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Essays on Decentralization and Pathways to Development

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Dedicated to the memories of my father...

ABSTRACT OF THE DISSERTATION

Essays on Decentralization and Pathways to Development

by

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Decentralization has dramatically altered governance in developing countries. However, the empirical evidence regarding its effects on the provision of public goods has been limited and ambiguous. In the first chapter I argue that this ambiguity stems from insufficiently disentangling partial from full decentralization. I differentiate between these two types by comparing administrative decentralization, political decentralization, and their complementarities in Indonesia. The paper employs a unique Indonesian panel of village level outcomes and a difference-in-differences estimation strategy with village level fixed effects. I show that use of a naïve specification that only considers political or administrative decentralization as separate treatments while neglecting their complementarities leads to an omitted variable bias problem. Results from a more complete specification suggest that districts that were treated with both types of decentralization, i.e. full decentralization, display significantly greater provision of public goods compared to those that experienced partial decentralization in the form of only political or administrative decentralization.

The second chapter of this thesis contributes to a related literature. It focuses on the causal effect of occupational transitions on consumption changes and poverty. Recent research has pointed out that sectoral transitions from the agricultural to the non-agricultural sector could be a successful pathway out of poverty due to higher productivity in the non-agricultural sector. But these studies face several limitations, such as the use of cross sectional or short panel data. We address some of these gaps and introduce two novel ways of defining sectoral transitions. Each of these definitions is used to exploit a fixed effects and an instrumental variable strategy with long run panel data on Indonesian households. Under both strategies we find that consumption growth is conditional on initial economic status and the nature of the transition—the growth was relatively higher only for those households who were either poor and agricultural in the baseline, or non-poor and non-agricultural. In terms of poverty, we find longer non-agricultural employment resulted in a positive probability of exiting poverty and a negative probability of becoming poor. Based on these findings we propose that pro-poor policies must be tailored to the agricultural or non-agricultural status of a household.

The third chapter is a natural extension of the first one. In this chapter I test whether individual outcomes associated with publicly provided goods, such as schools and health-centers, depend on decentralization complementarities. Based on three different datasets I conclude that individual welfare outcomes were significantly better for those belonging to fully decentralized districts compared to those in partially decentralized districts.

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CHAPTER 1

Public Goods Provision Under Partial Versus Full Decentralization in Indonesia

1.1 Introduction

Decentralization has been an important component to many reforms of developing-country governance, yet remarkably little is known about its effects on the provision of public goods. There are two opposing schools of thought. The first holds decentralization to be welfare increasing because it enhances accountability and facilitates the flow of information between the public and the relevant authorities. This can lead to responsive and efficient local governments and reduced social and political tensions (Bardhan, 2002; Faguet, 2014). Alternatively, decentralization may reduce welfare due to excessive rent-seeking, elite capture, overspending, scale inefficiency and degraded quality of public goods (Prud'homme, 1994). There is no consensus on which school of thought is correct. It

is an unresolved empirical question. The effects should depend on the inter-linkages between local and federal government, and on the institutions that define principal-agent relations (Mookherjee, 2015).

I argue that the ambiguity in the current literature is a result of a failure to differentiate "partial" from "full" decentralization. The former relates to having just one type of decentralization – administrative, political or fiscal – while the latter involves a combination of two or more. In most empirical studies, decentralization of a particular type is generalized as "complete decentralization". One type of decentralization can differ from another because of the differences in their associated characteristics such as *accountability* or *efficiency*. Treating all types of decentralization as the same confounds their specificities. Moreover, neglecting their complementarities could result in an omitted variable bias problem. For instance, an economy that is decentralized with *efficiency* enhancing institutions would perform differently if it is also decentralized with institutions that improve *accountability*.

The theoretical literature generally classifies decentralization as administrative, political or fiscal (Rondinelli, 1981; Treisman, 2007). "Administrative decentralization" refers to appointing or indirectly electing local officials for implementing centrally designed policies. "Political decentralization" makes local officials accountable to their citizens through direct elections with independent decision making authority in designing and/or implementing policies. Finally, "fiscal decentralization" involves delegation of public expenditure and/or revenue related responsibilities to local officials. Identification of these different types of decentralization and their complementarities may have important implications for accurate estimation. In this paper, I address the identification problem by differentiating between partial decentralization, i.e. just political or just administrative decentralization, and full decentralization resulting from the complementarities between the two under universal fiscal decentralization across Indonesian districts.

Indonesia provides an ideal setting for a comparative analysis of different types of decentralization and their complementarities. After the fall of Suharto's authoritarian regime, various decentralization and democratization reforms were implemented throughout Indonesia. The identification strategy used in this paper exploits the timing of these district level administrative and political decentralization processes. In this context, administrative decentralization refers to the gradual splitting of districts, which led to an increase in indirectly elected district heads until the introduction of direct elections in 2005. Political decentralization refers to the direct elections of district heads, which occurred as the terms of the existing, indirectly elected, district heads ended. Owing to these developments, there were four different types of districts by 2008: those that had split; those that had elections; those that split and had an election; and those that had none of the above.

Most of the empirical literature on decentralization measures public goods only at a macroeconomic level which fails to capture heterogeneous treatment effects within decentralized units. I use village level outcomes to overcome these limitations. Using a census of Indonesian villages, called PODES, I have constructed a unique panel of about 94% of the villages observed in the baseline. This permits me to employ a more robust specification of difference-in-differences with villages fixed effects.

The specific questions addressed in this study are:

1. Does decentralization affect the provision of public goods?

2. Do these effects depend on the complementarities between different types of decentralization?

3. Does a failure to account for such complementarities result in an omitted variable bias problem?

This paper presents two sets of findings. The first shows that administrative decentralization (district splitting) results in greater provision of public goods than those observed from political decentralization (elections). The second set of findings, which is a unique contribution of this paper,

relates to the complementary effects between the two types of decentralization. Specifically, the provisions of all village level public goods show significant improvements in districts that experienced both a split and an election. These effects are larger in magnitude and significance compared to those observed for villages in districts that faced only a split or an election or no decentralization at all. This finding has strong implications for existing studies focusing only on one type of decentralization while ignoring their joint effects. The districts having more fiscal resources (due to splitting) and higher accountability (due to direct elections) are likely to perform better than the districts treated with just one of these changes. These results hold over a longer period as well, using PODES-2011 instead of PODES-2008.

I further extend my analysis to account for the intensity of administrative decentralization. After the original districts were split, population and land area were unevenly divided between districts. Assuming an inverse relationship between the size of a constituency and the ease of governance, I assign a higher intensity of treatment to the new districts with smaller populations or land area. I find that higher intensity of treatment, i.e. a smaller population or land area, brings greater improvements to welfare.

In order to understand the channels for these positive effects, I provide suggestive evidence in terms of changes in governance quality. Specifically, I show that although two different groups of split districts faced similar increases in revenue, developmental expenditures increased only for those which faced an additional increase in accountability via direct elections. In other words, in districts without accountability the additional revenues due to splitting were funneled into administrative costs indicative of corruption in the absence of accountability.

This paper is organized as follows. The next section discusses the existing decentralization literature. This is followed by a conceptual discussion of partial and full decentralization in the third section. The political economy of Indonesian decentralization is discussed in the fourth section. In

the fifth section I describe the background for the empirical study by discussing the treatment, the data, the empirical model and tests of parallel trends. I present results in the sixth section, while the seventh section concludes.

1.2 Understanding Decentralization: A Literature Review

The process of decentralization involves the formation of a system of nested self-governments characterized by transparency, accountability, competition, participation and cooperation (Faguet, 2014). According to the World Bank decentralization is defined as "the transfer of authority and responsibility for public functions from the central government to intermediate and local governments or quasi-independent government organizations and/or the private sector." Note that, decentralization itself does not imply democracy; however, it can play an important role in deepening democracy and improving governance (Weingast, 2014).

Scholars consider decentralization to be one of the most consequential reforms in recent decades (Faguet, 2014; Rodden, 2006). Due to its multifaceted nature, the study of decentralization has been addressed in many different ways. None of these approaches are mutually exclusive; they differ in terms of how they compartmentalize different aspects of decentralization. I discuss three well-known approaches below.

One approach strives to understand the different implications of decentralization in a developed versus developing country. In the case of developed economies, the theories relating to first generation of fiscal federalism by Tiebout (1956) and Oates (1972) are well-suited. These theories focus on efficiencies and inefficiencies of decentralization with an assumption of a benevolent social planner and of voters' ability to reveal their preferences – by voting with their feet – for local public goods. But these assumptions do not hold in developing countries where political and fiscal incentives to cheat could threaten the stability of a federal system. The second generation theories move away from

those of the first generation by focusing on issues of political economy and corruption (Bardhan, 2002; Mookherjee, 2015; Weingast, 2014). To this end, the second generation of fiscal federalism models the behavior of self-interested political agents functioning in an imperfect institutional environment. Such models allow for the possibility of elite capture, corruption and clientelism.

In a second approach to the study of decentralization, Faguet (2014) distinguishes between policy-relevant[1] and governance outcomes[2], identifying the latter as more important than the former. The significance of outcomes related to governance is reflected in the manifestos of countries who seek decentralization as a means to increase participation and involvement of citizens in local governance.

A final approach to the study of decentralization involves classifying the various types of decentralization as administrative, political or fiscal (Ribot, 2002; Treisman, 2007). These different types of decentralization characterize prevailing governance institutions. Whether a country is decentralized into one or more than one type would define the ensuing structure and quality of governance. My paper relates to this approach of understanding decentralization and its effects. Below, I discuss these three types of decentralization and related empirical research.

Administrative decentralization

Administrative decentralization refers to the transfer of administrative responsibilities to local authorities for implementing programs and policies designed at a central level. It is considered to be one of the weakest forms of decentralization because local officials are accountable to the central government only, and have minimal decision making authority. Many countries have found it convenient to first adopt administrative decentralization before further delegating decision making authority. For example, the Indonesian government had identified districts as administrative units in the 1950s, but these districts were not given fiscal powers until 2001.

[1] Examples include accountability, responsiveness, use of power, political stability, and political competition.
[2] Examples of policy relevant outcomes include the provision of public goods and services and more equitable budgets across regions.

Empirical studies of administrative decentralization mostly focus on the devolution of responsibilities for the provision of public services such as health, sanitation and education. These studies have shown positive welfare effects from increased efficiency of service delivery (Alderman, 1998; Coady, 2001), better informed local officials (Carneiro et al., 2015; Azfar et al., 2001) and community participation (Galasso et al., 2001; Wade, 1997). In the Indonesian case, Burgess et al. (2011) have shown that the splitting of Indonesian districts led to increased deforestation.

Political decentralization

Political decentralization enhances local accountability, and when local officials are able to make expenditure decisions, it can ensure tailor-made policies for locally homogenous groups (Wallis and Oates, 1988). On the one hand, moving from a centralized state to a politically decentralized one re-orients local officials' incentives from following the central government directives to fulfilling local citizens' needs. On the other hand, local government can be susceptible to capture by powerful local elites, which often fails to increase accountability (Bardhan and Mookherjee, 2006). Political decentralization is the strongest form of decentralization because the agents – local authorities – are directly accountable to their principals – local voters. A famous case of political decentralization occurred in India, where during the 1990s elections were constitutionally formalized and made compulsory for village level governments, known as *gram panchayat*. Many empirical studies have shown positive and significant welfare effects from reforms related to village level elections (Foster and Rosenzweig, 2001; Anderson et al., 2012; Chattopadhyay and Duflo, 2004).

There are two kinds of studies related to political decentralization in Indonesia. One group focuses on intermediate outcomes, such as public expenditure, while the other group has considered public good outcomes related to health and education. Martinez-Bravo (2014) has shown that appointed village heads, inherited from the Suharto-regime, led to greater electoral fraud and clientelistic spending compared to newly elected village heads because of different incentive structures. Sjahrir

et al. (2014), while analyzing the determinants of excessive administrative spending, show that the proliferation of districts did not lead to increased administrative spending, and that direct elections did not have a role in curtailing waste. Skoufias et al. (2011) and Mukherjee (2014) use district level data to study the effects of district elections on various education and health related outcomes. While the former finds no effect of elections on such outcomes, the latter finds an increase in the number of public doctors, health workers and public teachers.

In contrast to the above studies, my research shows that there is a joint effect of administrative and political decentralization, which is hidden when they are analyzed separately.

Fiscal decentralization

Fiscal decentralization is a mix of the other two, whereby public revenue/expenditure related powers are given to local authorities. Most of the decentralization literature has focused on estimating the impact of fiscal decentralization at a macroeconomic level. The relationship between fiscal decentralization and economic growth is ambiguous. For example, in the case of OECD countries, Thornton (2007) does not find any significant relationship between fiscal decentralization and economic growth. Using the same sample of OECD countries but including controls for political and administrative decentralization, RodrÃŋguez-Pose and Ezcurra (2011) conclude that fiscal decentralization has a significantly negative effect on economic growth. Conversely, Iimi (2005) uses an instrumental variables technique to find that fiscal decentralization positively affects economic growth in a sample of 51 countries. A major limitation with these cross-country studies is that they do not account for within-country variation.

In the case of Indonesia, Pal and Roy (2015) conduct a before and after comparison to show the effects of universal district level fiscal decentralization on grassroots politics and local development. They argue that communities with homogenous socio-cultural characteristics experienced a change in leader selection methods that contributed to a positive impact on local development.

1.3 Partial and Full Decentralization: A Conceptual Discussion

The notion of complementarities among different types of decentralization is clarified with the following example. Consider a developing country with a centralized government and communities of different sizes and heterogeneous preferences for public goods.[3] According to the first generation federalism literature (Tiebout, 1956; Oates, 1972), administrative decentralization – i.e. appointing local officials for each heterogeneous group – will ensure efficient resource allocation in this country. But when local officials are centrally appointed, there might arise what I call a *double principal-agent (P-A)* problem due to political economy issues like corruption. In the first *double P-A* problem central government is the principal who provides contracts to local officials. In this case, if the central government desires high effort from local officials, monitoring costs can be high due to the distance between them. In the other *double P-A* problem citizens are the principal and the central government is the agent. Citizens must incentivize the central government, through voting and other means, to monitor local officials. However, it can be costly for heterogeneous citizens to coordinate and punish the ruling central government for their weak monitoring. So, both P-A problems jointly reduce the incentives for local officials to maximizing community welfare.

In such a society where administrative decentralization might fail due to corruption, a feasible mechanism to ensure high effort from local officials is through political decentralization in the form of locally held direct elections. The gains from administrative decentralization would be reaped fully only if it is complemented with the elements of political decentralization. The Indonesian case parallels this example, albeit under a universal fiscal decentralization. On the one hand, implementing only administrative decentralization in some districts increased resources at the disposal of local public officials but without any change in accountability. On the other hand, treating some of the

[3] This is an accurate description of the Indonesian case.

districts with only political decentralization increased accountability but not resources. In contrast, a synergy results in increased administrative efficiency and greater accountability when both types were implemented simultaneously.

1.4 Political Economy of Decentralization in Indonesia

In this paper I hypothesize that the joint effect – or synergy – of different types of decentralization should have a stronger effect than the impact of just one type of decentralization by itself. In the Indonesian context, the effect is likely to be positive due to the characteristics of the country's political economy and geography. In particular, regional heterogeneity, enhanced competition, need-based revenue sharing systems, and a balance of power between central and local governments all suggest positive effects from decentralization and its synergies. I discuss these below.

According to Oates (1972), decentralization is a preferred option if differences across regions are large and spillovers are small. Such a situation applies to Indonesia. The country is geographically heterogeneous, and is the world's largest archipelagic state with more than 17000 islands. Most of the country is unevenly covered in forests. The role of such heterogeneity in the Indonesian process of decentralization has been previously described by Fitrani et al. (2005). The authors argue that the splitting of districts was conditional upon characteristics such as geographical dispersion, political and ethnic diversity, and natural resource wealth, among others. Such heterogeneity reduces the possibility of spillovers in the provision of many public goods. Also, under such circumstances it would be efficient to have local governments provide public goods so that they may be tailored to local preferences.

A key role of decentralization is to enhance competition among local governments to attract mobile resources. According to Myerson (2014), competition should motivate politicians to offer better public services at a lower corruption price. Burgess et al. (2011) have shown increased competition

due to splitting, although it was in the form of increased illegal deforestation and reduced timber prices. However, splitting coupled with elections could have changed the form of competition in order to render positive welfare effects. This argument resembles Faguet (2014)'s point that "[s]ubjecting public office to elections is what changes the incentives politicians throughout a system face when that system is decentralized. Electionless decentralization does not have the same effect." Other signs of efficient/healthy competition come from Martinez-Bravo and Mukherjee (2015) who have shown that districts which had an appointed district head for a longer period displayed greater levels of corruption.

A third characteristic of Indonesian decentralization is related to the problems in achieving federal stability. According to Riker (1964) there are two forces that work to prevent federal stability: *centripetal forces*, whereby local governments survive at the mercy of a central government; and *fissiparous forces*, whereby the central government depends on local governments to remain in power. Under both forces it is difficult to maintain federal stability, but one solution to achieve stability is to have a balance of power. According to Faguet and Poschl (2015), "higher level governments are better at redistribution and stabilization and hence should levy broader-based taxes; but lower-level governments are better at eliciting preference and time-and-place information, and hence should have significant expenditure responsibility." There seems to be a similar balance of responsibilities between the central government and local governments in Indonesia. This balance of power is discussed further below.

Indonesian law bestows fiscal expenditure making powers to districts in areas such as education and healthcare, while the central government retains responsibility for national policies, such as national defense and foreign relations. This way of separating responsibilities goes hand-in-hand with Montesquieu et al. (1900)'s idea that multi-tier institutions can have advantages of both large and small size. Similarly, the power to raise revenue is largely confined to the central government; this parallels Weingast (2014)'s idea of the *limit condition* on the local elected representatives, in

terms of powers given to them, for the success of a decentralized democracy. Lastly, the post-Suharto regime moved the country to a multi-party system at the national and local levels, creating incentives for parties to move in both upward (central) and downward (local) directions.

Finally, Indonesian decentralization does not seem to be affected by the problem of *tragic brilliance*, which is defined by Weingast (2014) as the central government's efforts to influence election outcomes at local levels through centralized policies and taxation authority. In essence, *tragic brilliance* forces citizens to vote for local candidates supported by the party in control of the central government. In Indonesia, however, the election of district heads did not depend on the central government's discretionary fiscal authority. And while local governments did not have revenue raising powers, revenue sharing by the central government was need based and depended on factors such as the human development index, district area, and population (Eckardt and Shah, 2006).

1.5 Decentralization in Indonesia: Background, Data, Empirical Strategy and Identification

1.5.1 Background

The legacy of the existing structure of government in Indonesia dates back to the early 20th century. Districts and municipalities were formed in order to carry out administrative tasks. After colonial rule, the country oscillated between varying degrees of centralization until settling on the "guided democracy" of Sukarno, the first president of Indonesia. Sukarno ruled as an authoritarian until 1967; afterwards, the authoritarian rule continued in a different garb, popularly known as the "new order" regime, under President Suharto for another thirty one years, until 1998.

After the fall of Suharto's authoritarian regime in May 1998, Indonesia adopted various "big bang" decentralization reforms. These reforms affected all five tiers of the Indonesian government structure

(Figure 1.1). The power to govern was largely shared between central and district governments.[4] The transfer of power to district governments during 2000-2009 involved major reforms which can be categorized as fiscal, administrative and political decentralization, with the latter two comprising the treatments considered in this paper. I discuss these reforms below.

Fiscal decentralization (autonomous expenditure making power for districts)

With the benchmark laws of 1999 and 2004 (Law 22/1999 & 32/2004) district governments were given full autonomy to "govern and administer the interests of the local people" across about fifteen areas while the central government retained responsibility over five national level functions (foreign relations, national defense, legislations, macroeconomic policies and religious affairs). District governments were responsible for forming policies and making expenditure decisions in areas such as health, education, local infrastructure, public order and peace. Although district governments did not have the authority to collect major taxes, they were entitled to shares of central government revenue in the form of general allocation grants (DAU), taxes, special allocation grants (DAK) and natural resource revenue. This resulted in a doubling of per capita revenue for districts between 2000 and 2010. While district level policy decisions were made by a local assemblies and district head, the district heads generally had more power over decision making.

Fiscal decentralization was universal, and so it is not considered as a separate treatment in this paper since there is no variation across districts. Yet there are a few important takeaways from this reform. Revenue shares for districts increased due to these reforms, and district heads gained the power to influence spending. But until 2003 their appointment was contingent upon local assemblies, which were comprised of multiple parties. This arrangement may have led to collusion between the assemblies and district heads.

[4] Note that I refer districts for both *Kabupaten* and *Kota*. The former is more rural while the latter is more urban.

Administrative decentralization (the splitting of districts)

Administrative decentralization refers to the proliferation of districts and indirectly elected district heads. The number of districts increased from less than 300 in the year 2000 to about 500 in 2007 (Figure 1.2).[5] The formation of a new district also led to the formation of a new capital, a new assembly, and additional administrative staff. Some of the reasons for splitting as proposed by Fitrani et al. (2005) included geographic dispersion, political and ethnic diversity, natural resources and scope for bureaucratic rent seeking. However, there were no specific rules for splitting, and administrative delays often made it difficult for many districts to directly influence the process and the timing of a split.

In this paper, I define the proliferation of district heads as "administrative decentralization", which is slightly different from the commonly used definition. Administrative decentralization is defined as the increase in centrally appointed local officials subordinated to a central government. However, between 1999 and 2003 district heads in Indonesia were appointed by locally elected assemblies (not the central government), which were comprised of multiple parties. Nevertheless, the notion used here is similar as the district heads were not downwardly accountable to their citizens. Moreover, the district head's appointment depended on a group of elected representatives. Thus the only difference between this case and the canonical definition is that Indonesian district heads were appointed by the local, not central government, authorities.

The splitting of districts took place in sub-periods: 2001 to 2003 and 2007 to 2009. There was a moratorium on splitting from 2004 to 2006, which coincided with direct elections for district heads. One of the identification strategies used in this paper, drawn from Burgess et al. (2011) and Bazzi and Gudgeon (2015b), will exploit this moratorium on splitting.

[5] Some of the districts were split during 1999-2000 as a pilot, however, they were not given autonomous power until 2001. Hence I consider them as having split in 2001. Also, it took at least one year before the newly created districts could operate by themselves; hence, I consider the districts that split in 2007 as part of control group.

Political decentralization (direct election of district heads)

The first ever democratic parliamentary elections were held in 1999, in order to elect central and district assemblies (Figure 1.3).[6] These elections happen every five years in which multiple parties are allowed to compete. Between 1999 and 2004 legislatures of elected district assemblies appointed district heads when the terms of the existing, centrally appointed, district heads ended.[7] Since these heads were appointed by local legislatures, they did not generally have enough power to make independent decisions. Furthermore, there were possibilities of collusion between the two bodies for advancing their mutual self-interests. To address these issues, a new law was introduced in 2004, stipulating that from 2005 onwards district heads were to be chosen through direct elections once the terms of the existing, indirectly elected, district heads ended. The timing of these elections was random since the term of an existing district head was historically path dependent. These elections had two implications for governance at the district level. First, district heads became accountable to their citizens, and their term no longer depended on legislatures. Second, they were vested with substantial fiscal powers through fiscal decentralization.

To summarize, between 2000 and 2008 there were four sets of districts based on governance structure: those that split; those that had elections; those that split and had an election; and those that had none of the above. Moreover, both the splitting and the elections occurred over time.

1.5.2 Data

Data on splitting and elections

Data on the timing and location of district splitting comes from the Central Bureau of Statistics (BPS) in Indonesia. I treat new districts as well as their original counterparts as split districts. I

[6] Although provinces (equivalent to a state in many countries) are another hierarchical level between central government and districts, they mainly have a coordinative role between districts and the central government. Autonomy to govern, as in decision making powers over various public policy issues, rests with district heads. See Figure 1.1.

[7] Usually, a district head's term is five years. Before the 1999 elections, district heads were appointed by the Ministry of Home Affairs.

obtained information on election dates from Burgess et al. (2011).[8] This dataset contains information on the end of terms for the last indirectly elected district head, as well as the timing of the first direct elections.

Village level data

I obtain village level outcomes from the 2000, 2008 and 2011 waves of the Indonesian Village Potential Statistics (PODES). This village census survey contains socio-economic information from more than 68,000 villages, and includes data on schools, health centers, electricity, roads, markets and industries. The survey is conducted once every three years. A limitation of this data is that it is not a panel. I therefore use the names of villages, sub-districts, districts and codes of districts and provinces to create a unique panel, containing 92% of the villages in the baseline. Table A1.1 describes the sample that was created for the analysis. Out of 68,783 villages in the baseline, I was unable to match 5,365 villages between 2000 and 2008. A comparison of the included and lost villages is presented in Table A1.2. Both the samples have similar means across all the parameters, except for villages in plain regions and proportion of agricultural households.[9]

The outcomes that I focus on at the village level broadly fall under the category of public goods and services for which district governments were directly responsible. These outcomes include education, health, infrastructure and public order. The educational outcomes include the number of public junior high schools and the distance to a private or public junior high school.[10] Indicators for health related resources include the availability and distance measures for community health centers (*puskesmas*) which are exclusively financed by district governments. The availability of doctors is also used to proxy for health related resources.[11] Infrastructure is measured by the availability of

[8] I am grateful to Benjamin Olken at MIT for generously sharing this data.
[9] I don't include Jakarta in the analysis because districts in Jakarta are not autonomous. I also don't include Maluku and Irian Jaya provinces in the analysis due to frequent conflicts and political instability.
[10] I focus only on junior high school because primary education was almost universal in Indonesia before decentralization, and senior secondary education was usually funded by provinces.
[11] There is no information on whether doctors are public or private, but a major portion of local government expenditure was directed towards hiring personnel which included teachers and doctors (Mukherjee, 2014).

wide roads, street lights, and the share of households with electricity. For public order, I use the availability and distance to police stations.

1.5.3 Summary statistics

Table 1.1 presents summary statistics for the three treatment groups – villages in a district that faced a split, faced an election, or had both a split and an election. This table also includes summary statistics for the control group of villages. The majority of the villages are rural across all groups, although the rural share is slightly higher for the districts that were treated with both a split and an election. Consequently, we see a slightly higher proportion of agricultural households in villages that belonged to districts treated with both a split and an election. However, the proportion of agricultural land is similar across all groups. The geography and topography of the villages are similar as well, with most of the villages located in inland plain regions. The proportion of male and female voters is the same. The number of industrial units, mosques and primary schools are reported per 1000 individuals. All of these variables show similar average values across the treatment and control groups.

1.5.4 Empirical strategy

Binary treatment

In order to estimate the effects of different types of decentralization and their synergies I use the following difference-in-differences estimation strategy with village level fixed effects:

$$\begin{aligned} Y_{idt} = \alpha_i + \beta_1 Post_t + \beta_2 (Election * Post)_{dt} + \beta_3 (Split * Post)_{dt} + \\ \beta_4 (Split * Election * Post)_{dt} + \epsilon_{idt} \end{aligned} \tag{1.1}$$

Y_{idt} represents outcomes for village i in district d at time t. The variables *Post*, *Election* and *Split* are dummies for year, election and split respectively for each district d. β_1 is a dummy for

the follow-up period, and β_2, β_3 and β_4 capture the effect of having only an election, only a split and both respectively. Village fixed effects absorb the village specific time invariant unobservables, including the treatment group effects. The inclusion of village fixed effects makes this specification stronger than the usual difference-in-differences estimation strategy by relaxing the assumption of uncorrelated fixed characteristics and unobservables. Examples of time invariant unobservables that are not necessarily common across all individual units within a treated group could include characteristics related to geographical or political boundaries. For instance, a proportion of villages within a district could be located in resource rich regions which could be correlated with the treatments as well as the outcomes.

Due to the nature of the topic under study, there are considerable restrictions on the number of controls that can be used. Because time invariant controls are captured by the village fixed effects, whereas time varying characteristics would be endogenous to decentralization. For example, urbanization of a rural village could depend on its distance to the newly created district headquarter which is a result of splitting of districts.

I assume that the error terms are uncorrelated with the treatment, and I provide evidence for this through various identification tests in the next sub-section (see subsection 1.5.5). These tests are mainly used to identify the causal effects of a split and its interaction terms, since elections can be considered random due to the path dependence of their timing.

Intensity of treatment: duration, size and distance

Both splitting and elections were spread over time, meaning different districts faced decentralization at a different point in time. This implies that the districts that were decentralized earlier would have had greater governance experience compared to those who were decentralized at a later stage. To exploit variation in the length of time since a district was decentralized, the following specification was used.

$$Y_{idt} = \alpha_i + \beta_1 Post_t + \beta_2(Election\_months * Post)_{dt} + \beta_3(Split\_months * Post)_{dt} + \beta_4((Split * Election)\_months * Post)_{dt} + \epsilon_{idt} \quad (1.2)$$

This specification is similar to specification 1.1. The difference is that now the treatments are in terms of number of months since decentralization. Moreover, for the follow-up period PODES-2011 has been used instead of PODES-2008 because the differential welfare effects from the timing of decentralization should be greater in the medium term rather than the short term.

There were other heterogeneities in the intensity of treatment due to the splitting of districts. Two of the three heterogeneities are at district level while the third is at village level. The first two heterogeneities are differences in district population size and district land area in the post-splitting period. The third heterogeneity, the distance to a district headquarter, was a direct result of the formation of a new district. For such heterogeneities in treatment due to the nature of splitting, I estimate the following specification.

$$Y_{idt} = \alpha_i + \beta_1 Post_t + \beta_2(Election * Post)_{dt} + \beta_3(Intensity * Post)_{dt} + \beta_4(Intensity * Election * Post)_{dt} + \epsilon_{idt} \quad (1.3)$$

The only difference between specifications 1.1 and 1.3 is that the former had dummies for treatment, whereas in the latter specification *Split* has been replaced with *Intensity*. These heterogeneous intensity of treatments are captured using the following formulae.

1. Heterogeneity in population (post-split)

$$Change\ in\ population\ share = 1 - \frac{Population\ post\text{-}split}{Population\ pre\text{-}split}$$

2. Heterogeneity in land size (post-split)

$$Change\ in\ land\ size\ = 1 - \frac{Land\ size\ post\text{-}split}{Land\ size\ pre\text{-}split}$$

3. Heterogeneity in distance to district HQ (post-split)

$$\%\ change\ in\ dist.\ = ln(Dist.\ to\ district\ HQ\ pre\text{-}split) - ln(Dist.\ to\ district\ HQ\ post\text{-}split)$$

In the first two cases, consider a district with an original population size (or area) of 100. After splitting, for instance, district A gets 70 percent of the population and district B gets 30 percent. Since a smaller population would imply better administrative efficiency, I assign a treatment of 0.30 to district A and a treatment of 0.70 to district B. The same applies to land area. Hence, a lower share of the original population, or of the original area, in the post period is considered to be a greater intensity of treatment. Both population and land area intensities are created using baseline data. Lastly, the change in distance to a district headquarter is calculated using the logarithmic difference in a village's distance to the HQ before and after the split.

1.5.5 Identification

District splitting was not random. In this section, I discuss various tests to confirm that this poses minimal threats to the identification strategy. First, Figure 1.5 shows that the three treatment groups and the control group were following similar trends across various public goods in the pre-treatment period. All of these outcomes are roughly parallel implying an absence of any differential trend in the pre-treatment period, and confirming that the treatments are uncorrelated with the random error. Table 1.2 provides a test for this claim by estimating equation 1.1 for all the outcomes. It shows regression results for district level outcomes assuming that the treatment happened between 1996 and 2000. In this regression I assigned fake treatments in the pre-treatment period to the three treatment groups that faced only a split or only an election or faced both a split and an election. All the coefficients are insignificant, which is essentially a test of significance for the parallel trends plotted in Figure 1.5.[12]

[12] For parallel trends analysis in Figure 1.5 and Table 1.2, I use INDO-DAPOER data from the World Bank for the years 1996 and 2000.

In an alternative identification test I assign a fake split to the districts that did not divide during the period under analysis, but did divide after 2007. However, the election treatment was accurately assigned. Unlike in the previous case, the outcomes are at a village level and the years 2000 and 2008 correspond to the baseline and the end-line respectively. The results of this identification test are presented in Table 1.3. The coefficients on the variable of interest, i.e. the interaction between "fake split" and elections, are not as robustly significant as they are for the main results below. There is a significant positive change at the 5% level of significance for the dummy on health centers and for the proportion of households with electricity, and at the 10% level of significance for the police station dummy. These effects could be due to the treatment of elections or could be out of pure chance but not due to a fake split treatment. Such irregularities in significant effects suggest that the actual treatments were uncorrelated with unobservables.

I also conduct a falsification test using those public goods as outcomes for which district governments were not responsible, such as hospitals and primary schools. Since decentralization was not intended to affect these outcomes, this test should not find any relationship between them. According to Table 1.4 almost all the coefficients are insignificant, particularly the ones associated with the treatment of both elections and a split. This further strengthens the claim that the main results of this paper are indeed causal and unaffected by some unidentified relationship.

1.6 Results

Binary Treatment

The main results are presented in Table 1.5 through 1.7 for various village level outcomes in the years 2000 and 2008. In these tables each outcome is estimated using three separate models. The first two columns are based on naïve specifications that consider a split or an election as separate treatments. The third column uses the robust specification 1.1 that has only a split, only an election

and their interaction as treatments. A comparison between the first two columns and the third column indicates whether the synergy between two separate decentralization types has a stronger effect compared to just one type.

Table 1.5 shows that the availability of community health centers, doctors, and the number of junior high schools per 1000 people all increased as a result of decentralization. Specifically, in the districts that were treated with an election as well as a split, the proportion of villages having a health center or a doctor rose by about 3-4 percentage points which is roughly a 25 percent increase in the baseline proportion of villages. The number schools per 1000 people increased by 50 percent compared to the mean.

Table 1.6 presents results for infrastructure related public goods. In terms of these outcomes as well the villages in the districts that experienced both a split and direct elections observed better provision of public goods compared to other villages. The villages in jointly treated districts witnessed the largest increase in the share of households with electricity. On average, they had about 7 percent more households with electricity which is 12 percent of the mean. Also, the proportion of jointly treated villages with wider roads increased by about 4 percentage points but with a marginal increase over the mean of 89 percent. The high initial level is likely due to the special focus on road improvements during the Suharto regime in the early 1990s (Gertler et al., 2016). The availability of street lights is not as precisely estimated as the other outcome variables. Note that the effect of decentralization is also not as big for this outcome. However, the proportion of villages with police stations increased by about 37% over the mean.

The availability of public goods does not offer much insight into the situation of those villages that did not experience an increase in these items. For this reason, Table 1.7 reports the impact of decentralization on distance to health centers, schools and police stations. These were the only variables for which distance measures were available in the data. The results for these measures

are consistent with those for the availability measures presented in Table 1.5 and 1.6. The average distance to health centers was reduced for the villages in the districts with both a split and an election by about 2.2 kilometers, or a reduction of about 25% over the mean distance. Distance to junior high schools was reduced by 35%, while distance to police stations was reduced by 16%. Thus, a treatment of administrative and political decentralization not only increased the availability of public goods, but their accessibility as well.

It would be interesting at this point to briefly highlight some results from the existing literature. The only comparable studies are by Skoufias et al. (2011) and Mukherjee (2014). Both use district level data to study the effects of elections on education and health related indicators. The former finds no effect while the latter finds an increase in the number of public doctors and health workers (at 1% significance), and the number of public school teachers (at 10% significance).

Medium term impacts

The results so far relate to outcomes in the period immediately following decentralization. A possible concern could be that these results are due to some dynamics driven by the process of decentralization itself, which might fade after a short period of time. In order to address such concerns, I have done a medium term analysis using PODES 2011 as the follow-up period rather than PODES 2008. In the medium term analysis, I did not modify the treatment and control groups despite the fact that between 2008 and 2011 some additional districts were treated. This is due to missing information on treatment after 2008. In any case, this permits comparing the results with the same set of districts that were treated in the short term, and it should lead to a downward bias since some villages in the control group might have been treated between 2008 and 2011. Table 1.8 presents the results estimated with specification 1.1. It is clear that the effects are largest for the districts that faced both a split and an election. Most of the estimates are similar to those from the shorter period of time.

The findings from short and medium terms have two important implications. One is that a greater degree of decentralization has stronger welfare effects. It is likely that the efficiency gains and increased per capita fiscal resources from administrative decentralization act in concert with the increases in accountability from political decentralization to result in higher levels of public welfare. The second implication is that studies that neglect the joint effects of decentralization may be affected by omitted variable bias.

Intensity of treatment

Table 1.9 shows the results of heterogeneity in the timing of treatment using specification 1.2, while the effects of heterogeneity in population size, land area and distance to district HQ due to splitting are presented in Table 1.10 through 1.12. The main argument of this paper, i.e. that synergies have stronger effects, continues to hold since the villages belonging to the districts that were treated with both an election and a split display significantly greater welfare improvements compared to the villages in the districts with just one type of decentralization, or no decentralization at all.

In terms of timing, on average there is a significantly positive advantage of having both an election and a split for one additional month (Table 1.9). For example, having both treatments for one more month is associated with an increase in the availability of junior high schools by 0.15 for a population of 100,000. Similarly, across all outcomes there is a positive effect from having the synergy of an election and a split for an additional month, although for police stations the effect is significant only at the 10.5% level.

Table 1.10 and 1.11 show the welfare effects from changes in population size and land area. In both the tables the effect of the synergy is almost always higher than the separate effect of a split or an election. In Table 1.10, a village in a district receiving a lower population share has a higher chance of getting a public good. For instance, a 20% lower population translates into a 20% higher treatment which leads to one percent additional villages getting a health center. The same holds

for the effect of a reduction in land area as per Table 1.11. Table 1.12 shows the intensity of treatment due to changes in a village's distance to a newly created district headquarters. Although the estimated coefficients are not all statistically significant, the signs are as expected; reducing the distance to the district headquarters leads to an increase in the availability of public goods.

Robustness check

The identification strategy used in this paper is simple and intuitive. However, as discussed in subsection 1.5.5 above, district splitting was not random. In that section, I presented various identification tests which strongly suggest that the results in this paper are not affected by non-randomness in splitting. As a final robustness check I also use the identification strategy of Burgess et al. (2011) and Bazzi and Gudgeon (2015b). This test exploits randomness in splitting over time. According to Figure 1.3, the splitting of districts was spread over two sub-periods with a moratorium on splitting during 2004-06. The districts that were about to be split in 2004 were delayed until 2007. I re-estimate specification 1.1 where the control group includes only the districts that were split in the post-moratorium period. Thus, the comparison now is only within the groups that split, while the other treatment, the election of district heads, stays random since it was historically path-dependent. The results are shown in Table 1.13. All of the key findings remain qualitatively unchanged.

On the quality of governance

It is difficult to obtain data on governance quality. I present some suggestive evidence on this aspect of the Indonesian decentralization in Table 1.14 and 1.15. The results in Table 1.14 are produced using specification 1.1. The district level yearly expenditure and revenue data come from the World Banks' INDO-DAPOER dataset, which is available from 2001 onwards. The outcome variables are defined as follows. For each district, I calculated the average yearly per capita expenditure and per capita revenue before and after their treatment period. So, if a district was treated

in 2006, the pre-treatment data is the average per capita expenditure from 2001 through 2005, and the post-treatment data is the same average from 2006 through 2008.[13] The newly formed districts were assigned the per capita values of their original district in their pre-split years.

The first four columns in Table 1.14 report expenditures in education, health, agriculture and administration as a proportion of revenue, and the last column reports the percentage change in revenue. Splitting caused an increase in district revenue by about 33-34% compared to the districts that were not split. For the districts that faced only elections there were no significant changes in their expenditure or revenue. But the districts that faced only a split and no election saw a significant increase in administrative expenditure only, and no significant change in areas such as education, health and agriculture. In fact, these districts saw a fall in educational expenditure. Comparing this with our group of interest, i.e. the districts that faced both elections and a split, development-related expenditure increased significantly in health and agriculture by about 1% of total revenue which is a one-third and one-fourth increase over the baseline averages respectively. There was no significant change in educational expenditure, but more interestingly, administrative expenditure also did not change despite an increase in revenue. So although the two different groups of split districts faced similar increases in revenue, development expenditure increased only in those districts that faced an increase in accountability via direct elections.

Table 1.15 presents an alternative analysis to understand changes in the quality of governance. The results in this table are based on PODES-2008 because similar data was not available in PODES-2000. Thus, these results are from a simple cross-sectional comparison across districts. PODES-2008 contains two relevant village-level questions to assess the differences in the quality of district governance. The first question asks whether a village received any assistance from the district government to carry out village level development, and the second asks the amount of the assistance that was received. Using this information, I ran a cross-sectional analysis to compare districts across

[13] Since there was no pre and post period for the control group, I chose 2005 as the cut-off year to divide their pre and post-period which falls in the middle of 2001-2008 period.

different treatment groups. As evident from the first column, there was no significant difference in the proportion of villages receiving any assistance from district government; about 91% of the villages were receiving some assistance. In terms of per capita revenue, however, the villages belonging to the districts that faced only a split received about 60% more revenue compared to the control group. But the villages belonging to the districts that faced both a split and an election received about 80% more revenue. So, the change in the amount of village assistance increased more in the districts treated with both types of decentralization further confirming better governance in such districts.

1.7 Conclusion

The empirical evidence on the effects of decentralization on the provision of public goods has been limited and ambiguous. In this paper I have argued that the ambiguity in the existing literature regarding the effects of decentralization is due to an inadequate characterization of the types of decentralization and their complementarities. To test this claim, I have utilized the case of multiple Indonesian reforms in the post-Suharto era because it is ideal for comparing the separate and the complementary effects of different types of decentralization.

The empirical investigation shows that administrative and political decentralization jointly have stronger positive effects compared to just one kind of decentralization or partial decentralization. The Indonesian districts that were treated with both types of decentralization observed the biggest gains of about 25 to 50 percent of the mean across various public goods. Moreover, within the treated districts, the ones that had higher intensity of treatment – in terms of duration, size and distance – exhibited stronger positive effects. I also compared the changes in district revenue and expenditure to explore governance quality as a possible channel through which decentralization affected public goods. The results show that despite a similar increase in revenue for the districts that were split, developmental expenditures increased by 25 to 30 percent in health and agriculture only for those that also had elections.

So, the studies that fail to account for interactions between different types of decentralization miss empirically important dimensions of their impacts and their relative importance. A specific dimension, explored in this paper, was the complementary effects of factors such as higher fiscal resources and improved targeting (due to splitting) as well as increased accountability (due to elections). With higher resources and improved targeting the provision of public goods become feasible and efficient while enhanced accountability work as an effective enforcement mechanism.

This paper primarily focuses on the change in the provision of public goods, but offers little insight about the beneficiaries of increased public goods. Future work using the Indonesian Family Life Survey will involve a household level analysis to study the effects of the synergies on the change in the consumption of public goods such as government schools and community health centers by heterogeneous groups of households. Such analysis will be helpful in further exploring the possibilities of elite capture, and whether synergies mitigate it.

Decentralization synergies appear in other developing countries as well providing fertile ground for further empirical investigation. In the case of India, public goods improved in administratively decentralized villages only when they gained elected bodies in the 1990s (Foster and Rosenzweig, 2001; Chattopadhyay and Duflo, 2004). However, in neighboring Pakistan, repeated decentralization efforts have failed because local governments were created by military regimes to help them sustain power, albeit in the absence of democratically elected local governments (Cheema et al., 2015). In Bolivia, one of the most successful decentralization cases, public investment patterns improved significantly due to multiple decentralization reforms such as an increase in the number of municipalities, devolution of fiscal powers and increased accountability through direct local elections (Faguet, 2004).

Such examples of the existence of complementarities, along with the empirical test in this paper, have strong implications for policymaking. In recent decades, numerous centrally sponsored pro-

grams in areas such as health and education have been decentralized at the local level in various countries. A lot of these reforms lack one or the other component of local governance, such as spending responsibilities, decision-making autonomy or accountability. While designing decentralization policies, policymakers must take a comprehensive approach of devolving powers and ensuring accountability following all the three types of decentralization – administrative, fiscal and political. If they fail to do so, partial decentralization may lead to incomplete realization of the benefits of their efforts due to the inefficient provision of public goods.

Tables and Figures

Background

Figure 1.1: The administrative structure of the Indonesian government, 2007

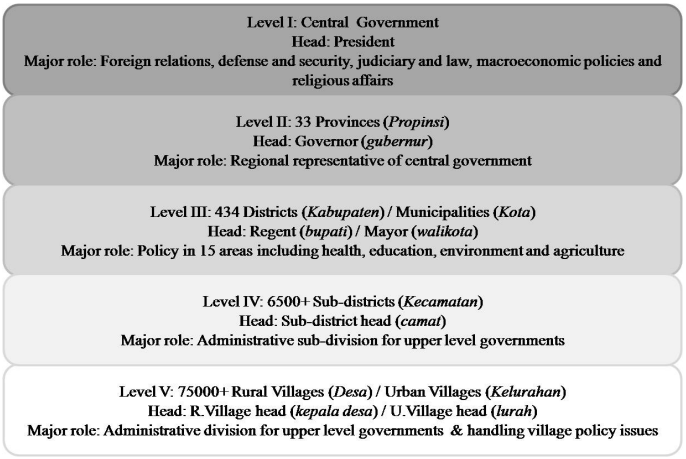


Figure 1.2: Evolution of number of districts/municipalities during 2001-07

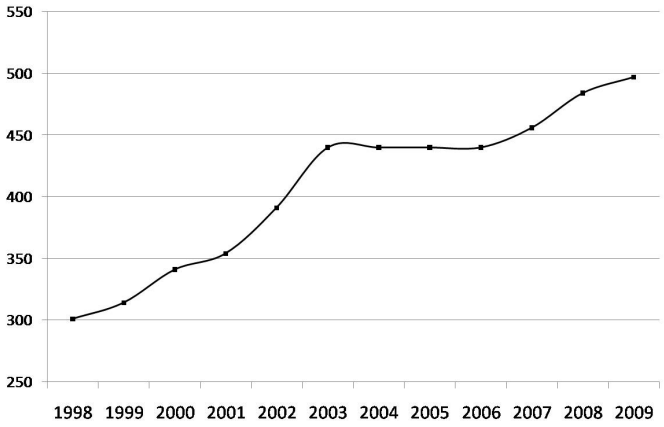


Figure 1.3: Timeline of decentralization process in Indonesia

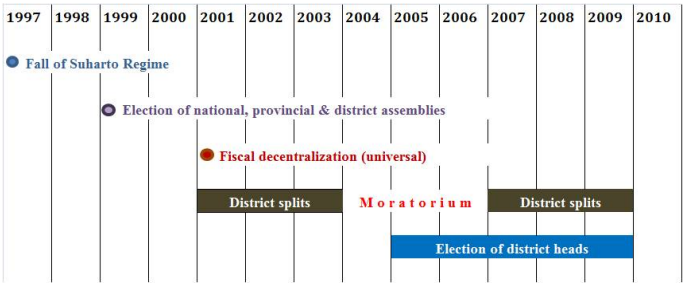


Figure 1.4: Districts that were treated with elections, splitting or both (as of 2007)

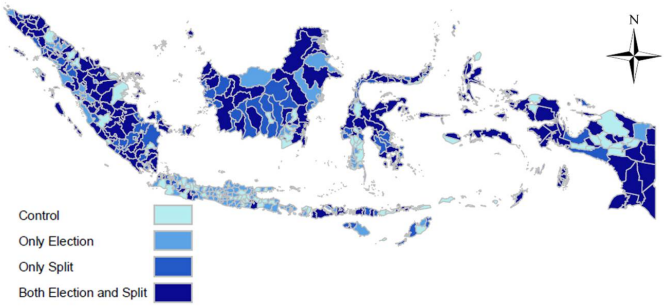
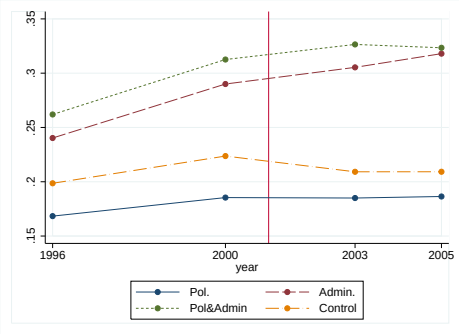
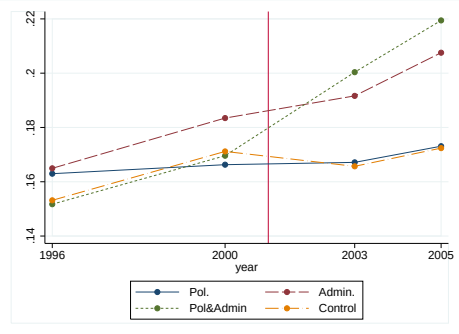


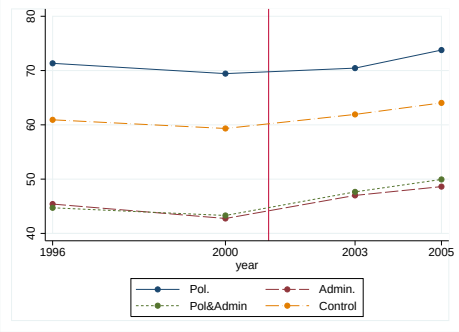
Figure 1.5: Parallel trends



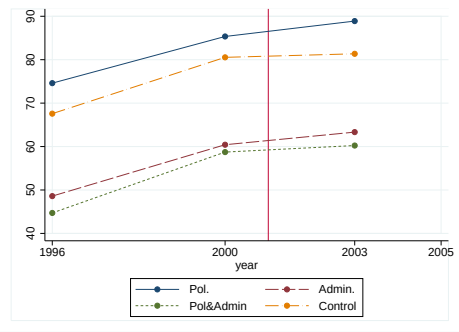
Healthcenters per 1000 individuals



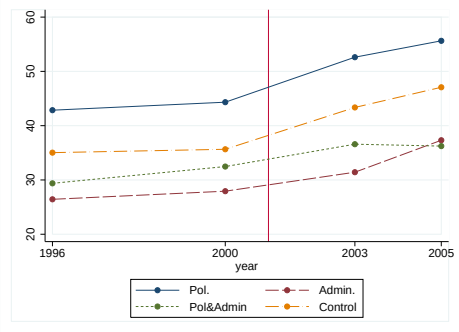
Number of schools per 1000 individuals



Mean of proportion of villages with asphalt roads in a district



Mean of proportion of households with electricity in a district



Mean of proportion of households with safe water in a district

District level INDO-DAPOER data by World Bank for the years 1996 and 2000 is used for these figures.

Table 1.1: Summary statistics for baseline (2000)

	(1) Control	(2) Split	(3) Election	(4) Both
Rural villages	0.71	0.69	0.75	0.86
	(0.45)	(0.46)	(0.43)	(0.35)
Villages in plain regions	0.76	0.76	0.75	0.73
	(0.42)	(0.43)	(0.43)	(0.45)
Villages next to water body	0.13	0.15	0.18	0.21
	(0.34)	(0.35)	(0.39)	(0.41)
Proportion of 1999 female voters	0.49	0.49	0.49	0.50
	(0.10)	(0.11)	(0.05)	(0.05)
Proportion of agri. HH	0.58	0.56	0.66	0.74
	(0.36)	(0.35)	(0.34)	(0.30)
Proportion of agri. land	0.58	0.58	0.58	0.59
	(0.31)	(0.31)	(0.32)	(0.30)
No. of food/leather industries	1.44	2.14	1.29	1.47
	(5.82)	(8.03)	(6.82)	(8.88)
No. of mosques	3.03	2.87	2.22	2.44
	(3.04)	(2.54)	(2.44)	(2.30)
No. of primary schools	0.98	0.95	1.15	1.17
	(0.65)	(0.55)	(0.84)	(0.90)
Observations	18740	17669	8961	14093

Means reported. Standard deviations are in parenthesis.

Number of industries, mosques and primary schools are for every 1000 individuals.

Weights are village population share within a district.

Table 1.2: Test for parallel trends in pre-treatment period

	Health-centers	Jr. secondary schools	Roads	Electricity	Water
Admin*Post	0.03*	0.00	0.10	0.16	1.55
	(0.02)	(0.01)	(2.09)	(2.90)	(2.01)
Pol*Post	-0.00	-0.01*	-0.64	-1.34	0.63
	(0.01)	(0.01)	(0.95)	(1.61)	(2.87)
Admin*Pol*Post	0.03	0.01	3.37	4.83	5.10
	(0.02)	(0.01)	(2.69)	(5.20)	(3.82)
N	526	526	526	526	526
R^2	0.23	0.11	0.05	0.57	0.07

*0.10 **0.05 ***0.01. District level INDO-DAPOER data by World Bank for the years 1996 and 2000 is used for this regression. Clustered standard errors at province level are in parentheses. Health-centers and Jr. secondary schools: number per '000 population, Roads: proportion of villages with asphalt roads, Electricity and Water: proportion of total households. Weights are district population share within a province.

Table 1.3: Test for parallel trends in post-treatment period

	(1) Health-centers	(2) Doctors	(3) Schools	(4) Roads	(5) Street lights	(6) Electricity	(7) Police stations
Admin*Post	-0.02**	-0.02	0.00	-0.04***	0.07***	0.08***	0.05***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Pol*Post	0.01	0.02*	-0.01**	-0.01***	0.00	0.01**	0.01
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
Admin*Pol*Post	0.04**	0.02	0.01	-0.01	-0.05*	0.03**	0.05*
	(0.02)	(0.03)	(0.01)	(0.01)	(0.03)	(0.02)	(0.03)
N	72,821	72,821	72,820	72,583	72,821	72,820	72,821
R^2	0.00	0.04	0.01	0.00	0.17	0.29	0.03

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 are used for this regression. Clustered standard errors at baseline district level are in parentheses. Here the split treatments are given to all those districts that have not yet split, but will split in future. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Street lights: dummy for street lights available in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. Weights are village population share within a district.

Table 1.4: Falsification test

	(1) Hospitals	(2) Primary schools	(3) Universities	(4) Places of worship
Admin*Post	-0.02*	-0.00	-0.01	0.13***
	(0.01)	(0.00)	(0.01)	(0.03)
Pol*Post	0.01*	-0.00	-0.00	0.10***
	(0.01)	(0.00)	(0.00)	(0.03)
Admin*Pol*Post	-0.02	-0.00	-0.00	0.01
	(0.01)	(0.00)	(0.01)	(0.03)
N	118,913	118,913	118,914	118,913
R^2	0.09	0.00	0.01	0.00

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (1) are used for this regression. This table reports results from all those public goods for which district governments were not responsible. Clustered standard errors at baseline district level are in parentheses. Hospitals: dummy for hospital in a village, Primary schools: number of primary high school per '000 people, Universities: number of universities per '000 people, Places of worship: number of worshipping places, such as mosques or churches, per '000 people. Weights are village population share within a district.

Table 1.5: Decentralization complementarities and public goods: Health and education

	Health-centers			Doctors			Jr. high schools		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Admin*Post	0.022***		0.008	0.021***		0.011	0.038***		0.020***
	(0.01)		(0.01)	(0.01)		(0.01)	(0.00)		(0.00)
Pol*Post		0.019***	0.007		0.025***	0.017*		0.012***	-0.007**
		(0.01)	(0.01)		(0.01)	(0.01)		(0.00)	(0.00)
Admin*Pol*Post			0.035***			0.039***			0.042***
			(0.01)			(0.01)			(0.00)
N	118914	118914	118914	118914	118914	118914	118913	118913	118913
R^2	0.01	0.01	0.01	0.05	0.05	0.05	0.02	0.02	0.02
Y-Mean	0.11	0.11	0.11	0.15	0.15	0.15	0.08	0.08	0.08
Admin=Admin*Pol			0.01			0.03			0.00
Pol=Admin*Pol			0.01			0.05			0.00

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (1) are used for this regression. Clustered standard errors at baseline district level are in parentheses. In order to keep the control group same as full-specification, districts that faced only election (split) are not included in control group of split (election) specification. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.6: Decentralization complementarities and public goods: Infrastructure

	Wide roads			Street lights			Police stations			Electricity		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Admin*Post	0.047***		0.051***	0.019***		0.012	0.008		-0.019	0.047***		0.011*
	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.00)		(0.01)
Pol*Post		-0.000	-0.007**		0.006	-0.003		0.027***	0.010		0.036***	0.007
		(0.00)	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)		(0.00)	(0.00)
Admin*Pol*Post			0.039***			0.021**			0.030***			0.071***
			(0.01)			(0.01)			(0.01)			(0.01)
N	118021	118021	118021	118914	118914	118914	118914	118914	118914	118913	118913	118913
R^2	0.02	0.02	0.02	0.16	0.16	0.16	0.03	0.04	0.04	0.30	0.30	0.31
Y-Mean	0.89	0.89	0.89	0.43	0.43	0.43	0.08	0.08	0.08	0.57	0.57	0.57
Admin=Admn*Pol			0.09			0.46			0.00			0.00
Pol=Admin*Pol			0.00			0.02			0.10			0.00

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (1) are used for this regression. Clustered standard errors at baseline district level are in parentheses. In order to keep the control group same as full-specification, districts that faced only election (split) are not included in control group of split (election) specification. Wide roads: dummy for wide roads in a village, Street lights: dummy for street lights available in a village, Police stations: dummy for police station available in a village, Electricity: proportion of households getting electricity. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.7: Decentralization complementarities and distance to health-centers, schools and police stations (in kms)

	Health-centers			Schools			Police stations		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Admin*Post	-2.24***		-1.68***	-1.74***		-1.26***	-1.33***		-0.68*
	(0.18)		(0.32)	(0.12)		(0.19)	(0.27)		(0.39)
Pol*Post		-0.40**	0.40***		-0.23**	0.43***		-0.69***	-0.07
		(0.17)	(0.15)		(0.11)	(0.12)		(0.25)	(0.24)
Admin*Pol*Post			-2.25***			-1.68***			-1.75***
			(0.23)			(0.17)			(0.37)
N	118914	118914	118914	118914	118914	118914	111593	111593	111593
R^2	0.03	0.02	0.03	0.05	0.04	0.05	0.06	0.05	0.06
Y-Mean	8.11	8.11	8.11	4.75	4.75	4.75	10.76	10.76	10.76
Admin=Admin*Pol			0.12			0.04			0.03
Pol=Admin*Pol			0.00			0.00			0.00

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (1) are used for this regression. Clustered standard errors at baseline district level are in parentheses. In order to keep the control group same as full-specification, districts that faced only election (split) are not included in control group of split (election) specification. Distance measures are in terms of kilometers from the village head office for the variables for which data was available. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.8: Decentralization complementarities and public goods in a medium term (PODES-2011 as post period)

	(1) Health-centers	(2) Doctors	(3) Schools	(4) Roads	(5) Street lights	(6) Electricity	(7) Police stations
Admin*Post	0.01*	0.00	0.06***	0.05***	0.05***	0.07***	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Pol*Post	-0.01	0.01	-0.03	-0.01***	-0.01	-0.01**	0.00
	(0.01)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
Admin*Pol*Post	0.03***	0.02	0.07***	0.05***	0.06***	0.14***	0.01
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
N	116939	116939	116938	116162	116939	116938	116939
R^2	0.01	0.04	0.04	0.03	0.16	0.44	0.03
Y-Mean	0.11	0.15	0.08	0.89	0.43	0.57	0.08
Admin=Admin*Pol	0.25	0.23	0.03	0.70	0.36	0.00	0.01
Pol=Admin*Pol	0.00	0.31	0.00	0.00	0.00	0.00	0.87

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2011 with specification (1) are used for this regression. Clustered standard errors at baseline district level are in parentheses. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Wide roads: dummy for wide roads in a village, Street lights: Dummy for street lights in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.9: Decentralization complementarities and public goods: Heterogeneity in timing

	(1) Health-centers	(2) Doctors	(3) Schools	(4) Wide roads	(5) Electricity	(6) Police stations
Admin_months*Post	-0.0000	-0.0000	0.0002***	0.0008***	0.0005***	0.0001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pol_months*Post	-0.0005**	0.0002	-0.0017***	-0.0008***	-0.0020***	0.0007**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(Admin*Pol)_months*Post	0.0010***	0.0008**	0.0015***	0.0011***	0.0034***	0.0007
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
N	116939	116939	116938	116162	116938	116939
R^2	0.01	0.04	0.04	0.03	0.44	0.03
Y-Mean	0.11	0.15	0.08	0.89	0.57	0.08
Admin=Admin*Pol	0.01	0.03	0.00	0.29	0.00	0.13
Pol=Admin*Pol	0.01	0.03	0.00	0.29	0.00	0.13

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2011 with specification (3) are used for this regression. Clustered standard errors at baseline district level are in parentheses. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Wide roads: dummy for wide roads in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.10: Decentralization complementarities and public goods: Heterogeneity in intesity of splitting (Population)

	(1) Health-centers	(2) Doctors	(3) Schools	(4) Wide roads	(5) Electricity	(6) Police stations
Intensity*Post	0.005	0.040**	0.028***	0.097***	0.012	-0.040*
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
Pol*Post	0.004	0.023***	-0.010***	-0.008***	-0.001	0.008
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Intensity*Pol*Post	0.054***	0.090***	0.070***	0.065***	0.100***	0.047*
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)
N	118905	118905	118904	118012	118904	118905
R^2	0.01	0.05	0.02	0.03	0.31	0.04
Y-Mean	0.11	0.15	0.08	0.89	0.57	0.08
Inten.=Inten.*Pol	0.03	0.05	0.00	0.02	0.00	0.01
Pol=Inten.*Pol	0.01	0.00	0.00	0.00	0.00	0.10

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (2) are used for this regression. Clustered standard errors at baseline district level are in parentheses. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Wide roads: dummy for wide roads in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.11: Decentralization complementarities and public goods: Heterogeneity in intesity of splitting (Land area)

	(1) Health-centers	(2) Doctors	(3) Schools	(4) Wide roads	(5) Electricity	(6) Police stations
Intensity*Post	-0.001	0.029*	0.004	0.055***	-0.001	-0.040*
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
Pol*Post	0.002	0.019**	-0.018***	-0.017***	-0.006	0.009
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Intensity*Pol*Post	0.049***	0.080***	0.048***	0.045***	0.084***	0.053**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
N	118867	118867	118866	117975	118866	118867
R^2	0.01	0.05	0.02	0.02	0.30	0.04
Y-Mean	0.11	0.15	0.08	0.89	0.57	0.08
Inten.=Inten.*Pol	0.01	0.04	0.00	0.44	0.00	0.00
Pol=Inten.*Pol	0.01	0.00	0.00	0.00	0.00	0.05

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (2) are used for this regression. Clustered standard errors at baseline district level are in parentheses. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Wide roads: dummy for wide roads in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Table 1.12: Decentralization complementarities and public goods: Heterogeneity in intesity of splitting (Distance to district HQ)

	(1) Health-centers	(2) Doctors	(3) Schools	(4) Wide roads	(5) Electricity	(6) Police stations
Intensity*Post	0.006	-0.027***	-0.000	-0.029***	-0.013**	0.012
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Pol*Post	-0.007	0.014*	-0.027***	-0.028***	-0.016***	0.005
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Intensity*Pol*Post	-0.006	-0.043***	-0.003	-0.005*	-0.022***	-0.014
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
N	118914	118914	118913	118021	118913	118914
R^2	0.01	0.05	0.02	0.02	0.30	0.04
Y-Mean	0.11	0.15	0.08	0.89	0.57	0.08
Inten.=Inten.*Pol	0.37	0.23	0.57	0.00	0.28	0.10
Pol=Inten.*Pol	0.96	0.00	0.00	0.00	0.44	0.20

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (2) are used for this regression. Clustered standard errors at baseline district level are in parentheses. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Wide roads: dummy for wide roads in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Robustness

Table 1.13: Alternative specification based on splitting moratorium

	Health-centers		Doctors		Schools		Wide roads		Street lights		Electricity		Police stations	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Admin*Post	0.03***	0.01	0.05***	0.04***	0.00	-0.01	0.03***	0.04***	-0.04***	-0.04***	0.02**	-0.02**	0.02**	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Admin*Pol*Post		0.04***		0.06***		0.01		0.02**		-0.04**		0.04***		0.04***
		(0.01)		(0.01)		(0.01)		(0.01)		(0.02)		(0.01)		(0.01)
N	53,699	53,699	53,699	53,699	53,698	53,698	53,014	53,014	53,699	53,699	53,698	53,698	53,699	53,699
R^2	0.01	0.01	0.05	0.06	0.03	0.03	0.03	0.03	0.16	0.16	0.32	0.32	0.04	0.04
Y-Mean		0.10		0.10		0.09		0.81		0.26		0.44		0.08
Test1		0.01		0.03		0.00		0.09		0.46		0.00		0.00

*0.10 **0.05 ***0.01. PODES-2000 and PODES-2008 with specification (1) are used for this regression. This table reports comparison within only split districts and hence the districts that were treated with election are excluded here. Clustered standard errors at baseline district level are in parentheses. Health-centers: dummy for disitrict community center (*Puskesmas*), Doctors: dummy for doctors available in a village, Schools: number of junior high school per '000 people, Wide roads: dummy for wide roads in a village, Street lights: Dummy for street lights in a village, Electricity: proportion of households getting electricity, Police stations: dummy for police station available in a village. p-values are reported for the test of equality of coefficients. Weights are village population share within a district.

Governance quality

Table 1.14: Decentralization synergies and governance quality (Change in district level expenditure as a proportion of total revenue and percentage change in per capita revenue)

	(1) Edu.	(2) Health	(3) Agri.	(4) Admin.	(5) Rev. p.c.
Admin*Post	-0.07***	-0.00	0.01	0.06**	0.33***
	(0.02)	(0.00)	(0.01)	(0.03)	(0.07)
Pol*Post	0.02	0.01*	0.00	-0.02	0.02
	(0.02)	(0.00)	(0.00)	(0.02)	(0.03)
Pol*Admin*Post	-0.01	0.01**	0.01**	0.01	0.34***
	(0.01)	(0.01)	(0.00)	(0.03)	(0.07)
N	876	876	875	869	889
R^2	0.24	0.39	0.23	0.04	0.89
Y-Mean	0.33	0.06	0.04	0.32	75.09
Split=Election*Split	0.00	0.00	0.66	0.03	0.95
Election=Election*Split	0.06	0.22	0.01	0.19	0.00

*0.10 **0.05 ***0.01. District level INDO-DAPOER data by World Bank for the years 2001 through 2008 is used for this regression. Clustered standard errors at province level are in parentheses. Edu.: District level educational expenditure as a proportion of revenue, Health: District level health expenditure as a proportion of revenue, Agri.: District level agricultural expenditure as a proportion of revenue, Admin.: District level administrative expenditure as a proportion of revenue, Rev. p.c.: Log of district level per capita revenue. p-values are reported for the test of equality of coefficients. Weights are district population share within a province.

Table 1.15: Decentralization complementarities and governance quality (District government assistance to village governments in 2008)

	(1)	(2)
	Whether a vilage received assistance	Amount of assistance (p.c. mn. IDR)
Split	0.02	0.03**
	(0.02)	(0.01)
Election	0.02	0.01
	(0.02)	(0.01)
Election*Split	-0.02	0.04***
	(0.02)	(0.01)
N	52,973	49,272
R^2	0.01	0.00
Control-Mean		0.05

*0.10 **0.05 ***0.01. PODES-2008 used for this regression. The results report a cross sectional comparison between different treatment groups. Clustered standard errors at province level are in parentheses. 'Whether a village received assistance': dummy for a village receiving any assistance from district government, 'Amount of assistance (p.c. mn. IDR)': Total value of per capita assistance received by village from district govenment. Weights are village population share within a district.

Appendix

Table A1.1: Sample description of baseline villages

	Districts	Villages
Original census sample	314	68,783
Lost (in panel creation)	-	5,365
Excluded provinces (Jakarta, Maluku and Irian Jaya)	23	3,955
Final sample (by treatment groups)		
Control	105	18,740
Split	28	8,961
Election	103	17,669
Both	55	14,093

Table A1.2: Matching panel and lost sample for baseline (2000)

	(1) Panel Sample	(2) Lost Sample
Rural villages	0.71	0.71
	(0.45)	(0.45)
Villages in plain regions	0.76	0.67
	(0.42)	(0.47)
Villages next to water body	0.16	0.15
	(0.37)	(0.36)
Proportion of 1999 female voters	0.49	0.50
	(0.10)	(0.07)
Proportion of agri. HH	0.58	0.67
	(0.36)	(0.35)
Proportion of agri. land	0.56	0.56
	(0.32)	(0.32)
No. of food/leather industries	1.54	1.47
	(6.69)	(5.08)
No. of mosques	2.69	2.76
	(2.68)	(2.50)
No. of primary schools	0.97	1.05
	(0.97)	(0.79)
Observations	63417	5365

Means reported. Standard deviations are in parenthesis.

The panel sample is the sample used for main analysis. The lost sample is the 8% sample lost in creating the panel.

Number of industries, mosques and primary schools are for every 1000 individuals.

Weights are village population share within a district.

CHAPTER 2

Pathways out of Long Term Poverty: The Role of Sectoral Transitions in Indonesia[1]

2.1 Introduction

Poverty elimination is one of the primary goals of economic development. The world poverty rate (measured at $1.90 a day) has declined by about 50 percent over the last two decades (World Bank, 2017). Yet, poverty eradication continues to be an important goal in the United Nations' "2030 Agenda for Sustainable Development". Despite considerable effort at the national and international

[1] I would like to thank the Blum Initiative for Global and Regional Poverty for funding the project that resulted into this chapter. My chair Dr. Steven Helfand was the principal investigator (PI) while I was co-PI on the project.

levels to fight poverty, there are substantial disparities in the success of poverty reduction across and within countries. For instance, more than 50% of Sub Saharan Africa's population lives below $2 a day. The majority of these people reside in rural areas dominated by agricultural activities.

Many studies have argued that improvements in the agricultural sector could be a viable pathway out of poverty. Some examples of these improvements include enhancement of agricultural productivity, improved access to land, better agricultural technology and elimination of market imperfections (Lipton and Longhurst, 2013; Datt and Ravallion, 1998; Valdès and Foster, 2007; de Janvry and Sadoulet, 2010). However, support of the agricultural sectors in developing countries continues to face resistance due to a policy bias in favor of urban development (Bezemer and Headey, 2008). In recent years the role of the non-agricultural sector as a pathway out of poverty has gained considerable attention in the literature (Lanjouw and Lanjouw, 2001; Start, 2001; Haggblade et al., 2010).

The increasing availability of high quality micro level data, and in particular of panel data, has made it possible for researchers to conduct refined microeconomic analyses to understand the comparative role of the agricultural and non-agricultural sectors in escaping poverty (de Janvry et al., 2005; Lanjouw and Shariff, 2004; Chawanote and Barrett, 2014; Bezu et al., 2015; McCulloch et al., 2007; Gollin et al., 2014). An important question has been whether movement from the agricultural to the non-agricultural sector improves individual welfare. A majority of these studies conclude that moving out of agriculture, or diversifying into non-agricultural activities, increases earnings or consumption. An exception to these studies is a recent paper by Hicks et al. (2017) who find low productivity gaps and zero consumption gaps between the agricultural and non-agricultural sector. We return to this study towards the end of this section. With few exceptions, most of the empirical studies estimate correlations between sector of occupation and welfare outcomes. Their estimated results are not necessarily causal. We discuss below some of the most important methodological limitations of these studies.

An important limitation of the literature relates to the use of cross sectional data in the majority of studies (de Janvry et al., 2005; Lanjouw and Shariff, 2004; Reardon et al., 2000; Ferreira and Lanjouw, 2001; Matsumoto et al., 2006). There have been several recent papers that have used panel data, but without exception these have been relatively short panels (McCulloch et al., 2007; Chawanote and Barrett, 2014). The results based on cross-sectional data compare individuals engaged in different sectors at one point in time. Cross-sectional studies suffer from a variety of identification issues, such as reverse causality in the sense that employment in a particular sector could be a result of individual welfare rather than its cause, as well as omitted variables bias that results from a failure to include additional relevant variables in the analysis. The use of short panels would partially take care of this problem as it permits controlling for time-invariant characteristics of an individual and produces estimates that are based on sectoral transitions that hold individual characteristics constant. However, sectoral transitions can either be permanent or temporary in nature. In a short period it might be the case that certain kinds of sectoral transitions predominate, such as within informal occupations. Panel data that only covers a short period of time are unable to distinguish between these different types of transitions.

We employ a panel dataset which is one of the longest panels that has been used to explore the relationship between sectoral transitions and welfare. It is a panel of households from the Indonesian Family Life Survey (IFLS) that spans a period of two decades, from 1993 to 2014.[2] With this kind of data we can control for time invariant unobservables at the household level that could be endogenous to sectoral choices and poverty, a point strongly emphasized in Hicks et al. (2017). Moreover, we can observe sectoral transitions pertaining to both short and long periods of time.

Another limitation of the existing literature is that most studies utilize individuals as the unit of analysis to estimate the effects of sectoral transitions. But, in a developing country setting,

[2] We explore the Indonesian case because it is a country that has experienced one of the highest growth rates among developing nations. Its poverty rate fell from about 50% to 10% over the last two decades, suggesting that the fruits of growth have been spread widely. It thus provides an interesting example of a developing country that has made considerable progress, not only economically, but also in terms of democratization.

particularly in rural areas, both sectoral choice and the intra-household distribution of resources are likely to be determined at the household level. Several individuals in a household may be engaged in the same economic activity, such as farming in a household based non-agricultural firm. Similarly, employment diversification of some household members is a household decision and the returns from these economic activities accrue to the entire household, rather than just to an individual. Thus, we conduct our analysis at the household level by identifying sectors based on the proportion of total household labor hours worked, and by defining welfare using household consumption per capita.

In the first part of our analysis we observe households at four different points in time. We categorize households based on the number of survey rounds that they were observed in a particular sector in an attempt to divide them into groups defined by their permanent or temporary sectoral transitions.[3] Those who exited a particular sector in the first period and those who were employed in a sector across all survey rounds are permanent in nature. Alternatively, those who were employed in their baseline sector for two or three periods could include both temporary and permanent transitions.

In the second part of the analysis in this chapter, we estimate the effect of sectoral transitions using the instrumental variable (IV) estimation technique with household fixed effects. This estimation technique is better than having just household fixed effects because it provides stronger causal identification by allowing us to deal with endogeneity issues due to time invariant as well as time varying factors. However, availability of just one valid instrument forces us to redefine our key variable of interest. In this part of the analysis we use all 22 years of data and categorize households based on the number of years in a particular sector. In the first stage we predict the number of years using the well-known Bartik shift-share instrument that decouples local labor demand from supply. Most of our findings based on the instrumental variable technique are consistent with what was found in the first part of the analysis.

[3] We conducted a similar analysis for rural vs. urban transitions, but the sectoral transitions appear to be much more important. They are what we focus on in this paper.

Our study closely relates to Hicks et al. (2017). Contrary to the results from two important studies (Gollin et al., 2014; Young, 2013) they find low and insignificant productivity gaps and zero consumption gaps between the agricultural and non-agricultural sectors and between the urban and rural areas. They argue that although education largely accounts for selection into different sectors or regions, a large part of selection is captured by individual fixed effects. Using the IFLS survey years 1993, 1997, 2000 and 2008 they create 21 years of panel from the recall data of individual occupation and income.[4] For consumption, however, they use information from the four survey years since it was not available for each year. In our study we are focusing on long term consumption changes from 1993 to 2014 while ignoring the short term changes as in Hicks et al. (2017).

While we find positive consumption growth across the whole sample, based on our preferred IV specification, the marginal growth was lower due to non-agricultural employment compared to the employment in the agricultural sector. However, a sub-group analysis reveals that the benefits of non-agricultural employment are conditional upon other economic factors. Longer employment in the non-agricultural sector resulted in relatively higher consumption growth only for those households who were either poor and agricultural in the baseline, or non-poor and non-agricultural.

In terms of poverty transitions we find that the effect of longer employment in the non-agricultural sector was welfare improving. The effect on the probability of exiting poverty was significantly positive and on the probability of becoming poor was significantly negative.

The rest of this chapter is organized as follows. Section two discusses the data and construction of variables for the analysis in the first part of this chapter. In the third section we present descriptive statistics on sectoral transitions over the 22 year period along with the associated economic dynamics. We propose our fixed effects regression specification in the fourth section and provide results in the

[4] In our study, we do not rely on recall of income data because we believe there could be misreporting of income and considerable measurement error. An individual is more likely to report similar annual income when asked to report historical incomes for the past 5-7 years. This could also be the reason behind insignificant estimates in Hicks et al. (2017).

fifth section. In the sixth section we employ the instrumental variable technique for a stronger causal identification. The last section concludes.

2.2 Data and Summary

The household level data used in this chapter comes from the Indonesian Family Life Survey (IFLS). It is a panel survey that spans a period of 22 years, from 1993 (7,224 households) to 2014 (15,761 households). We use a panel for four rounds—gathered every seven years—that successfully tracks about 90% of the households surveyed in 1993.[5] IFLS is representative of about 83% of the Indonesian population living in 13 of the 26 provinces in 1993. This dataset has information at the household and community levels. The data cover, among other things, household consumption, individual sector of employment, individual income by sector of employment, and other household characteristics.

Categorization of Households

In addition to tracking the originally surveyed households, IFLS also follows members who separated from original households and formed or became part of a new household, which they call split-off households. We divided households into the following four categories (Table 2.1):

1. *Never Split*: These are the households whose members never formed a new household during the survey period. According to Table 2.1 below, by 2014, only 11% of households were in this group.

2. *Split – Parents*: These are original households that were split because at least one of their members split-off to form a new household. We call them *Split – Parents* because their members are largely from the first generation of the 1993 IFLS survey. *Split – Parents* accounted for

[5] There was another round conducted in 1997, but it was different than the other rounds because of the Asian Financial Crisis of 1997. Hence, we limit our analysis to four rounds.

26.4% of all households in the year 2000. This proportion increased to around 30% in 2007 and 2014.

3. *Split – Children*: Two types of members separated from the original households to form a new household: children of household heads and everyone else. We call the first type *Split – Children*. This group accounted for 23% of all households surveyed in 2000, and rose to 38.8% in 2014.

4. *Split – Other*: These involve other members of the original households, such as siblings of household head that split-off to form new households. The proportion of such households increased from around 10.6% in 2000 to 21.1% in 2014.

In this chapter, we limit the analysis to the first three groups. We further combine the first two groups, i.e. *Never Split* and *Split – Parents*, because they both derive primarily from the adults in the original set of households. Thus, we work with two groups defined by generation in this chapter: *Parents* and *Children*.[6]

Households were categorized into agricultural and non-agricultural sectors based on the allocation of total adult labor hours worked by household members. If a household allocated more than three-quarters of its total adult labor hours to agricultural activities then that household was assigned to the agricultural sector. If more than three-quarters of the hours were allocated to non-agricultural activities the household was identified as non-agricultural, and households that did not fall into either of the two sectors were classified as *other*. We limit our analysis in this chapter to households that were classified into the agricultural or non-agricultural sectors in the baseline. Approximately 6% of households were classified as *other* in the baseline, and were excluded for this reason, while 43% were classified as agricultural and 51% were classified as non-agricultural.

[6] In future research we will confirm that the results are robust to the exclusion of the "other" group and the combination of the two types of parents. Preliminary descriptive analysis supported these decisions.

Summary Statistics

Table 2.2 presents characteristics of the households surveyed in 1993 and 2014. The column "1993 All" includes the information for all of the households surveyed in 1993. In 2014, households are categorized as *2014 Parents* and *2014 Children*. 2014 Parents include both the *Never Split* and the *Split – Parents*. The proportion of households living in rural areas was close to 70% in 1993. By 2014, this proportion had declined to 51% for parents and 42% for children. Thus, children were more likely than their parents to exit rural areas. Households became smaller in this period, from an average of 4.69 members to about 3.65 members. The majority of households were male headed, but the share is lower in the *2014 Parents* category of households than in the *2014 Children* households. This is likely due to wives of original male heads taking over as new heads after their death. This is also evident in the slightly lower proportion of males in households belonging to this category. Because of the sample design, household heads are about 18 years younger in the *2014 Children* category compared to *2014 Parents* category. The median age among the members of the *2014 Children* households is also about 15 years lower.

In terms of education, 76% of household heads in 1993 had attended no school or at most a primary education. The *2014 Parents* made some progress relative to 1993, with the share in these two categories falling to 63%. Because they are younger and were raised in a period when public schooling was expanding, the heads of newly formed households were more educated than their parents. Only 1% of the *2014 Children* had not attended any school compared to 13% of the *2014 Parents*. Furthermore, a higher proportion had attended higher schooling levels: 20% had attended junior high school, 34% had attended senior high school and 15% had attended college or higher, compared to 13%, 17%, and 7% respectively for the *2014 Parents* household heads. Finally, although the *2014 Children* households have higher levels of human capital, the households in the *2014 Parents* category are richer in terms of physical assets, probably due to a lifetime of asset accumulation.

2.3 Sectoral Transitions

Sectoral transitions in a two period survey can be conveniently studied using transition matrices. But, for a four period case it is not possible to use two-by-two transition matrices because of the need for higher dimensions. Hence, we condense the information contained in four-period sectoral transitions in a novel way. We categorize households by the number of survey rounds they were observed in their baseline sector. The baseline distribution of households by sector is presented in the fifth column of Table 2.3. About 35.4% of the *Parents* households lived in rural areas and were engaged in agricultural activities, while 19.4% were rural and employed in the non-agricultural sector. In urban areas the shares in the agricultural and non-agricultural sectors were 9.8% and 35.3% respectively. Thus, in the baseline around two-thirds of rural households were agricultural, while close to 80% of urban households were non-agricultural. We use these categories to describe the households, their average consumption and baseline poverty.

Proportion of households that continued in their baseline sector in the follow-up survey rounds of IFLS

In Table 2.3 there are four columns — labeled 1 through 4 — under the heading "Rounds observed in 1993 sector". These column headings represent the total number of survey-rounds a household was observed in its baseline sector. By way of example, the first row provides the breakdown of the rural *Parents* households that were agricultural in the baseline, and shows the number of periods that they remained in agriculture. Only 23.2% of these households stayed in the agricultural sector across all four periods (see the last column), while 14.4% moved out of agriculture after the first round of the survey.[7] The share of households that stayed in agriculture for two or three survey-rounds was 23.9% and 38.6% respectively. Similarly, the second row provides the classification over the four

[7] Note that moving out of a baseline sector, e.g. the agricultural sector, means that the proportion of total household hours worked in the agricultural sector falls below 75%. This could imply 100% employment in the non-agricultural sector or diversification between the two sectors.

survey rounds for the rural households that were initially engaged in the non-agricultural sector. A higher proportion of these households, more than 30%, continued in their baseline sector. This pattern of continuing in the baseline non-agricultural sector was even more pronounced in urban areas where more than 50% of the *Parents* households were observed in the non-agricultural sector across all the four rounds. A mere 7% of urban agricultural households continued as agricultural across all four rounds.

The sectoral dynamics of *Children – Split* households is also interesting. In these households, the baseline sector was assigned using their parents' sector. The overall picture of these second generation households is similar to what was observed for the *Parents* households. However, for these households the shares that transitioned out of agriculture, and that remained in the non-agricultural sector, are even higher.

We also conducted a similar transition analysis by location, i.e. the number of rounds that households were observed in rural or urban areas. Since transitions between rural and urban locations are quite low, we do not present the results here. About 80-90% of households continued in their baseline location for three or four rounds.

Per capita consumption of households that continued in their baseline sector

In the previous sub-section we discussed sectoral transitions of households in a four-period setting. In this sub-section we use the same structure to explore the economic gains and losses associated with such transitions. Table 2.4 is similar in structure to Table 2.3, except that it now reports average real per capita consumption expenditure in 2014. First, for baseline rural households, we note that staying in the agricultural sector across all four periods for both *Parents* and *Children* households was associated with the lowest consumption level in 2014 within each respective group. In

contrast, those that stayed in the non-agricultural sector for three or four periods experienced higher consumption levels. Employment in agriculture for lesser number of periods, particularly within the baseline rural households, was associated with higher consumption level in 2014. Similarly, the households that were employed in the non-agricultural sector for one or two periods had a lower consumption level than those engaged in it for longer period, irrespective of location.

Table 2.5 presents the percent change in consumption levels between 1993 and 2014. Surprisingly, in most of the cases, the households in the agricultural sector in the baseline experienced larger percentage gains in consumption expenditure compared to the baseline non-agricultural households. But comparing these percentage changes to median consumption in the baseline helps to explain the reason behind such unexpected results. The households in the non-agricultural sector had higher median consumption in 1993 to begin with. For instance, within the baseline rural area *Parents* households engaged in non-agricultural activities had 50% more consumption than those engaged in the agricultural sector. Thus, the agricultural households experienced faster growth from a lower base.

Baseline poverty

Table 2.6 presents the baseline share of poor households within each sectoral category. This table helps us shed light on selection of households into different sectoral categories based on their baseline economic status. We have used the official Indonesian poverty lines for different provinces to identify poor households. There is a clear relationship within rural households that were employed in the agricultural sector in the baseline. The groups that continued longer in the agricultural sector had higher shares of poor households in the baseline. On the other hand, the rural households that succeeded in staying in the non-agricultural sector for more periods had a much lower share of poor compared to the household that remained in the non-agricultural sector for only one or two periods. These relationships suggest self-selection on baseline characteristics. These patterns are distinct for

urban households. Among the urban non-agricultural *Parents*, for example, only those that left after the first period were clearly poorer. Another interesting observation is that the proportion of poor in each respective category is generally higher among the *Children – Split* households than among their *Parents*. This suggests a possible association between baseline poverty and the splitting of households.

Dominance Analysis of Sectoral Strategies: Consumption distributions in 1993 and 2014 by number of rounds observed in each sector (Parents)

So far we presented averages of household consumption by different sectoral categories, but these averages could be an insufficient representation of an entire distribution. In this section we present the distributions of log real per capita consumption expenditure by the number of rounds households were observed in their baseline sector. Figures 2.1a and 2.1b depict these distributions in 1993 and 2014, respectively, for *Parents* that began in the agricultural sector, while Figures 2.2a and 2.2b do the same for the *Parents* initially in the non-agricultural sector. In each of these figures, the vertical line represents the national poverty line for Indonesia in 2014. For all categories of households, both within the baseline agricultural and non-agricultural sectors, the level of consumption increased between 1993 and 2014. This is clear from the shifting of the distributions to the right, as well as the scaling up of the consumption levels on the horizontal axis.

As with Table 2.6, the figures also suggest that there was self-selection into different pathways. Figures 2.1a and 2.1b show that those households that stayed in agriculture for three or four periods had consumption distributions that were dominated by the households that stayed in agriculture for only one or two periods. Thus, those households that were already better off in the baseline were more likely to leave. By 2014, the hierarchy was even more clear. The distribution of consumption for households engaged in the agricultural sector for only one period dominated all of the other distributions. The same pattern is observed with the remaining consumption distributions: the

distribution of households that worked in agriculture for two periods dominated the distribution for three periods, and the distribution for three periods dominated the one for four periods.

A slightly different relationship between baseline distributions and pathway choices is observed for the households that began in the non-agricultural sector. Households that were engaged in the non-agricultural sector for three or four periods had consumption distributions that were quite similar in both 1993 and 2014, and these distributions dominated the other two groups. Thus, these households were already observably better off in the baseline and remained so twenty years later. The households that were observed in the non-agricultural sector only in the baseline period had a consumption distribution that was already dominated by the other three groups in 1993, and continued to be dominated by them in 2014. The consumption distribution of the households that were in the non-agricultural sector for two periods lie between the other groups. In 2014, however, among the households in the neighborhood of the poverty line, only the group that was in the non-agricultural sector for just one period was clearly distinct from the other three.

Overall, these consumption distributions reveal the following major points. Almost every household experienced an overall increase in real per capita consumption expenditure. A longer period of engagement in the agricultural sector, and likewise a lesser period of engagement in the non-agricultural sector, was associated with lower consumption distributions relative to the other groups. However, from the dominance of these distributions one cannot conclude very much about causal effects. Moreover, there appears to be selection of households into different categories: those engaged in agricultural activities for more periods, or in the non-agricultural sector for fewer periods, had relatively lower consumption levels to begin with. Hence, there is a need for a more sophisticated analysis to tease out the causal relationship between sectoral transitions and household welfare. We take a step in this direction using regression techniques in the next section.

2.4 Regression Specification

A basic specification using OLS to estimate the effect of sectoral transitions is:

$$Y_{ht} = \alpha + \sum_{s=1}^{3} \beta_s Ag\_s_h + \sum_{s=1}^{4} \beta_{s+3} Non\text{-}Ag\_s_h + \gamma X_{ht} + \theta * t + \epsilon_{ht} \tag{2.1}$$

In the equation above, Y_{ht} represents the household level outcome for the years 1993 and 2014.[8] It captures household welfare in terms of three different outcomes: real per capita consumption, an indicator for exiting poverty, and an indicator for becoming poor. Ag_s_h and $Non\text{-}Ag\_s_h$, where s takes the value 1-3 for Ag and 1-4 for $Non\text{-}Ag$, are indicator variables for whether agricultural and non-agricultural households, respectively, were observed in their baseline sectors for one, two, three or four periods. Households that were in the agricultural sector for all four periods are excluded from the regression and used as a comparison group, and thus the estimated coefficients β_1 through β_7 capture the difference of each sectoral transition in relation to this excluded group. X_{ht} represents household specific time-varying controls, and t is a time dummy.

A problem with Equation 2.1 is that it does not account for the fact that a household's occupation in a particular sector could be correlated with its inherent characteristics or some selected unobservables. The estimates from this specification would be biased due to unobserved cross-sectional variation among households that leads them to choose different sectoral categories. Since the IFLS data tracks the same households over time, it allows us to carry out a within household fixed effects analysis for which the following specification is used:

$$Y_{ht} = \alpha_h + \sum_{s=1}^{3} \beta_s Ag\_s_h * t + \sum_{s=1}^{4} \beta_{s+3} Non\text{-}Ag\_s_h * t + \gamma X_{ht} + \theta t + \epsilon_{ht} \tag{2.2}$$

[8] We focus only on 1993 and 2014 outcomes because we want to test for long period, instead of short-term, welfare changes.

This specification is similar to Equation 2.1, except that it includes fixed effects (α_h) that control for household specific time invariant characteristics affecting sectoral transitions and welfare outcomes. Also, since sectoral categories are fixed over time, they are interacted with a time dummy in order to capture the effect of sectoral transitions while controlling for the effect of belonging to these categories through the fixed effects. The identifying assumption that is necessary for these to be causal estimates is that, after controlling for the time varying observables (X_{ht}), the residuals are independent of any unobserved time varying factors that could be affecting household decisions over sectoral transitions. This assumption may or may not be valid, and thus claims about causality can only be made with caution. We relax this assumption to account for time-varying unobservables by employing the instrumental variable technique in the sixth section.

2.5 Regression Results

The regression results for three different outcomes—log of consumption, probability of exiting poverty and probability of becoming poor—are presented in tables 2.7 through 2.9. These regressions were carried out only with the *Parents* sample. In Table 2.7, the first two columns present OLS estimates using Equation 2.1 with and without time-varying controls, while the final three columns are estimated with the fixed effects model in Equation 2.2. According to the first column, compared to the households that were employed in the agricultural sector for all four periods, all other households achieved significantly higher consumption growth. Once we control for household specific time varying factors, such as education, the magnitude of all the estimates, and the significance of some, declines.

Surprisingly, these estimates become insignificant or negative when household fixed effects are included (column 3). This indicates that, once we control for time-invariant unobservables, the rate of growth of consumption was the same for all agricultural households—regardless of the number of periods in agriculture—and slower for non-agricultural households compared to the households that

were always agricultural. Additionally, the negative coefficients are in the range of 21-24 percent and statistically significant at 5% level for the households that were employed in non-agricultural activities for more than one period. These results do not support what has been argued in the literature about comparatively higher returns from the non-agricultural sector. They suggest that the benefits of working in the non-agricultural sector result from fixed unobservable characteristics that likely cause self-selection into these sectors. Once these unobservables are captured with the fixed effects, the gains from transitioning into the non-agricultural sector either disappear or become negative. These results echo the findings of Hicks et al. (2017) who find zero impact of transitioning from agriculture to non-agriculture. The main differences between Hicks et al. (2017) and our study is that they use only one dummy variable for transitions and unlike them we use long term consumption changes between 1993 and 2014.

In order to get a better understanding of these surprising results we divide households into baseline poor and non-poor groups and present the estimates separately in columns (4) and (5) respectively. These estimates capture heterogeneity of outcomes based on initial poverty status, and provide a different picture compared to the estimates based on the entire sample. Column (4) shows that among the baseline poor, six of the seven groups experienced consumption growth that was not statistically different from the control agricultural households. The only exception is the group that moved out of the agricultural sector in the first period. Households in this group experienced 17% higher consumption compared to the control group, although this was statistically different only at the 10% level of significance. In summary, among the baseline poor, the differences in the growth of consumption across groups were either statistically insignificant (in six cases) or small (in one case).

The same is not true for the baseline non-poor households (see column 5). Those who were engaged in the non-agricultural sector for three or more survey rounds experienced 50% higher consumption growth compared to the control group, at the 1% level of significance. Similarly, the households that left the agricultural sector after the first survey round, and worked in the non-agricultural sector for

the next three rounds, experienced 40% faster consumption growth at the 5% level of significance. Thus, unlike the baseline poor, the baseline non-poor could experience stronger consumption growth if they were employed in the non-agricultural sector for three or more periods, regardless of which sector they began in. The households observed in the non-agricultural sector for two of the four survey-rounds also experienced faster consumption growth, but only at the 10% level of significance. The rest of the groups were not significantly different from the control group.

The analysis to this point has been conducted in comparison to the households that were employed in the agricultural sector across all four survey rounds. Using the results from columns 4 and 5 in Table 2.7, we also test for the equality of coefficients across all groups. The results from these pairwise tests are presented in tables 2.7a and 2.7b for the baseline poor and non-poor, respectively. Among poor households, Table 2.7a, shows that almost all groups appear to have similar consumption growth regardless of their sectoral transitions. Only those households that left the agricultural sector after the first period performed better than almost all other groups of poor households.

The same is not true within non-poor households (see Table 2.7b). From this table we observe two important points. The consumption growth experienced by the households that left the agricultural sector after the first period was similar to the ones that were always non-agricultural and thus better than those that were always agricultural. On the other hand, the households that left the non-agricultural sector after the first period experienced significantly lower consumption growth compared to the ones that were always non-agricultural, but equivalent to those that were always agricultural.

Poverty Analysis

Consumption growth provides an indication of improvement in economic status for all households, but it doesn't say much about exit from, or entry into, poverty. For estimating these changes in relative positions we use two different outcomes: an indicator variable for exiting poverty and an

indicator variable for becoming poor. The results are presented in Tables 2.8 and 2.9. In both tables, the third column shows our preferred fixed effects specification. In Table 2.8, the sample is restricted to the baseline poor and the coefficients represent the probability of moving out of poverty. The results are quite different to what was observed for consumption growth among the baseline poor households in Table 2.7. In that case, all groups experienced similar consumption growth other than the group that left agriculture after the first period, and even for this group it was only different at the 10% level of significance. A focus on poverty exit gives a very different picture. According to the third column of Table 2.7, the households that were engaged in the non-agricultural sector for more periods, or in the agricultural sector for fewer periods, had between a 7.4 and 10.6 percentage point (pp) higher probability of exiting poverty relative to the households that remained in agriculture for all four periods. Stated differently, poor households that worked in agriculture for three or four periods, regardless of which sector they began in, had a lower probability of exiting poverty than the other groups.

The estimates for the probability of entering poverty are presented in Table 2.9. Here, the results are broadly consistent with what was observed for consumption growth in Table 2.7. The households that were engaged in non-agricultural activities for two, three or four periods and the ones that left the agricultural sector after the first period continue to perform better than the control group. The only group that experienced a significantly lower probability of becoming poor, at the 1% level of significance, is the group that was employed in the non-agricultural sector for all four survey rounds. The reason for similarity in the results based on consumption growth and the probability of exiting poverty could be an overall growth experienced by a majority of Indonesian households and the resulting substantial drop in poverty.

So far the comparison of poverty entry and exit probabilities has been against the households that were employed in the agricultural sector for all four periods. In Tables 2.8a and 2.9a we present the results for tests of equality of coefficients between all possible pairs using the estimates from column

3 in Tables 2.8 and 2.9, respectively. Households that were engaged in the agricultural sector for only one or two periods, and those that were engaged in the non-agricultural sector for at least two periods, had a significantly higher probability of exiting poverty compared to those that were agricultural for three or four periods. There is no significant difference in the probability of exiting poverty across the baseline non-agricultural households. In terms of the probability of becoming poor, Table 2.9a does not exhibit any clear pattern beyond what was observed in Table 2.9—most groups are less likely to become poor than the group that worked in agriculture the entire time.

2.6 Instrumental Variable Estimation

So far we have estimated the key variable of interest after controlling for time varying observables and time invariant unobservables that could be correlated with the choice of sector and household outcomes. However, this does not account for omitted time varying factors such as changes in market opportunities in favor of a particular sector. Such time varying factors could be biasing the estimates depending on local demand for labor in different sectors. In order to correct for this potential bias, we re-estimate the effect of sectoral employment on consumption and poverty by predicting our endogenous variable using an instrument. However, the availability of just one valid instrument requires modifying the indicator variables for sectoral transition. Earlier there were eight distinct groups for which we would require at least seven valid instruments which are not feasible in our case. Thus, we update our key explanatory variables by condensing the eight groups into a single continuous variable. Below, we first discuss our instrument and then we explain the modified explanatory variable.

Instrument – Bartik Shift-Share

Household sectoral choices reflect labor supply decisions. We use a measure of local labor demand for predicting these sectoral choices. We create this measure based on the national employment

growth by industry-occupation along with local industry-occupation employment shares in the baseline.[9] This instrumental variable (IV) is widely known as Bartik shift-share instrument (Bartik, 1991). It is a standard IV where local labor demand is decoupled from labor supply. The basic procedure is to fix the employment shares of local industry-occupation at an initial baseline year and use the national employment growth to estimate the demand for labor in these local cells. This measure of regional labor demand shocks is likely to directly affect sectoral labor supply of households. For example, we would expect households to shift labor supply from the agricultural sector to non-agriculture if the regional labor demand from the non-agricultural sector grows faster. We create the measure of shift-share using the following formula:

$$S_d = \sum_i \sum_o G_{io(2014-1992)} * \frac{E_{iod,1992}}{E_{d,1992}} \tag{2.3}$$

In this equation S_d represents the shift-share estimate for a district d. G_{io} is the national employment growth in industry i and occupation o between 1992 and 2014. A district weight is obtained by taking the ratio of $E_{iod,1992}$ and $E_{d,1992}$, i.e. the employment share of industry-occupation in a district's total employment in 1992. This formula is similar to the existing applications of the shift-share instrument (Schaller, 2016; Card, 2009). We use this instrument to predict our modified endogenous regressor which we discuss below.

Number of years in the non-agricultural sector

For exact identification of two-stage least squares estimation we cannot rely on the multiple endogenous regressors that we have been using so far. Certainly, segregating households into distinct groups is a better indicator of sectoral employment since it allows flexibility in estimation without imposition of a functional form. However, it has limitations when it comes to a two-stage least

[9] There are nine industries and 5 occupations. The industries are agriculture, mining/quarrying, industrial processing, electricity/gas/water, construction, wholesale/retail/restaurant, transportation/communication, finance/insurance and social services. The occupations include self-employed without family workers, self-employed with family workers, employer, employee, and family workers.

squares technique which is a stronger method for establishing causality in the case of omitted time-varying correlates. So, we redefine the key variable of interest as the number of years employed in the non-agricultural sector. To the best of our knowledge we are the first to employ this definition of sectoral employment. In most of the literature it is defined as a dummy variable of moving into or out of a sector.

In the IFLS surveys, individuals were asked information related to employment and income from the year preceding the survey-round all the way back to the previous survey year. Recall information on income is highly likely to be misreported but the same is not true for the sector of employment. We use the retrospective information on the sector of employment to create a variable for the number of years employed in the non-agricultural sector.

The distribution of households by the number of years they were employed in the non-agricultural sector is presented in Figure 2.3.[10] About 23 percent of the households were employed in the non-agricultural sector during the entire twenty-two years of the survey. This group is similar to the *nag4* group in the analysis in the previous section. Similarly, about 12 percent of the households were not employed in the non-agricultural sector at all during the survey period, which is to say that they were employed in the agricultural sector for the entire 22 years. This group is similar to the *ag4* group. Figure 2.3 shows that each bin of different number of years had between 2 and 8 percent of households engaged in the non-agricultural sector. Note that it is not clear from this figure whether these were continuous years or not.

It would make sense to differentiate households that have been engaged in the non-agricultural sector for continuous years from those with spells of temporary employment in it. Table 2.10 presents the share of households with continuous years and the average number of sectoral transitions for each group (defined by the number of years in the non-agricultural sector). For obvious reason the

[10] We assign the number of years in a sector to a household based on the retrospective information of its primary working member. We plan to further refine this definition based on the total household hours in future research.

share that is continuous is one within the groups of households engaged in the non-agricultural sector for 0, 1 and 22 years. For all the other groups the pattern is not clear. For instance, among those households that were engaged in the non-agricultural sector for 2 to 8 years, the proportions that were employed continuously varied from about 0.33 to 0.88. The remaining groups in which a large proportion of households were engaged continuously in the non-agricultural sector are 14, 15, and 21 years. The proportion in the rest of the groups was mostly under 0.1 implying that most households moved in and out. Since there is no clear pattern, we do not separately analyze the households engaged in the non-agricultural sector for continuous years. The last column of Table 2.10 reports the average number of transitions between the two sectors. The average number of transitions varied between 1.3 and 3.6. Relatively higher transitions, more than three, are observed primarily within the households engaged in the non-agricultural sector for 9 to 13 years. A further refinement would be to look at a specific point in time that a household transitions from the agricultural to the non-agricultural sector. We leave this for the future work.

The last result that describes our new endogenous regressor is presented in Figure 2.4. This figure plots the average of log real per capita consumption in 1993 by the number of years in the non-agricultural sector. There is a clear upward trend that is increasing in the number of years in the non-agricultural sector. This implies that there is selection into the number of years of employment in the non-agricultural sector which is similar to what was observed in the third section above. Households with higher baseline consumption were subsequently engaged in the non-agricultural sector for a longer period. In order to deal with this problem we employ an instrumental variable estimation strategy with household fixed effects, which is an improvement over the fixed effects estimation strategy in the previous section.

Estimation with the number of years in the non-agricultural sector

We estimate the effect of employment in the non-agricultural sector for an additional year using the following fixed effects estimation:

$$Y_{ht} = \alpha_h + \beta(Years\ in\ non\text{-}ag.)_h * t + \gamma X_{ht} + \theta t + \epsilon_{ht} \tag{2.4}$$

Equation 2.4 is same as Equation 2.2 except that now we have only one β to estimate unlike the earlier case when there were separate coefficients corresponding to seven groups. For the IV estimation strategy we predict *Years in non-ag.* using the Bartik shift-share instrument in the first stage.

The results using Equation 2.4 are presented in Tables 2.11 through 2.15. Table 2.11 reports estimates for the effect of the number of years in the non-agricultural sector on log of real per capita consumption. The first column is a simple OLS estimate, similar to column 2 in the Table 2.7 earlier. On average an additional year of employment in the non-agricultural sector results in about a 0.5 percent increase in consumption at the 1% level of significance. But according to the fixed effects (FE) estimate in column 2 there is significantly lower consumption growth by about 0.9% per year of employment in the non-agricultural sector, which is around 1% per year of the 80% consumption growth for the entire sample period of 1993-2014. These two estimates are qualitatively similar to what we found in the previous section.

The last column presents the estimate from the FE-IV approach. Note that the *F-statistic* from the first stage in the last row confirms the relevance of our instrument. The coefficient on the Bartik index from the first stage estimates implies that a positive labor demand shock to one's region leads to longer employment in the non-agricultural sector. The FE-IV estimate from the second stage has the same sign as the FE estimate but with three times the magnitude. Economically the

consumption change of about 2% due to the non-agricultural employment might seem small, but when converted into a longer period this results into a change of about 20% over 10 years which is one-fourth of the consumption growth in the entire sample period.

When we divide the sample into baseline poor and non-poor households we get a very different picture (see Table 2.12). Now, consumption growth is relatively lower only for the baseline poor households. They are relatively higher, in contrast, for those who were non-poor in the baseline. Results from a further sub-group classification, similar to that in the previous section, are presented in Table 2.13. Here, in addition to poverty status, we also differentiate by households that were agricultural in the baseline versus those that were not. The result identifies two separate groups but in a more refined way than what was presented in Table 2.12. We find that relatively faster growth in consumption was experienced by those who were poor but agricultural in the baseline and by those who were non-poor but non-agricultural. In contrast, those who were poor and non-agricultural in the baseline together with those who were non-poor and agricultural both experienced slower consumption growth by continuing for an additional year in the non-agricultural sector.

Consumption changes are indicative of absolute economic status, but they don't tell us about changes in poverty status. For this purpose, we also look at transitions in and out of poverty as in the previous section. From Tables 2.14 and 2.15 we find that an additional year of employment in the non-agricultural sector resulted in about a 0.7 percent increase in the probability of exiting poverty and about a 0.4 percent decrease in the probability of becoming poor. We found similar results for poverty transitions in the previous section as well.

2.7 Conclusion

The debate surrounding productivity differences between the agricultural and non-agricultural sectors is an old one. It goes back to the early 20th century when the Soviet government was

planning collectivization of agriculture and forcing the surplus labor to move to the non-agricultural sector for rapid industrialization. It has also been a focus of the literature on economic development, particularly in terms of the roles of the agricultural and non-agricultural sectors in reducing poverty. While some studies suggest that improvements in the agricultural sector can play a major role in reducing poverty, others have advocated for policies that promote employment in the non-agricultural sector.

In this chapter we revisit this question using one of the longest household panels in a developing country. Our outcomes are consumption changes and poverty transitions over a period of 22 years, between 1993 and 2014. First, we show through descriptive analysis that there is a possibility of selection of households into different sectoral groups. Households with lower baseline consumption in 1993 were subsequently engaged in agriculture for more periods and in non-agriculture for less. In order to deal with the selection problem we re-define sectoral employment in two novel ways to be consistent with two different estimation strategies—household fixed effects and instrumental variables. While the magnitudes of the estimates differ, the qualitative results are robust to the choice of method. With the estimation based on the entire sample we find lower consumption growth due to non-agricultural employment compared to employment in the agricultural sector. However, a sub-group analysis reveals that the benefits of non-agricultural employment are conditional upon other economic factors. Longer employment in the non-agricultural sector resulted in relatively higher consumption growth only for those households who were either poor and agricultural in the baseline, or non-poor and non-agricultural.

In terms of poverty transitions, the findings suggest that non-agricultural employment had a positive effect for poor and non-poor households. A longer period of employment in the non-agricultural sector resulted in a higher probability of moving out of poverty and a lower probability of becoming poor.

Overall, the non-agricultural sector does appear to be a pathway out of poverty, but moving into this sector does not always result in higher consumption growth compared to engaging in agricultural activities. It depends on the initial economic status as well as on the nature of the sectoral transitions. This is an important result for public policy. Gains from both sectors can be exploited by targeting policies specific to the initial economic status and sector. Agricultural poor households could be incentivized to diversify into productive employment in the non-agricultural sector. A different set of policies, in contrast, is required for the non-agricultural poor. It is likely that these involve human capital acquisition that permits moving up the non-agricultural employment ladder. This is an important topic for future research.

Tables and Figures

Table 2.1: Original Households and Their Splits

	1993	2000	2007	2014
Never Split	100.0	40.0	19.0	11.0
Split - Parents	0.0	26.4	31.0	29.1
Split - Children	0.0	23.0	34.6	38.8
Split - Other	0.0	10.6	15.4	21.1
No. of HH	7,224	10,508	13,590	15,761

Table 2.2: Household Characteristics by Household Type

	1993 All	2014 Parents	2014 Children
Rural	0.69	0.50	0.43
	(0.46)	(0.50)	(0.49)
Demographics:			
HH size	4.69	3.79	3.68
	(2.05)	(1.93)	(1.47)
Male HH head	0.86	0.77	0.91
	(0.35)	(0.42)	(0.29)
Male proportion in HH	0.48	0.46	0.51
	(0.19)	(0.23)	(0.22)
HH head age	45.42	54.91	36.91
	(13.92)	(13.03)	(8.83)
Median age in HH	25.93	40.01	25.24
	(14.37)	(17.13)	(8.89)
Highest school attended by HH head:			
No School	0.21	0.13	0.01
	(0.41)	(0.33)	(0.11)
Primary	0.55	0.50	0.28
	(0.50)	(0.50)	(0.45)
Jr. high	0.10	0.13	0.20
	(0.30)	(0.34)	(0.40)
Sr. high	0.10	0.17	0.34
	(0.31)	(0.38)	(0.47)
College or higher	0.03	0.07	0.15
	(0.18)	(0.26)	(0.36)
Assets:			
Owns farm land	0.36	0.37	0.22
	(0.48)	(0.48)	(0.41)
Farm land value (IDR 100,000)	125.65	451.86	335.22
	(625.46)	(803.27)	(649.65)
Farm land size (ha.)	.	0.78	0.90
	(.)	(2.08)	(3.66)
Other assets value (IDR 100,000)	301.03	638.43	465.71
	(3155.15)	(1308.00)	(908.27)

Standard deviation in parentheses.

HH: Household.

Table 2.3: Proportion of Households by Number of Periods in Baseline Sector

HH Type	1993 Location	1993 Sector	1993 Proportion	Rounds oberved in 1993 sector			
				1	2	3	4
Parents	Rural	Ag	35.4	14.4	23.9	38.6	23.2
		Non-Ag	19.4	14.5	22.1	32.2	31.2
	Urban	Ag	9.8	43.1	31.2	18.7	7.0
		Non-Ag	35.3	4.5	12.9	30.0	52.6
Children - Split	Rural	Ag	35.2	18.5	31.8	33.2	16.5
		Non-Ag	20.5	6.3	21.9	33.3	38.5
	Urban	Ag	8.7	47.6	31.9	13.3	7.2
		Non-Ag	35.6	2.2	9.9	29.4	58.6

Table 2.4: 2014 Per Capita Consumption by Number of Periods in Baseilne Sector (1000s of IDR per month)

HH Type	1993 Location	1993 Sector	Rounds oberved in 1993 sector			
			1	2	3	4
Parents	Rural	Ag	1094	931	885	762
		Non-Ag	974	996	1209	1192
	Urban	Ag	1289	1136	1180	1341
		Non-Ag	1086	1320	1507	1343
Children - Split	Rural	Ag	1185	1156	1077	935
		Non-Ag	1178	1336	1498	1397
	Urban	Ag	1486	1561	1255	1214
		Non-Ag	1399	1603	1717	1549

Table 2.5: Percentage Change in Per Capita Consumption Between 1993 and 2014 by Number of Periods in Baseline Sector

HH Type	1993 Location	1993 Sector	Median Consumption in 1993	Rounds oberved in 1993 sector			
				1	2	3	4
Parents	Rural	Ag	194	126	108	110	114
		Non-Ag	287	110	107	99	99
	Urban	Ag	336	81	104	75	117
		Non-Ag	401	61	69	85	87
Children - Split	Rural	Ag	185	146	133	133	127
		Non-Ag	270	128	141	129	126
	Urban	Ag	317	109	106	130	96
		Non-Ag	343	105	107	111	114

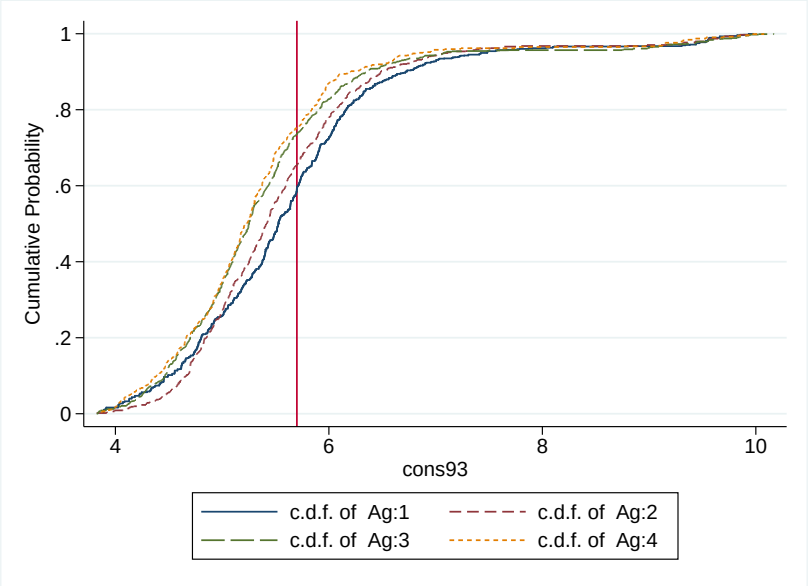
Table 2.6: Proportion of Poor Households in 1993 by Number of Periods in Baseline Sector

HH Type	1993 Location	1993 Sector	Rounds oberved in 1993 sector			
			1	2	3	4
Parents	Rural	Ag	65	66	73	77
		Non-Ag	58	59	46	39
	Urban	Ag	40	49	51	41
		Non-Ag	45	36	33	37
Children - Split	Rural	Ag	71	69	79	80
		Non-Ag	65	59	49	48
	Urban	Ag	45	43	66	65
		Non-Ag	61	39	40	45

CDF Plots - Parents (by sector)

Figure 2.1: Consumption Distribution, by Number of Rounds Observed in Agricultural Sector

(a) 1993



(b) 2014

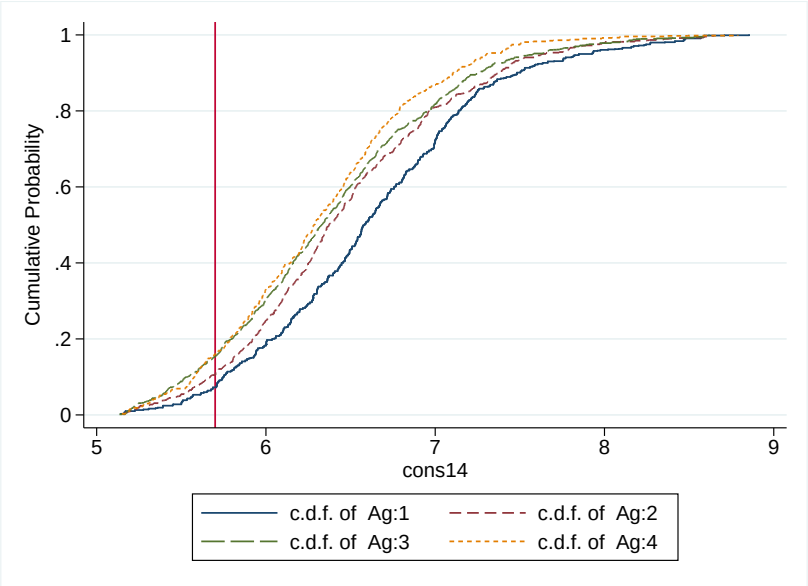
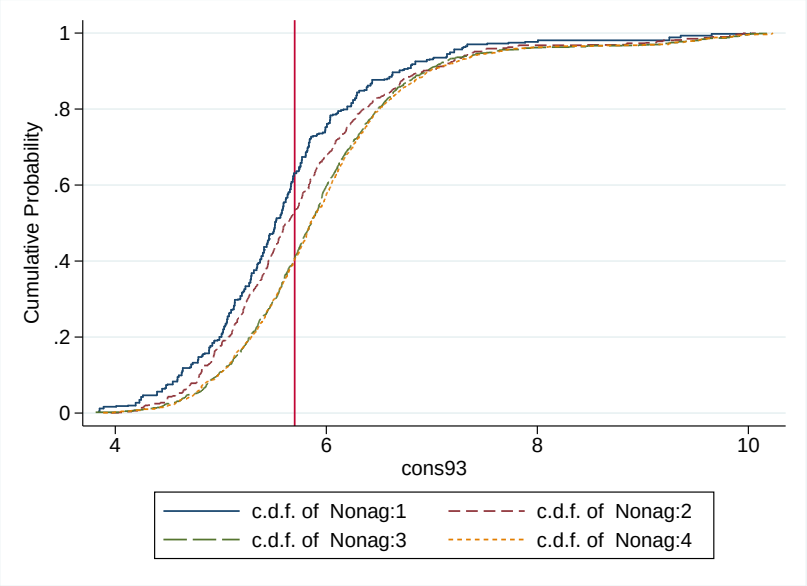


Figure 2.2: Consumption Distribution, by Number of Rounds Observed in Non-Agricultural Sector

(a) 1993



(b) 2014

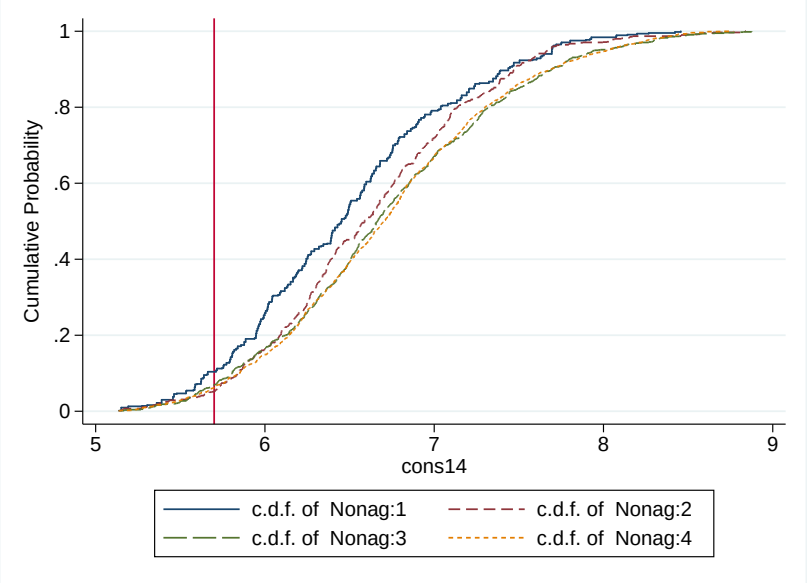


Table 2.7: Sectoral Transitions and Consumption Changes.
Dep. Var.: "Log of Consumption"

	OLS		Fixed Effects		
	(1)	(2)	(3)	(4) Baseline poor	(5) Baseline nonpoor
ag1	0.158***	0.128***	-0.001	0.171*	0.406**
	(0.02)	(0.02)	(0.10)	(0.09)	(0.20)
ag2	0.077***	0.066***	-0.103	-0.015	0.204
	(0.02)	(0.02)	(0.09)	(0.07)	(0.17)
ag3	0.035*	0.022	-0.080	-0.029	-0.009
	(0.02)	(0.02)	(0.08)	(0.05)	(0.17)
nag1	0.086***	0.053*	-0.214*	0.072	0.085
	(0.03)	(0.03)	(0.12)	(0.10)	(0.22)
nag2	0.133***	0.076***	-0.242**	-0.078	0.338*
	(0.02)	(0.02)	(0.10)	(0.08)	(0.18)
nag3	0.195***	0.121***	-0.233**	-0.106	0.532***
	(0.02)	(0.02)	(0.09)	(0.07)	(0.17)
nag4	0.187***	0.121***	-0.229**	-0.094	0.528***
	(0.02)	(0.02)	(0.09)	(0.07)	(0.17)
N	11103	11099	11111	5701	5410
R^2	0.55	0.58	0.32	0.75	0.06
Controls	No	Yes	Yes	Yes	Yes
Cons. Growth	0.94	0.94	0.94	1.48	0.32

Table 2.7a: Between Group Comaprison of Coefficients in Column 4 of Table 7 (For the Baseline Poor)

Sector	ag4	ag3	ag2	ag1	nag1	nag2	nag3	nag4
ag4	-							
ag3	-	-						
ag2	-	-	-					
ag1	*	**	**	-				
nag1	-	-	-	-	-			
nag2	-	-	-	***	-	-		
nag3	-	-	-	***	-	-	-	
nag4	-	-	-	***	*	-	-	-

Table 2.7b: Between Group Comaprison of Coefficients in Column 5 of Table 7 (For the Baseline Non-Poor)

Sector	ag4	ag3	ag2	ag1	nag1	nag2	nag3	nag4
ag4	-							
ag3	-	-						
ag2	-	-	-					
ag1	**	**	-	-				
nag1	-	-	-	*	-			
nag2	*	**	-	-	-	-		
nag3	***	***	**	-	***	*	-	
nag4	***	***	**	-	***	*	-	-

Table 2.8: Sectoral Transitions and Poverty Exit Dep. Var.: "Dummy for baseline poor becoming non-poor".

	OLS		Fixed Effects
	(1)	(2)	(3)
ag1	0.051***	0.048***	0.106***
	(0.01)	(0.01)	(0.03)
ag2	0.038**	0.035**	0.086***
	(0.01)	(0.01)	(0.03)
ag3	-0.009	-0.013	-0.014
	(0.01)	(0.01)	(0.03)
nag1	0.028	0.021	0.052
	(0.02)	(0.02)	(0.04)
nag2	0.038**	0.040***	0.102***
	(0.02)	(0.01)	(0.03)
nag3	0.030**	0.020	0.074**
	(0.01)	(0.01)	(0.03)
nag4	0.037***	0.030**	0.093***
	(0.01)	(0.01)	(0.03)
N	5716	5702	5725
R^2	0.74	0.75	0.86
Controls	No	Yes	Yes

Table 2.8a: Between group comaprison of coefficients in Column 3 of Table 8

Sector	ag4	ag3	ag2	ag1	nag1	nag2	nag3	nag4
ag4	-							
ag3	-	-						
ag2	***	***	-					
ag1	***	***	-	-				
nag1	-	-	-	-	-			
nag2	***	***	-	-	-	-		
nag3	**	***	-	-	-	-	-	
nag4	***	***	-	-	-	-	-	-

Table 2.9: Sectoral Transitions and Poverty Entry Dep. Var.: "Dummy for baseline non-poor becoming poor".

	OLS		Fixed Effects
	(1)	(2)	(3)
ag1	-0.030*	-0.023	-0.062*
	(0.02)	(0.02)	(0.03)
ag2	-0.016	-0.013	-0.030
	(0.02)	(0.02)	(0.04)
ag3	-0.031*	-0.028	-0.059*
	(0.02)	(0.02)	(0.04)
nag1	-0.019	-0.019	-0.048
	(0.02)	(0.02)	(0.04)
nag2	-0.043**	-0.033**	-0.079**
	(0.02)	(0.02)	(0.03)
nag3	-0.035**	-0.023	-0.062*
	(0.02)	(0.02)	(0.03)
nag4	-0.044***	-0.034**	-0.085***
	(0.02)	(0.01)	(0.03)
N	5438	5435	5435
R^2	0.04	0.05	0.07
Controls	No	Yes	Yes

Table 2.9a: Between group comaprison of coefficients in Column 3 of Table 9

Sector	ag4	ag3	ag2	ag1	nag1	nag2	nag3	nag4
ag4	-							
ag3	*	-						
ag2	-	-	-					
ag1	*	-	-	-				
nag1	-	-	-	-	-			
nag2	**	-	**	-	-	-		
nag3	*	-	-	-	-	-	-	
nag4	***	-	**	-	-	-	*	-

Figure 2.3: Distribution of households by
the number of years in the non-agricultural sector

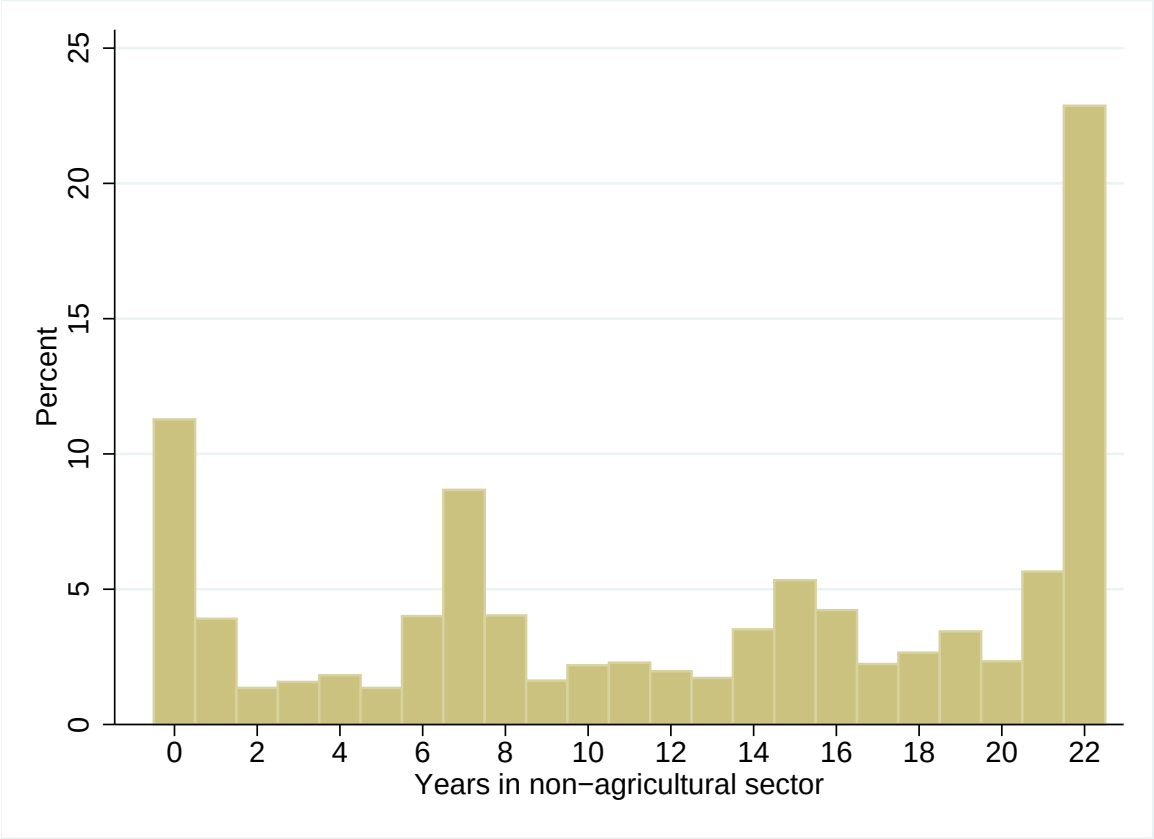


Table 2.10: Share of households with continuous years of employment in non-agriculture and average number of transitions between sectors

No. of years in non-agricultural sector	No. of households	Percent of HHs with continuous years	Average number of transitions
0	459	1	0
1	159	1	1.3
2	55	0.33	2.6
3	64	0.70	2.5
4	74	0.49	2.7
5	55	0.40	2.9
6	163	0.82	2.3
7	353	0.88	1.5
8	164	0.35	2.4
9	66	0.09	3.5
10	89	0.10	3.4
11	93	0.02	3.6
12	80	0.03	3.3
13	70	0.14	3.3
14	143	0.51	2.3
15	217	0.49	2.0
16	172	0.07	2.5
17	91	0.18	3.1
18	108	0.06	2.8
19	140	0.05	2.4
20	95	0.12	2.4
21	230	0.40	1.6
22	931	1	0

Figure 2.4: Average baseline consumption by
the number of years in the non-agricultural sector

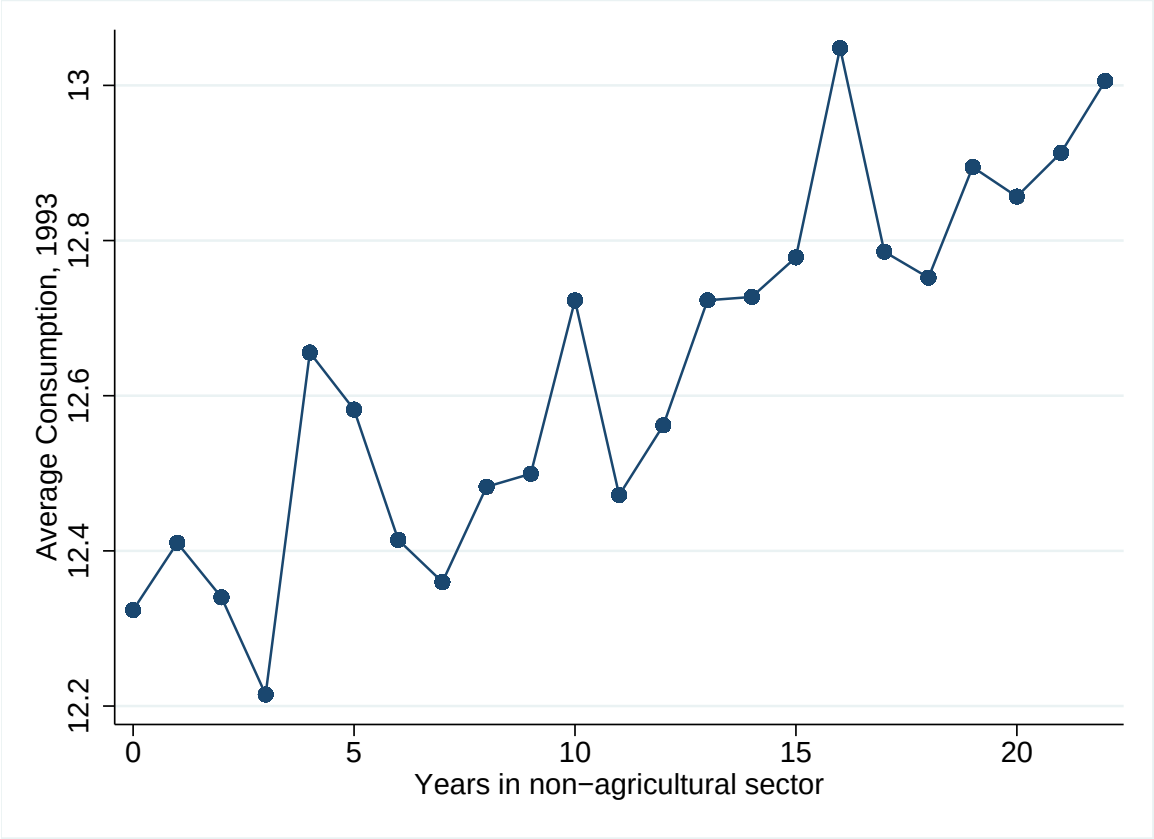


Table 2.11: Effect of number of years in a sector on consumption changes

	(1) OLS	(2) FE	(3) FE-IV
Non-ag. years	0.0048***	-0.0088**	-0.0245***
	(0.00)	(0.00)	(0.01)
N	8131	8132	8122
R^2	0.58	0.35	0.34
Cons. Growth	0.80	0.80	0.80
First Stage			
Bartik			2.82***
			(0.17)
F-stat			275.51
Prob.>F			0.0000

Table 2.12: Effect of number of years in a sector on consumption changes (Within poor and non-poor)

	Baseline poor		Baseline non-poor	
	(1) FE	(2) FE-IV	(3) FE	(4) FE-IV
Non-ag. years	-0.0029	-0.0217***	0.0192***	0.0276**
	(0.00)	(0.01)	(0.01)	(0.01)
N	4311	4306	3822	3818
R^2	0.74	0.73	0.04	0.04
Cons. Growth	1.28	1.28	0.25	0.25
First Stage				
Bartik		3.09***		2.21***
		(0.22)		(0.17)
F-stat		198.81		164.85
Prob.>F		0.0000		0.0000

Table 2.13: IV estimates of the effect of number of years in a sector on consumption changes (conditional on baseline sector and poverty status)

	Baseline poor		Basline non-poor	
	(1)	(2)	(3)	(4)
Non-ag.	0.0724***		-0.0907*	
years*baseline ag.	(0.02)		(0.05)	
Non-ag.		-0.0147***		0.0197*
years*baseline non-ag.		(0.00)		(0.01)
N	4306	4306	3816	3816
R^2	0.71	0.75	-0.04	0.06
Cons. Growth	1.28	1.28	0.25	0.25
First Stage				
Bartik	-0.78***	3.86***	-0.61***	2.81***
	(0.12)	(0.24)	(0.07)	(0.20)
F-stat	44.29	250.47	66.63	190.44
Prob.>F	0.0000	0.0000	0.0000	0.0000

Table 2.14: Effect of number of years in a sector on the probability of exiting poverty

	(1) FE	(2) FE-IV
Non-ag. years	0.0042***	0.0067***
	(0.00)	(0.00)
N	4311	4306
R^2	0.86	0.86
First Stage		
Bartik		3.08***
		(0.22)
F-stat		193.60
Prob.>F		0.0000

Table 2.15: Effect of number of years in a sector on the probability of becoming poor

	(1) FE	(2) FE-IV
Non-ag. years	-0.0009	-0.0042**
	(0.00)	(0.00)
N	3821	3816
R^2	0.07	0.06
First Stage		
Bartik		2.20***
		(0.17)
F-stat		169.07
Prob.>F		0.0000

CHAPTER 3

Full versus partial decentralization and individual welfare in Indonesia

3.1 Introduction

In chapter 1, I showed that full decentralization differs from partial or no decentralization in terms of the provision of public goods. Specifically, I showed that public goods—such as health-centers and schools—increased significantly in the villages belonging to the fully decentralized Indonesian districts compared to those in the districts with partial or no decentralization. However, increased provision of public goods does not necessarily imply changes in final outcomes such as education or health. In the absence of such achievements the effects of decentralization and the resulting public goods would be incomplete. Decentralization is a means to achieve an end, not an end in itself (Bossert, 1998).

In this chapter I address this gap by exploring the effects of decentralization complementarities on individual outcomes. This provides an important contribution to the literature because there are few studies that estimate the effects of decentralization on individual level outcomes (Treisman, 2007), and certainly none that analyze the effects of complementarities between different types of decentralization.

The decentralization event that was exploited in the previous chapter relates to the post-Suharto dictatorial regime. From 2000 to 2009, some districts experienced two important decentralization reforms: elections and splitting.[1] Districts experienced these policies at different points in time which resulted in heterogeneity in these treatments across districts. One can observe four groups of districts at a point in time: those with only election or only splitting, those with both and the ones with none. The districts that experienced only an election or only splitting differ from the ones that experienced both, in the sense that the former had partial decentralization while the latter were fully decentralized. Partial decentralization implies an increase in just accountability (via elections) or just administrative resources (via splitting), while full decentralization could improve both accountability and administrative resources.

In this chapter I focus on the individual outcomes associated with three of the seven village level publicly provided goods and services explored in the previous chapter. These are community health centers, junior high schools, and electricity. The availability of these village level goods was significantly higher in the districts treated with full decentralization compared to those that experienced partial or no decentralization. In this chapter, like the previous one, I test for the effects of full versus partial decentralization on individual outcomes such as educational attainment. While the main source of data will be *Susenas* (an individual level cross-sectional survey of socio-economic characteristics), I corroborate some of my findings from two additional data sources —

[1] Note that in addition to these two reforms, district level fiscal decentralization was universal. In 2000, all district governments were given autonomous power to make expenditure decisions in fifteen policy areas while the majority of tax collection power was retained by the central government.

IFLS and *Indo-Dapoer* — using estimation techniques specific to each dataset. Broadly speaking, the methodology will rely on difference-in-differences estimation with individual or district fixed effects, wherever applicable.

The question that I explore in this chapter is:

Do increased public goods that result from complementarities between different types of decentralization lead to improvements in associated individual outcomes?

This chapter makes two important contributions to the literature. First, to the best of my knowledge, there is no study that estimates the causal link between complementarities of different types of decentralization and individual outcomes. Even the studies that estimate the effect of any kind of decentralization are limited. A major limitation with associating decentralization with individual outcomes is the availability of relevant data in order to accurately identify the treatment of decentralization applicable to an individual. This brings me to the second contribution. In order to deal with identification problems I employ three separate identification strategies on three distinct datasets, along with different imputation techniques to assign the treatment of decentralization. The results are consistent across all three datasets and methods, which lend greater credibility to the findings.

The main finding is that the districts treated with full decentralization observed the most improvement in the individual outcomes associated with increased public goods. For example, in the previous chapter I had shown that improvements in junior high schools were highest in the fully decentralized districts compared to partially decentralized ones or in the districts without any decentralization. In this chapter, I show that educational attainment at a junior high school level or above is significantly higher in these fully decentralized districts. I find similar improvements in health and electricity outcomes. Finally, I have also initiated a potential topic for future research by

analyzing the effects of complementarities of decentralization on individual income and consumption. Although there is no obvious link between the two, it is possible that there are general equilibrium effects due to increased public goods.

The organization of this chapter is as follows. The next section discusses the existing literature and in the third section I describe the three datasets used in this paper. In the fourth section I provide a brief summary of Indonesian decentralization (which was described in detail in the previous chapter). The fifth section describes the econometric strategy pertaining to the three datasets, followed by a brief discussion of the summary statistics. The main results are presented in the sixth section followed by robustness checks in the seventh section. The last section concludes.

3.2 Existing Literature

Channa and Faguet (2016) provide a systematic literature review of the empirical studies that test the link between decentralization and final outcomes related to health and education. They document the quantitative studies that attempt to investigate the effect of decentralization on education and health. They come across 34 such studies and out of these they find only 14 to be strongly or very strongly credible in terms of establishing a casual relationship. The papers using direct individual measures are quite limited. Most of them are either cross-country studies or at best they use sub-regional aggregates. Even among the studies using individual outcomes some have small sample sizes severely limiting the external validity of their findings.

In a methodologically strong study, but at county level, Uchimura and Jütting (2009) show that increased fiscal decentralization led to reduced infant mortality in China. Another finding in a similar spirit is by Asfaw et al. (2008), using village level data, who show that higher fiscal decentralization led to lower infant mortality in India. The studies focusing on the effects of decentralization on education make more use of micro data, such as school level or student level outcomes. For instance,

Galiani et al. (2008) find a positive effect of decentralization on school level test scores in Argentina compared to the schools that were always provincial. Similarly, Faguet and Sánchez (2008) find increased school enrolment due to increased decentralization and fiscal powers provided to local governments in Colombia. According to Channa and Faguet (2016), 11 out of the 34 studies used individual level outcomes and most of these were looking at decentralized education management per se and not a decentralized government. For instance, Duflo et al. (2011) study the effect of school autonomy in hiring teachers and monitoring their performance.

In summary, there are a limited set of studies that estimate the impact of decentralization of governance on individual outcomes related to health and education. Most of the studies use regional aggregates and their measures of decentralization are mostly fiscal decentralization or in some cases increased accountability.

Finally, to the best of my knowledge, outcomes like electricity — which is an important measure of individual welfare — have not been explored in the decentralization literature. Pecuniary measures of welfare such as income and consumption have also received less attention (Jütting et al., 2005).

3.3 Data

Susenas

This is a large cross-sectional socioeconomic survey conducted every one to two years. It collects data on household and individual characteristics including health, education and labor force experience. The sample is representative of Indonesia's population during the time of the survey. I obtained information related to health and education from the years 2000 and 2009. There are three main variables that will be used as outcomes. The first is outpatient visit to community health centers which indicates an individual's preference for private versus public health center when in need for an outpatient treatment. Although it is not a final health outcome it signifies whether

health centers created due to decentralization were preferred over private ones and did not get unused. Second outcome is maximum education level of an individual. Last is household access to electricity and the source of electricity — public or private. The latter indicates the ability of local governments to provide electricity compared to private sources. This dataset will be the main source of data in this chapter, while the other two datasets will serve to provide corroborating evidence.

IFLS

The Indonesian Family Life Survey (*IFLS*) is an individual panel data set that spans over a period of 21 years, from 1993 to 2014. This data is more detailed than *Susenas*, but for a much smaller sample. It is representative of about 83% of the Indonesian population in 1993. For the purpose of this study, I utilize the 2000 and 2007 survey rounds. The outcomes to be used from this data include education level of an individual and the real per capita income and consumption of a household.

Indo-Dapoer

This is a district level dataset publicly made accessible by the World Bank. It contains information on individual level outcomes like proportion of individuals with secondary education in a district. I will be using these outcomes to corroborate the findings from *Susenas* and *IFLS*.

3.4 The Indonesian Decentralization

In this section I provide a brief summary of the Indonesian decentralization process that was exploited in the previous chapter. After the fall of Indonesia's long serving Dictator Suharto, the Indonesian government implemented various decentralization and democratization reforms. The identification strategy in this chapter exploits the variation in district level administrative and political decentralization between 2000 and 2009. Districts are the main local governments in Indonesia.

Administrative decentralization refers to the gradual splitting of districts over time. This resulted in the formation of a new district capital, an increase in the number of district heads, and more administrative and fiscal resources for each district. The number of districts increased from less than 300 in the year 2000 to over 500 by 2012. District splitting took place in two sub-periods: 2001 to 2003 and 2007 to 2012. There was a moratorium on splitting from 2004 to 2006, which coincided with the initiation of direct elections for district heads.

Political decentralization refers to the direct elections of district heads from 2004 to 2009, which occurred as the terms of the existing, indirectly elected, district heads ended. The timing of elections is plausibly exogenous because it was historically determined by temporal differences in the formation of districts during the early to mid-20th century, as well as by the decisions made during the Suharto regime. Concerns over the possibility of corruption between district heads and local governments provided the impetus for such elections (Mietzner, 2007).

Due to these reforms, there were four different types of districts by 2008: those that were split; those that had elections; those that experienced both; and those that experienced neither. The treatment will be based on these four groups of districts, while the outcomes will be mostly at the individual level before and after the decentralization event.

3.5 Econometric Specifications

The three datasets are distinct. Since the treatment is at district level, each dataset differs in terms of identification of an individual's district before and after splitting of districts. For example, in *Susenas* the information on the boundaries of the newly formed districts is not available in the baseline, but it can be identified in *IFLS*. Also, in the district level dataset *Indo-Dapoer* the information on outcomes in the baseline is available only at the level of the original districts. These kinds of issues require estimation strategies that are specific to each dataset.

3.5.1 Specification – Susenas

Since *Susenas* is a cross-sectional data set, the boundaries of new split districts can be identified only in the end-line. In the baseline, however, the information is available only for original undivided districts. So, if a district A was split into A1 and A2, individuals can be identified belonging to newly formed A1 and A2 separately only in the end-line but in the baseline all individuals can at best be assigned A as their district. As a result, it is not be possible to assign treatments based on new district boundaries. Out of the three kinds of treatments — *Election, Split* and *Both* — it is straightforward to assign the first two, but not the last treatment. *Election* happens in non-split districts so both baseline and end-line districts are the same. *Split* treatment is assigned to the entire original district that was split; hence, all the individuals within the original district were treated with closer government due to splitting. For the last treatment, i.e. *Both*, an example should help to illustrate the challenge. If both A1 and A2 faced elections in addition to being split, then assigning the treatment *Both* is non-problematic. But this is not the case when only one of the two has faced an election. For simplicity, I assign a treatment of *Both* if at least one part of the newly formed district faced an election in addition to a split. Thus, any coefficient associated with this treatment should be interpreted as a lower bound. The resulting difference-in-differences specification is:

$$\begin{aligned} Y_{idt} = \alpha + \beta_1 Post_t + \beta_2 * Election_{dt} + \beta_3 * Split_{Dt} + \beta_4 (Split * Election_{Dt}) + \\ \beta_5 (Election * Post)_{dt} + \beta_6 (Split * Post)_{Dt} + \beta_7 (Split * Election * Post)_{Dt} + \epsilon_{idt} \end{aligned} \tag{3.1}$$

where Y_{idt} represents individual outcomes belonging to district d at time t. β_1 captures the time effects. β_2, β_3 and β_4 capture time-invariant effect of belonging to respective group of treatment. Note the different subscripts d and D for these different groups. The subscript d represents identification of true original and final district; districts with only *Election* were the same in both periods and hence clearly identified. But, subscript D represents assignment to districts based on their baseline boundaries. So, if district A was split into A1 and A2, the treatment *Split* is assigned to

A because A1 and A2 cannot be identified in the baseline and the same is true for *Split*Election*. Lastly, note that for the treatment *Split*Election* at least one part of the split district has faced an election by the end-line. The coefficients of interest are β_5, β_6 and β_7.

3.5.2 Specification – Indo-Dapoer

Indo-Dapoer data has individual information aggregated at the district level. The estimation problem in this dataset is that the aggregated information in the baseline period is not available based on the boundaries of the newly formed districts. For example, in the baseline period the proportion of school enrolment is available for the entire original districts and in the end-line the same information is available for newly formed districts. So, for estimation purposes the same baseline aggregated value is assigned to all the newly formed parts of the split districts. For example, if district A is split into A1 and A2, in the baseline the average value is the same for A1 and A2 while in the end-line they are assigned their own values. The assumption here is that in the baseline the average value of district A is truly representative of A1 and A2. This imputation applies to all the split districts and hence to the districts with treatments *Split* and *Split*Election*. The direction of bias is unknown since *Election* was random. Unlike Equation 3.1 in the case of *Indo-Dapoer*, the assignment of treatment is based on the final boundaries of newly formed districts. The resulting difference-in-differences specification with district fixed effects is:

$$Y_{dt} = \alpha_d + \beta_1 Post_t + \beta_2 (Election * Post)_{dt} + \beta_3 (Split * Post)_{dt} + \beta_4 (Split * Election * Post)_{dt} + \epsilon_{idt} \tag{3.2}$$

This specification is similar to Equation 3.1, except that here the assignment of treatment is based on end-line districts. Also, district fixed effects α_d absorbs group effects of the three treatment groups. Note that the baseline value of outcomes for newly formed districts is same as their original counterparts.

3.5.3 Specification – IFLS

IFLS is panel data at individual level and so the estimation problems are different than in the cases of *Susenas* and *Indo-Dapoer*. Treatment and outcomes can be conveniently identified for each individual/household based on the final district boundaries.[2] Hence, the estimation technique in this case will be same as in the previous chapter, i.e. difference-in-differences with individual fixed effects.

$$Y_{idt} = \alpha_i + \beta_1 Post_t + \beta_2 (Election * Post)_{dt} + \beta_3 (Split * Post)_{dt} + \beta_4 (Split * Election * Post)_{dt} + \epsilon_{idt} \tag{3.3}$$

Here, Y_{idt} is outcome for individual i in district d at time t. α_i captures individual fixed effects. β_2, β_3 and β_4 capture the effects of belonging to one of the three treatment groups.

3.6 Summary Statistics

Table 3.1 presents baseline summary results from *Susenas* and *IFLS* for the four groups — districts with no decentralization, districts with only political or only administrative decentralization, and districts with both.[3] Average household size across all four groups is around four members per household according to *Susenas*, but it is about six members based on *IFLS*. The sample consists of 46% married individuals and about 50% females in each group. In *IFLS* as well there are about 50% female members in a household. The average age varies from one group to another. The districts treated with both a split and an election has the youngest population at an average of 25.54 years while the districts with only an election are the oldest at an average of 28.80 years. Similarly, in the *IFLS* sample household heads are youngest in the districts treated with both split and election

[2] The only issue here was splitting of households between 2000 and 2007. For the new split-off households baseline value was imputed based on their original counterpart. This exercise was carried out only to ensure completeness in the sample, however, it doesn't affect the main results.

[3] Note that political decentralization implies elections and administrative decentralization means splitting of districts.

compared to other districts. The reason behind these differences in age is unclear, although they are unlikely to be correlated with different types of decentralization.

3.7 Results

Tables 3.2 through 3.5 present the main results for individual level outcomes. These results are estimated using specifications 3.1, 3.2 and 3.3 corresponding to the three datasets used. I discuss these results separately for each outcome.

Education

In the previous chapter I showed that the villages belonging to the districts that were treated with both an election and a split had significantly more junior high schools per capita compared to the villages belonging to the districts with only a split, only an election or neither. The difference was around 4 schools per 100,000 people, an increase of about 50 percent compared to the baseline mean.

Table 3.2 in this chapter presents the effect of this increase on an individual's educational attainment. The first two columns present estimates from the individual level surveys *Susenas* and *IFLS*. The outcome in both the cases is defined as an individual with at least a junior high school level of education. The last column is based on district level data, and the outcome is defined as the proportion of individuals enrolled in junior high school in a district. Across all the three datasets there is strong evidence of a significant increase in schooling at or above the junior high school level for the districts treated with full decentralization, but not for those treated with partial decentralization. Based on all the three datasets the increase is about 6-8 percent over baseline mean schooling. Based on *Susenas* and *IFLS*, the proportion of individuals with at least junior high school education increased by 2-3 percentage points compared to a baseline mean of about 35-36 percent. Similarly, based on the district level data *Indo-Dapoer*, the proportion of individuals enrolled in junior high

school increased by 4 percentage points in the districts treated with both an election and a split compared to a baseline mean of 59 percent. Overall, along with the finding in the first chapter, the result here implies that full decentralization resulted in increased junior high schools which in turn affected the level of schooling.

Visits to community health center

For testing the effect of full decentralization on individual outcomes related to health centers, relevant information was available only in *Susenas*. Table 3.3 presents the estimation results for outpatient visits to community health centers conditional on any outpatient visit by an individual. The proportion of individuals visiting a community health center for outpatient treatment increased by 6 percent and 10 percent in the districts treated with both a split and elections and in the districts treated with only a split, respectively. These estimates are not significantly different from each other as per the test of equality between these coefficients reported in the second last row. They are indeed different from the estimate of the districts treated with only elections. Hence, the effect of more health centers, as observed in the first chapter, has certainly resulted in increased outpatient visits by the individuals belonging to fully decentralized districts. But, a statistically similar increase is observed even in the districts that experienced partial (administrative) decentralization.

Electricity

This outcome is similar to the one used in the first chapter. Earlier it was defined as the proportion of households with access to electricity in a village. This proportion had increased significantly at the 1% level of significance for the villages belonging to fully decentralized districts and at the 10% level of significance for the villages belonging to only split districts. But a test of equality of coefficients between the two significant coefficients had suggested that it was higher for fully decentralized districts.

Table 3.4 in this chapter presents a slightly different version of this outcome. Columns 1, 3 and 4 use indicators for a household with access to electricity as dependent variable from *Susenas*, *IFLS* and *Indo-Dapoer*. But the second column indicates a household with access to electricity from a public utilities provider. According to this column, the proportion of households with electricity from a government source increased significantly, at the 1% level of significance, by 8 percentage points. This was an increase of about 10 percent over the baseline mean of 79 percent. This could be a lower bound since, as described above, not all fully decentralized districts did in fact face elections. Similar increases are observed in columns 1, 3 and 4 that use indicators for a households with access to electricity from *Susenas*, *IFLS* and *Indo-Dapoer*. However, in the case of *Indo-Dapoer* even the districts treated with only a split have a significantly positive coefficient. But the estimated coefficient is significantly smaller than the fully decentralized districts as per the second to last row. Interestingly, this result is similar to the village level proportion of households with electricity in the previous chapter.

Income and Consumption

The final outcome variables explored in this chapter, using only *IFLS* data, are household consumption and income. There is no obvious link between decentralization and income/consumption. However, considering the increased availability of various publicly provided goods in the fully decentralized districts one could expect general equilibrium effects on household consumption or income. A short-term channel would be increased demand for labor in order to construct new public goods such as schools. A longer-term channel could be direct and indirect employment generation due to the availability of a public good, such as the demand for teachers.[4]

Table 3.5 presents the results from *IFLS* for the log of real per capita income and consumption at a household level. Both variables increased significantly by about 19% for the households belonging to

[4] Note that in the previous chapter I showed increased availability of doctors in the districts treated with full decentralization. Also, according to Mukherjee (2014), a major portion of local government expenditure was directed towards hiring personnel which included teachers and doctors.

the districts treated with both an election and a split. The income coefficient of fully decentralized districts is significantly different from that of the partially decentralized districts, i.e. only an election or only a split. But the same is not true of consumption. In the case of consumption, the fully decentralized districts have a significantly different coefficient from the control districts, but it is not statistically different from the partially decentralized districts.

The finding in this subsection indicates that full decentralization has some effects on outcomes like consumption and income. Future research should seek a deeper understanding of the general equilibrium effects of decentralization.

3.8 Robustness

For robustness check I adopt the identification strategy from Burgess et al. (2012) and Bazzi and Gudgeon (2015a). As discussed in chapter 1, the splitting of districts was not random although the timing of splits was. Furthermore, the timing of elections was random. Splitting was spread over two sub-periods. The first sub-period was 2001-2003. This was followed by a moratorium on splitting from 2004-2006. Splitting resumed from 2007 onwards. The moratorium was imposed in order to implement the newly announced district level elections, beginning in 2005. Thus, the districts that were scheduled to be split during 2004-2006 were randomly postponed to the post-2007 period. In order to take advantage of this random bifurcation in the timing of split, I use the following specification to test the differences in outcomes between fully and partially decentralized districts. The main idea here will be to make all the comparisons only within split districts hence mitigating the concern of splitting being endogenous to the treatment. For the purpose of illustration, I modify specification 3.3, but the counterparts for specifications 3.1 and 3.2 are similar.

$$Y_{idt} = \alpha_i + \beta_1 Post_t + \beta_3 (Split * Post)_{dt} + \beta_4 (Split * Election * Post)_{dt} + \epsilon_{idt} \tag{3.4}$$

The main difference between specifications 3.3 and 3.4 is that the comparison is now only within the split districts. The districts that were split in the post-moratorium period are now functioning as control group. So the estimations based on specification 3.4 do not include the districts that did not face any splitting treatment.

It is important to note the following two points while interpreting the results from this estimation. First, the control group includes split districts in the post-moratorium period (i.e. post-2007) and the end-line year of *Susenas* and *Indo-Dapoer* is 2009. So, in the case of these two datasets the control group would include the districts that have been treated by the time their respective outcomes are observed in the end-line. Hence, the estimates in this case would be lower bound. Second, in the case of *IFLS*, since the data may not be representative of all the decentralized districts, estimated results after dropping the non-split districts must be interpreted only as suggestive evidence. In a nutshell, the main objective of this exercise will be to check if the districts that were partially decentralized, i.e. faced only splitting, were different from the districts that were fully decentralized when compared to the districts that faced splitting in the post-moratorium period.

The results from specification 3.4 are presented in Appendix tables A3.1 through A3.4. As per the *Susenas* data set, the individuals belonging to fully decentralized districts were not significantly different from the control group in terms of education (Table A3.1). However, considering the fact that the control group also included treated districts (see above), fully decentralized districts certainly did better than partially decentralized districts according to the last row of the first column that tests for the equality between the coefficients of partially decentralized and fully decentralized districts. The same is not true in the case of *IFLS* data, where no significant difference is observed between districts with only administrative decentralization compared to the districts with both administrative and political decentralization. Finally, in the case of *Indo-Dapoer* there is no significant difference between the coefficients of only split and both election and split, but the districts with both treatments did better than the control split districts.

In the case of outpatient visits to community health centers (Table A3.2) both partially and fully-decentralized districts seemed to have performed equally well since both the coefficients are significantly better than the control districts, but there is no significant difference between the two. However, in the case of electricity access (Table A3.3), households in the fully decentralized districts experienced significantly better outcomes compared to the control and partially decentralized districts. Finally, in the case of income (Table A3.4) the individuals belonging to the fully decentralized districts had significantly higher income growth compared to the control group, whereas the individuals from partially decentralized districts observed negative income. But for consumption, there are no significant differences between different treatment groups and the control.

In summary, the robustness of these results suggest that welfare outcomes are better for individuals belonging to the fully decentralized districts compared to those from districts with only administrative decentralization. This also mitigates concerns of splitting being endogenous to the treatment since all of the comparisons in this subsection are within split districts.

3.9 Conclusion

Chapter 1 of this dissertation explored whether the amount of publicly provided goods differed in fully decentralized districts relative to partially decentralized ones. Since fully decentralized districts in Indonesia experienced an increase in such goods, in this chapter I explored whether individual outcomes associated with those publicly provided goods also changed.

The conclusions here are similar to those in the previous chapter. Individuals or households belonging to the districts treated with both administrative and political decentralization experienced significantly better welfare outcomes compared to the partially decentralized districts or the districts with no decentralization. This finding was supported by data from three difference sources.

Other household level outcomes explored in this chapter included income and consumption. The objective was to test if there are general equilibrium effects of decentralization. Again, the conclusions were similar to those obtained for other outcomes. This opens up a potentially rich area for future research: the general equilibrium effects of decentralization.

Tables

Table 3.1: Summary Statistics

	Control	**Political**	**Admin.**	**Both**
	Susenas			
HH Size	4.09	4.02	4.07	4.30
	(1.82)	(1.80)	(1.75)	(1.83)
Marital Status	0.44	0.45	0.45	0.43
	(0.50)	(0.50)	(0.50)	(0.49)
Female	0.50	0.51	0.49	0.49
	(0.50)	(0.50)	(0.50)	(0.50)
Age	28.02	28.80	26.73	25.54
	(18.97)	(19.57)	(18.52)	(18.24)
	IFLS			
HH Size	6.21	5.91	6.45	6.31
	(2.83)	(2.65)	(2.76)	(2.86)
HH Head Age	47.57	47.81	46.49	45.94
	(19.61)	(29.56)	(12.63)	(13.73)
Female (in a HH)	0.51	0.51	0.50	0.51
	(0.17)	(0.17)	(0.17)	(0.17)

Table 3.2: Decentralization Complementarities and Individual Schooling

	Min. schooling: Jr. High school		Jr. High Enrolment Ratio
	Susenas	IFLS	Indo-Dapoer
Split*Post	-0.010	0.024	1.986
	(0.01)	(0.02)	(2.14)
Election*Post	0.002	-0.000	0.151
	(0.01)	(0.01)	(1.55)
Election*Split*Post	0.022**	0.031**	4.048**
	(0.01)	(0.01)	(1.67)
N	1935707	40920	765
R-Sq	0.01	0.10	0.30
Y-Mean	0.34	0.36	59.19
Admin=Admin*Pol	0.02	0.70	0.30
Pol=Admin*Pol	0.02	0.03	0.02

*0.10 **0.05 ***0.01. Col.1 is based on specification (1), Col.2 is based on specification (3) and the last column is based on specification (2). District level clustered standard errors are in parentheses.

Table 3.3: Decentralization Complementarities and Outpatient visit (Only Susenas)

Split*Post	0.102***
	(0.04)
Election*Post	0.009
	(0.02)
Election*Split*Post	0.062**
	(0.02)
N	239006
R-Sq	0.01
Y-Mean	0.31
Admin=Admin*Pol	0.31
Pol=Admin*Pol	0.03

*0.10 **0.05 ***0.01. Col.1 is based on specification (1). District level clustered standard errors are in parentheses.

Table 3.4: Decentralization Complementarities and Access to Electricity

	HH with Electricity	HH Obtaining Electricity from State	HH with Electricity	Proportion of HH with Electricity
	Susenas		IFLS	Indo-Dapoer
Split*Post	0.053	-0.011	0.060	7.327***
	(0.04)	(0.03)	(0.04)	(1.78)
Election*Post	-0.006	0.006	0.025	1.150
	(0.01)	(0.01)	(0.03)	(1.36)
Election*Split*Post	0.129***	0.082***	0.156**	11.674***
	(0.03)	(0.03)	(0.06)	(2.05)
N	481092	481092	16442	765
R-Sq	0.04	0.08	0.08	0.50
Y-Mean	0.84	0.79	0.90	77.43
Admin=Admin*Pol	0.11	0.02	0.17	0.04
Pol=Admin*Pol	0.00	0.01	0.05	0.00

*0.10 **0.05 ***0.01. Col.1 and 2 are based on specification (1), Col.3 is based on specification (3) and the last column is based on specification (2). District level clustered standard errors are in parentheses.

Table 3.5: Decentralization Complementarities and HH Consumption/Income (Only IFLS)

	Income	Consumption
Split*Post	-0.109	0.080
	(0.11)	(0.07)
Election*Post	0.031	0.037
	(0.06)	(0.06)
Election*Split*Post	0.195**	0.189*
	(0.09)	(0.11)
N	16442	16442
R-Sq	0.07	0.06
Admin=Admin*Pol	0.01	0.35
Pol=Admin*Pol	0.05	0.17

*0.10 **0.05 ***0.01. Cols. 1 and 2 are based on specification (3). Log of real pre capita income and consumption used for the regressions. District level clustered standard errors are in parentheses.

Appendix

Table A3.1: Decentralization Complementarities and Individual Schooling (Within Split Districts)

	Min. schooling: Jr. High school		Jr. High Enrolment Ratio
	Susenas	IFLS	Indo-Dapoer
Split*Post	-0.027**	-0.001	1.56
	(0.01)	(0.01)	(2.12)
Election*Split*Post	0.014	-0.001	3.84**
	(0.01)	(0.01)	(1.65)
N	1405018	19513	573
R-Sq	0.01	0.00	0.34
Y-Mean	0.33	0.35	58.73
Admin=Admin*Pol	0.00	0.96	0.26

*0.10 **0.05 ***0.01. All the results here are based on within split districts, so control group includes all the districts that were split in the post-moratorium period. District level clustered standard errors are in parentheses.

Table A3.2: Decentralization Complementarities and Outpatient visit (Only Susenas - Within Split Districts)

Split*Post	0.098**
	(0.04)
Election*Split*Post	0.058**
	(0.02)
N	170267
R-Sq	0.01
Y-Mean	0.31
Admin=Admin*Pol	0.35

*0.10 **0.05 ***0.01. All the results here are based on within split districts, so control group includes all the districts that were split in the post-moratorium period. District level clustered standard errors are in parentheses.

Table A3.3: Decentralization Complementarities and Access to Electricity (Within Split Districts)

	HH with Electricity	HH Obtaining Electricity from State	HH with Electricity	Proportion of HH with Electricity
	Susenas		IFLS	Indo-Dapoer
Split*Post	0.033	-0.031	0.016	5.743***
	(0.04)	(0.03)	(0.04)	(1.91)
Election*Split*Post	0.120***	0.079***	0.132*	10.485***
	(0.03)	(0.03)	(0.07)	(2.15)
N	346866	346866	10239	573
R-Sq	0.04	0.07	0.10	0.53
Y-Mean	0.81	0.74	0.87	74.11
Admin=Admin*Pol	0.06	0.01	0.12	0.02

*0.10 **0.05 ***0.01. All the results here are based on within split districts, so control group includes all the districts that were split in the post-moratorium period. District level clustered standard errors are in parentheses.

Table A3.4: Decentralization Complementarities and HH Consumption/Income (Only IFLS - Within Split Districts)

	Income	Consumption
Split*Post	-0.179*	0.053
	(0.11)	(0.07)
Election*Split*Post	0.168**	0.145
	(0.08)	(0.11)
N	10239	10239
R-Sq	0.06	0.04
Admin=Admin*Pol	0.01	0.46

*0.10 **0.05 ***0.01. All the results here are based on within split districts, so control group includes all the districts that were split in the post-moratorium period. District level clustered standard errors are in parentheses.

CHAPTER 4

Conclusions

This research focuses on the economics of poverty and development in a developing country—Indonesia. One part of this thesis analyzes the direct role of government in influencing the provision of public goods and thereby affecting individual access to health, education and electricity. The other part looks at how individual choices, such as choosing to work in a particular sector, affect poverty. The broader objective of this research was to understand the role of different factors, public or private, in influencing economic welfare.

In the first chapter I have argued that the ambiguity in the existing literature regarding the effects of decentralization is due to an inadequate characterization of the types of decentralization and their complementarities. I showed through empirical investigation that administrative decentralization (represented by splitting of districts) and political decentralization (represented by elections of district heads) jointly have stronger positive effects compared to just one kind of decentralization or no decentralization at all. I also showed that despite a similar increase in revenue for the districts that were split, developmental expenditures increased by 25 to 30 percent only for those that also had elections.

A specific dimension, explored in this chapter, was the complementary effects of factors such as higher fiscal resources and improved targeting (due to splitting) as well as increased accountability (due to elections). Such complementarities have strong implications for policymaking. While designing decentralization policies, policymakers must take a comprehensive approach of devolving powers and ensuring accountability following all the three types of decentralization—administrative, fiscal and political. If they fail to do so, partial decentralization may lead to incomplete realization of the benefits of their efforts due to the inefficient provision of public goods.

The second chapter revisits the old question about the role of non-agricultural employment in escaping poverty. For this we use one of the longest household panels in a developing country. With the estimation based on the whole sample we find lower consumption growth due to non-agricultural employment compared to employment in the agricultural sector. However, a sub-group analysis reveals that the benefits of non-agricultural employment are conditional upon other economic factors. Longer employment in the non-agricultural sector resulted in relatively higher consumption growth only for those households who were either poor and agricultural in the baseline, or non-poor and non-agricultural. In terms of poverty transitions, the findings suggest that non-agricultural employment had a positive effect for poor and non-poor households. A longer period of employment in the non-agricultural sector resulted in a higher probability of moving out of poverty and a lower probability of becoming poor.

Overall, the non-agricultural sector appears to be a pathway out of poverty, but moving into this sector does not always result in higher consumption compared to engaging in agricultural activities. Gains from both sectors can be exploited by targeting policies specific to the initial economic status and sector. Agricultural poor households could be incentivized to diversify into productive employment in the non-agricultural sector. A different set of policies, in contrast, is required for the non-agricultural poor. It is likely that these involve human capital acquisition that permits moving up the non-agricultural employment ladder. This is an important topic for future research.

The last chapter is a natural extension of the first chapter where I showed that the amount of publicly provided goods was higher in fully decentralized districts relative to partially decentralized ones. In this chapter I explored whether individual outcomes associated with those publicly provided goods also changed. The conclusions were similar to those in the first chapter. Individuals or households belonging to the districts treated with both administrative and political decentralization experienced significantly better welfare outcomes compared to the partially decentralized districts or the districts with no decentralization.

This research has addressed the role of two factors in affecting economic welfare. On the one hand government can ensure improved welfare outcomes directly by having a functional and an empowered local governance system. On the other hand policies could be targeted towards reducing poverty by taking into account the sectoral employment opportunities that households face, and the choices that they make.

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