ÉCOLE DOCTORALE SCIENCES ÉCONOMIQUES, JURIDIQUES, POLITIQUES ET DE GESTION
Université Clermont Auvergne

École Doctorale des Sciences Économiques, Juridiques, et de Gestion
Centre d'Études et de Recherches sur le Développement International (CERDI)

Université Clermont Auvergne, CNRS, IRD, CERDI, F-63000 Clermont-Ferrand, France

ESSAYS ON THE POLITICAL ECONOMY OF DECENTRALIZATION

Thèse présentée et soutenue publiquement le 17 Septembre 2021
Pour l'obtention du titre de Docteur *ès* Sciences Économiques

Par
MUHAMMAD ADIL

Sous la direction de:
Grégoire ROTA-GRAZIOSI & Florent BRESSON

Membres du jury

Thierry Madiès	Professeur, Universitéde Fribourg, Suisse	(Rapporteur)
Sonia Paty	Professeur, GATE, Université Lyon II, France	(Rapporteur)
Grégoire Rota-Graziosi	Professeur, Directeur, CERDI, Université Clermont Auvergne, France	(Co-directeur thèse)
Florent Bresson	Maître de conférences, CERDI, Université Clermont Auvergne, France	(Co-directeur thèse)

L'université Clermont Auvergne n'entend donner aucune approbation ni improbation aux opinions émises dans cette thèse. Ces opinions doivent être considérées comme propres à leur auteur.

Dedicated to

My grandfather Haji Muhammad Azam (Late), who inculcated the spirit of education in the family.

My Parents, Gulzar Ali and Zaib-un-Nisa, whose love, support and prayers have been a constant strength throughout my educational and personal life.

My uncle, Haji Dad Khuda, who supported me in pursuit of my dreams on every stage and always showed confidence in my decisions for education.

My wife, for her constant love, support, concern and encouragement. Her strength made my journey possible. She stayed strong in caring and educating our children without me. I am proud of her.

My loving daughters Afrah and Marwa, and my loving son Muhammad Anas for their love and prayers for me. They have proved to be stronger in dealing with my absence than I could imagine.

My siblings, for their support and care for me and my family while I have been away.

My whole family, for their concerns and support throughout my stay abroad.

Acknowledgments

All thanks and praise is to God, The Creator, The Most Merciful, and peace and blessings of God be upon his beloved people who care for the mankind.

It would require a very long list to enumerate all the people to whom I am indebted for their invaluable assistance in my PhD journey. I would like to express my heartfelt gratitude to my supervisors Professor Gregoire ROTA-GRAZIOSI and Professor Florent BRESSON for their patience and constant guidance throughout my PhD period. Their guidance has been a light in the darkness. I am thankful for their cordial attitude that kept me going. I could not have imagined better mentors for myself.

I would like to acknowledge the financial support from Higher Education Commission (HEC) of Pakistan, which helped me to complete this milestone.

I am thankful to my parents Gulzar Ali and Zaib-un-Nisa for their love, prayers and encouragement to always follow my dreams. Their regular contact and guidance remained the most cherishing and encouraging for me.

Very special thanks to my wife for being a constant source of great love, support, and encouragement in my blackest hours. Her dedication in caring and raising our children alone and empowering me to pursue my education abroad is remarkable. It would have been impossible to succeed on this journey without her being there.

I am thankful to all my family, my siblings, and my in laws. Your prayers for me have sustained me this far. It has been a long, complex yet satisfying journey and I am glad that you were all part of it.

This thesis is the result of five years of studies spent in School of Economics, CERDI. I would like to thank the entire faculty who provided an opportunity to explore the field of research from a different perspective than I knew. Huge thanks goes to the administrative team at CERDI, specially to Chantal, Johan, Aurelie, Estelle, Martine, Claudine, Hassen, Patricia, Flora, Anaelle, and Marie for their help and guidance with any issues that the students come across. Their kind treatment was family like and always made me feel home.

I am thankful to my colleagues and friends at the Ministry of Planning and Development Balochistan for their support and help. My deepest gratitude goes to Nadir Naseer, Abdul Rahim Megal, Mohammad Arif Achakzai, and Nawaz Ahmed for their constant support. I

am equally thankful to my friends Naseer, Asad, Badar, Mannan, Raouf, Siddique, Mohsin, Deenar, and many others.

I am greatly thankful to my friend Zia ur Rehman who was always there to support and guide me. His sincere suggestions and guidance made things easier. He is a friend I am proud to have. I am also thankful to Professor Abdul Baqi, Mama Khalid Jigar, Bilal Ahmed Mengal, Zulqarnain Haider Mengal, Noroz, Sher Ahmed Baloch, Yasir. You all have been a great support in my difficult times.

I am thankful to all my friends and colleagues at CERDI and UCA. Special thanks to Camille, Pauline, Elsa, Pierre, Jeremy, Huges, Ibrahim, Naseem, Mahmady, Yoro, Ali, Jean Marc, Claire Ricard, Isaaq for their valuable discussions and insightful comments on my work. I am equally thankful to Claire Gaubert, Alexandra, Akim, Regina, Awa, Fatoumata, Wendkuni, Camara, Moulaye, Afrika, Humaira, Anam, Badi, Faheem, Aale, Maimouna, Kodjo, Assi, Kaba, Anneliese, Aime, Aicha, Faycal, Nestor, Tarna, Aubin, Boly, Ghenima, Zeinab, Zhanar, Kamshat, Alou, Audrey-Anne, Axlle, Yashmina, Falapalaki, Aristide, Kossivi, Estel, Gildas, Macoura, Harouna, Ngoc Ha, Aguima Aime, Edouard, Ismael, Zerbo. You all have been a wonderful team at CERDI.

I am also thankful to many people who made my stay in France a lovely and memorable one. Thanks to Sevinj and Serge for their lovely friendship. Thanks to all Pakistani friends for sharing some memorable gatherings. I am indebted to Javaid Ali Shah and Mohammad Iqbal for their hospitality. Last but not the least, I extend my gratitude to Professor Dr. Manzoor Ahmed for his valuable guidance on the subject and help with the sources of data on Pakistan economy.

Summary

This thesis consists of three chapters, which address different questions about the political economy of decentralization. In the first paper (Chapter 1), I study how Pakistan undertook decentralization reforms at different times and see how those reforms improved the country's overall social and economic services delivery. I report the results from an input (per capita sectoral expenditures) and an output (sectoral outcomes) approach. I leverage the use of sectoral spending with the decentralization reforms. The evidence shows reforms have had a short-run positive effect in increasing the delivery of some of the services but have failed in the long run. The results highlight certain loopholes in the policy design and implementation.

Furthermore, the lack of political will to share authority with subnational governments and the failure of equitable resource distribution among federal units and the central government are other specific reasons for the non-delivery of expected outcomes from the reforms. The reforms have been an important ingredient for military rulers to legitimize their unlawful takeover of the civilian governments. For the elected governments, decentralization reforms have been a way forward to ease regional tensions (among and between provinces and the central government) over regional autonomy and resource distribution. Hence, the reforms undertaken in the country have often aimed at anything but improving quality of life and delivering services to poor masses. However, the reforms enable sub-national governments to make specific decisions on local public services delivery.

Based on the evidence from the analysis in this paper, I infer that the decentralization reforms will plausibly succeed if they promote regional economic growth and development with more authority to provincial governments on taxation and revenue generation. Moreover, regional governments' lack of political and financial management capacity are other critical points for improvement. If appropriately designed and implemented equitably, the policy reforms can improve regional governments' capacity to add more to national economic growth. Furthermore, the local governments need to be seen as an auxiliary to higher tiers and not competitors. This shift in the paradigm in the relationship between higher and lower tiers of the governments will surely add to the potential benefits from the decentralization reforms in Pakistan.

The second paper (Chapter 2) provides evidence on decentralization and its effects on reducing regional disparities in Asia. The paper focuses on predicting how political and fiscal decentralization measures complement one another in affecting regional disparities. As a source of identification, this paper uses a range of fiscal and political decentralization indicators. For the regional income inequalities, I identify the coefficient of variation of regional GDP per capita as an outcome variable. This allows for a comparative analysis of inequalities among regions within a country. To further add to the results, I use the Gini index from the World Bank as an alternate outcome variable. The use of the Gini index allows for a comparison of income differences among countries. I take an opportunity to test the relationship in an individual and combined set-up with the decentralization indicators.

The evidence shows that fiscal decentralization has harmed regional inequalities (increase in regional disparities). The lack of fiscal autonomy and limit to decide on taxation and revenues hinders sub-national governments' scope for the provision of services demanded by the local population. This induces regional inequalities to widen because more public services delivery targeted to the welfare of people and raising standards of living becomes difficult.

The political decentralization measures portray a mixed effect in this regard. The authority on the political front is limited in many countries. This affects regional inequalities to reduce only partially. The partial effects further help in digging deep into the matters. The policies aim to empower subnational governments on political and fiscal dimensions. Nevertheless, these reforms have not been entirely successful in reducing regional income disparities in these countries.

The third paper (Chapter 3) takes a historical perspective and studies the colonial economic history in British Indian Punjab. The decentralized services delivery in the districts of colonial Punjab as a function of state capacity (financial capacity) is a significant focus in this chapter. The colonial districts were constrained with the availability of economic and institutional capacity; the colonial government made fewer efforts to uplift people's welfare. I use per acre of land revenues to measure state capacity and analyze how the financial availability through agriculture taxation affected the health and education services delivery. I leverage the use of census year data for the analysis. Guided by the results of linear models, I find that the state capacity had positive effects on health and education outcomes. The literacy rates and the reduction of mortality rates were somewhat observable in the initial years of the study. However, these effects diminished over time. In addition to the financial State capacity, I include infrastructural development as a secondary influencing agent in the analysis.

The British Indian railroad project was one of the most significant railway network projects of history. The effects of transportation infrastructure development worked as a catalyst for changing the dynamics of agriculture extension. The effects were prominent for Punjab. The agriculture production was motivated by the availability of railway transportation for trade. The price volatilities reduced, and the famine hit districts received food grains quickly to mitigate the adverse effects. This improved health and economic well-being of the people. The demand for education and health facilities equally raised. The railway infrastructure was influential on health and education outcomes. Nevertheless, the effects reduced over time, and the impact of this vast infrastructure development had lower influences on increasing literacy rates and reducing mortality rates in the districts of Punjab.

Keywords: Political and fiscal decentralization, services deliver, literacy, mortality, health, education, state capacity, railways, regional inequality, Gini index, agriculture tax, colonial policies, Punjab, Pakistan, Asia.

Résumé

Cette thèse se compose de trois chapitres, qui abordent différentes questions sur l'économie politique de la décentralisation. Dans le premier article (chapitre 1), j'étudie comment le Pakistan a entrepris des réformes de décentralisation à différentes époques et si ces réformes ont permis d'améliorer la prestation globale des services sociaux et économiques du pays. Je fourni les résultats d'une approche par les intrants (dépenses sectorielles par habitant) et par les sortants (résultats sectoriels). Je tire parti de l'utilisation des dépenses sectorielles avec les réformes de décentralisation. Les preuves montrent que les réformes ont eu un effet positif à court terme en augmentant la prestation de certains services mais ont échoué à long terme. Les résultats mettent en évidence certaines lacunes dans la conception des politiques.

En outre, le manque de volonté politique et les lacunes dans la distribution des ressources sont d'autres raisons spécifiques pour lesquelles les réformes n'ont pas produit les résultats escomptés. Les réformes ont été un facteur discriminant pour les gouvernements militaires afin de légitimer leur prise de pouvoir illégale. Elles ont également été un acte des gouvernements civils pour apaiser les tensions régionales (parmi et entre les provinces et le gouvernement central) sur la distribution des ressources. J'en déduis que les réformes de décentralisation seront plausiblement couronnées de succès si elles favorisent la croissance et le développement économique régional en donnant plus d'autorité aux gouvernements provinciaux en matière de taxation et de génération de revenus. En outre, le manque de capacité des gouvernements régionaux en matière de gestion politique et financière est un point critique à améliorer. Si elles sont conçues de manière appropriée et mises en œuvre équitablement, les réformes politiques peuvent améliorer la capacité des gouvernements régionaux à contribuer davantage à la croissance économique nationale. Les gouvernements locaux doivent être considérés comme des auxiliaires des niveaux supérieurs et non comme des concurrents. Ce changement de paradigme dans la relation entre les niveaux supérieurs et inférieurs du gouvernement ajoutera certainement aux bénéfices potentiels des réformes de décentralisation au Pakistan.

Le deuxième article (chapitre 2) fournit des preuves de la décentralisation et de ses effets sur les inégalités régionales en Asie. Le document s'attache à prédire comment les indicateurs

de décentralisation politique et fiscale se complètent pour affecter les disparités régionales. Comme source d'identification, j'utilise une série d'indicateurs de décentralisation fiscale et politique. Pour les inégalités de revenu régionales, j'identifie le coefficient de variation du PIB régional par habitant comme une variable de résultat. Pour étoffer les résultats de l'analyse, j'utilise également l'indice de Gini de la Banque mondiale. Je profite de l'occasion pour tester la relation dans une configuration individuelle puis combinée avec les indicateurs de décentralisation. Les preuves montrent que la décentralisation fiscale a nui à la situation, amenant une hausse des disparités régionales. Les indicateurs de décentralisation politique ont eu des effets mitigés à cet égard. L'analyse déduit que le manque d'autonomie fiscale dans plusieurs pays asiatiques entrave la manière dont les gouvernements infranationaux fournissent les services demandés par la population locale ; ce qui les empêche par ailleurs de réduire les inégalités. L'autorité sur le front politique est également limitée dans de nombreux pays, ce qui n'affecte que partiellement les inégalités régionales. Les politiques, entreprises par chaque pays, visent à donner plus de pouvoir aux gouvernements infranationaux sur les plans politique et fiscal. Ces réformes n'ont pas entièrement réussi à réduire les disparités régionales de revenus dans ces pays.

Le troisième article (chapitre 3) adopte une perspective historique et étudie l'histoire économique coloniale du Pendjab indien britannique. La prestation de services décentralisés dans les districts du Pendjab colonial en fonction de la capacité de l'État (capacité financière) est un point important de ce chapitre. Les districts coloniaux étaient limités par la disponibilité des capacités économique et institutionnelle ; le gouvernement colonial a fait moins d'efforts pour améliorer le bien-être de la population. J'utilise les revenus par acre de terre pour mesurer la capacité de l'État et analyser comment la disponibilité financière par le biais de la fiscalité agricole a affecté les services de santé et d'éducation. Je m'appuie sur les données des années de recensement pour l'analyse. Guidée par les résultats des modèles linéaires, je constate que la capacité de l'État a des effets positifs sur les résultats en matière de santé et d'éducation. Une hausse du taux d'alphabétisation et la réduction des taux de mortalité étaient quelque peu observables au cours des premières années de l'étude. Toutefois, ces effets ont diminué au fil du temps. En plus de la capacité financière de l'État, j'inclus le développement des infrastructures comme vecteur d'influence secondaire dans l'analyse.

Le projet de chemin de fer de l'Inde britannique a été l'un des projets de réseau ferroviaire les plus importants de l'histoire. Le développement des infrastructures liées au transport a joué un rôle de catalyseur modifiant la dynamique de l'extension agricole. Ces effets ont été particulièrement marqués au Pendjab. La production agricole a été motivée par la disponibilité

du transport ferroviaire pour le commerce. La volatilité des prix a été réduite et les districts touchés par la famine ont reçu rapidement des céréales pour atténuer les effets négatifs. Cela a amélioré la santé et le bien-être économique de la population. La demande d'éducation et de services de santé a également augmenté. L'infrastructure ferroviaire a eu une influence sur les résultats en matière de santé et d'éducation. Néanmoins, les effets se sont atténués avec le temps, et l'impact de ce vaste développement d'infrastructures a eu une influence moindre sur l'augmentation des taux d'alphabétisation et la réduction des taux de mortalité dans les districts du Pendjab.

Mots clés : Décentralisation politique et fiscale, prestation de services, alphabétisation, mortalité, santé, éducation, capacité de l'État, chemins de fer, inégalité régionale, indice de Gini, impôt agricole, politiques coloniales, Pendjab, Pakistan, Asie.

Table of contents

List of Tables

List of Figures

Introduction

"Decentralization has, not only an administrative value, but also a civic dimension, since it increases the opportunities for citizens to take interest in public affairs; it makes them get accustomed to using freedom. And from the accumulation of these local, active, persnickety freedoms, is born the most efficient counterweight against the claims of the central government, even if it were supported by an impersonal, collective will." (Alexis de Tocqueville) in (Vo, 2010)

The history of decentralization can be traced to the Greek city-states of as early as 200 B.C. The city-states were considered more democratically manageable with an effective administration. Almost all the countries in the world today have gone through a certain decentralization process in their history. However, in contemporary history, decentralization, known as 'the fiscal federalism theory,' has emerged and progressed through the 1950s and 1960s (Guziejewska et al., 2018). The leading proponents of that time include Kenneth Arrow, Richard Musgrave, and Paul Samuelson, besides Wallace Oates. The countries with a federal[1] system of government were the first to experiment with fiscal federalism. Nevertheless, the results have been mixed. While many countries saw improvements in public participation, efficient administration, and a rise in local capacity, nearly all of them faced serious problems implementing decentralization reforms (Rondinelli et al., 1983). The experiments with the decentralized reforms continue to take place around the world. Though the aims for such reforms are diverse, they serve the public needs in one way or another.

'Decentralization' generally means a division of decision-making powers between the center and sub-national units. It is a process, a set of state reforms that are implemented on every tier of government. The different types of these reforms include political, administrative, and financial dimensions. The definition of each dimension is given in Ozmen (2014). Political decentralization aims to give citizens or their elected representatives more power in public decision-making. Administrative decentralization seeks to redistribute authority, responsibility, and financial resources for providing public services among different levels of government.

[1]Federalism is a mode of political organization that unites separate states or other polities within an overarching political system in a way that allows each to maintain its own integrity (Britannica, accessed on March 25, 2021 https://www.britannica.com/topic/federalism). Federalism and decentralization are often used in a unitary manner; however, the differences exist. For detailed discussion on these differences see Blume and Voigt (2011).

Fiscal decentralization refers to a series of policies designed to increase the financial autonomy of sub-national governments (Falleti, 2005). All of them aim to empower sub-national governments to make decisions for providing better public services.

What motivates decentralization?

The challenges of central governments in providing a fair and equitable amount of public services and equal opportunities for economic development to all regions in a country have grown manifold today. Central governments everywhere have lost their legitimacy in public services delivery, whereas decentralization is believed to offer a range of benefits to cater for those failures (Bardhan, 2002). Concomitantly, the countries are decentralizing administrative, fiscal, and political functions to lower tiers of government (Azfar et al., 1999). This fragmentation in government responsibilities reduces the center's power and enables local governments to compete at the local level and be accountable (Devarajan et al., 2009) to the local people. It also makes governments more efficient and responsive to local needs (Faguet, 2002). Decentralization promotes public participation in decision-making. It empowers local masses, particularly the poor, women, youth, and ethnic and religious minorities whose rights are not adequately represented in the decision-making process (Miller, 2002; Grävingholt et al., 2006). Given these challenges and the central governments' failure to address the issues at large have motivated the power and authority over some issues to be devolved to local people.

Furthermore, the driving forces for decentralization, as noted by Von Braun and Grote (2002), also include regional political freedom, participation, conflict resolution, the pressure of global competition, demand for stabilization, demand for equity, and efficiency. All these forces are political and economic challenges that the developing countries have faced. Besides several other reasons, these forces have compelled countries to decentralize their government systems to avoid civil conflicts and reduce poverty and inequalities.

Decentralization is initially pursued as administrative reforms to increase service delivery and economic efficiency. However, these are seen as an essential process for strengthening democracy in countries with a history of conflicts. The reforms might result from political inspiration; they have significant economic, administrative, and governance effects. Consequent upon such implementations (governance effect), the decision-makers are brought closer to citizens that presumably have better information about local preferences (Oates, 1972). Concomitant to information asymmetry, decentralization improves the efficient provision of public goods (Kahkonen and Lanyi, 2001). Furthermore, such policies are on the main agenda list of

many international organizations and donor agencies that support developing countries. Decentralization is an essential step towards democratization. Therefore, it is supported by these organizations profoundly (Dickovick, J Tyler, 2013). It is a powerful tool in enhancing public governance.

How are these reforms perceived?

The global development community increasingly recognizes that the public sector in developing and transitional countries must operate more effectively to chase development goals and curtailing growing poverty and inequalities. Such ambitions may less likely be achieved without considering the vital role of the local public sector. The services are provided through local governments, either by deconcentrated departments or ministries[2] or through devolved governments[3]. Hence, the economic development and poverty reduction goals could be achieved through strengthening local public services delivery. The decentralization reforms play an essential role in this regard, especially for the developing and transitional economies.

Over the last several decades, a silent revolution has plagued the world governments to let go of a part of their financial and political authority to lower levels of governments (Ivanyna and Shah, 2014). From the political transition taking place in Eastern Europe to globalization, divisive politics and the quest for accountable governance have contributed to the acceleration of this revolution. The developing and the transition economies worldwide have made efforts to strengthen the role of local governments in the public sector (Boex and Yilmaz, 2010). Even though the international development community has made considerable efforts to benefits from the decentralized public sector, the expected benefits have always remained an illusion. The reforms have often been criticized for the institutional capacity of local governments, seen as a significant obstacle in the provision of local public services (Ahmad et al., 2005). Inappropriate policy designs, their poor organization, and poor implementation have remained some of the other causes for the failure of the reforms in several countries.

The decentralization reforms have been undertaken with a mix of stated objectives worldwide. These objectives are of a diverse range. Better public services delivery; enhancing better public management, good governance, and accountability; boost economic growth and development; improve equitable services delivery and development outcomes; and promote condi-

[2]Deconcentration means that the decision-making authority remains with the central government. The lower levels of government are limited because they transmit and implement the decisions taken by the central authority. This is rather a limited form of decentralization.

[3]Transferring decision-making powers to elected officials in local jurisdictions, civil society, and other similar representatives at the local level is known as devolution.

tions for a more stable state, among many others (Smoke, 2015). The goals attached to these reforms reflect the preferences and specific objectives of every state. Although decentralization is global and noticeable, our knowledge is limited on its performance[4].

Although some form of public sector decentralization is universally practiced, the curiosity on how well these public policies deliver to people remains high. For common masses, the questions range from why do countries decentralize? Is there a well-presented justification for it? How well these policies work? Furthermore, how can it increase people's welfare? For the policymakers, how to design and implement decentralization to get maximum benefits and limit potential threats? Moreover, what do policymakers and practitioners need to understand while formulating such reforms? What is the importance of the implementation timing for the policy reforms? are some of the major concerns.

Does decentralization work?

The proponents promise several good results of the decentralization reforms. The opponents equally criticize the reforms and their promised outcomes. The stories differ for both the schools of thought. When it comes to political representatives advocating for the reforms, they must defend how they change people's welfare. Unfortunately, the potential impacts of decentralization reforms are yet in the process of exploration at large. However, the available research to date provides tentative conclusions on both fronts. It is often difficult, however, to isolate the pure effects of decentralization alone from everything else.

The above-stated arguments bring forth the importance of decentralization reforms, their important place in the study of local public services delivery, the support these reforms receive from international organizations, and the possible channels through which they affect people's welfare. Against this background, the research in this thesis highlights the decentralization reforms and their effects on local public services delivery. The essays discuss the historical experiments of the decentralized reforms and their effects on people's welfare in colonial Punjab, the contemporary developments of the reforms in present-day Pakistan, and extend to analyses of the reforms with regional inequalities in some of the Asian countries. I provide a summary of each of the papers below.

Chapter 1, *"Decentralization and Public Services Deliver: A Political Economic Analysis of Pakistan"* studies how decentralization reforms have been implemented in Pakistan and what ef-

[4]The researchers have presented several reviews of decentralization reforms. Some of them include Tanzi (1995); Litvack et al. (1998); Ahmad and Tanzi (2002); Bardhan and Mookherjee (2006); Cheema and Rondinelli (2007); Connerley et al. (2010); Faguet (2014).

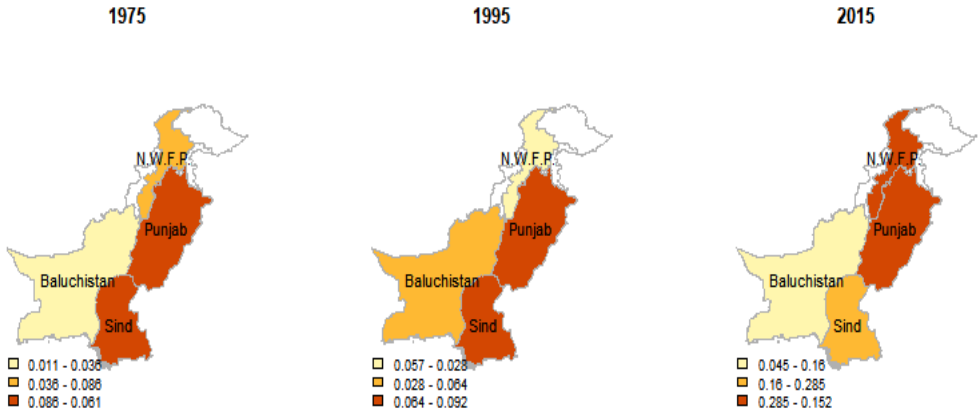
fects such reforms have had on local public services delivery. The political economy of resource distribution is at the heart of this paper. I analyze the historical resource distribution criteria between the different government levels; central, provincial, and local governments. The paper sheds light on the centralization of the taxation system and the lower financial capacity of the sub-national governments. Moreover, I equally discuss why the reforms have been a play game for the military rulers and an apple of contention for the democratically elected governments. The paper briefly discusses how decentralization reforms have seen several waves in past decades and what has caused their failure in public services delivery.

Pakistan has remained under military rule for 33 years in its 73 years history as of 2020. All the military governments introduced some form of local government reforms. The reforms aimed mainly at legitimizing military rulers and not primarily for empowering sub-national governments and ensuring the provision of public services. However, by default, the local government reforms provided some authority to local representatives to make decisions on specific local public services. These authorities remained very limited by any definition. All the reforms have had their flaws and were partially successful in improving local people's welfare. The policy designs, their fair implementation, the unwillingness of bureaucracy to share its power with the local representative, and the lack of local government capacity have been the prominent causes of the failures. Pakistan has undergone, what Cheng and Li (2019) calls, policy experimentation. Since her independence, Pakistan has experienced many attempts for local government engineering. However, she has failed to empower the lower tiers fully. More often, the local governments are put on hold. Even if the elections are held (under the military rule or by the orders of the higher courts), power is seldom devolved to the local governments[5].

I leverage the use of 41 years of data from 1975 to 2015 to study decentralization reforms and services delivery by sub-national governments in Pakistan. The indicators for decentralization reforms include expenditure and revenue shares of the sub-national governments. The empirical strategy uses per capita sector-wise expenditure as a proxy for decentralized services delivery (input approach). Moreover, I also provide some evidence by looking at the outcomes for some sectors (output approach). The exercise includes individual, combined, and interaction strategies to complement the findings.

The overall results posit a worsening effect of the decentralization reforms and public services delivery. The empirical evidence shows that the expenditures directed to specific social and economic public services have worsened over the long run. However, some short-run

[5] https://tribune.com.pk/story/2292509/local-government-and-pakistans-reluctant-political-elite.



Notes: The maps show how expenditure share of subnational governments have varied since 1975 to 2015. The variations equally represent preferences of political parties in power during these years. The Provinces of Punjab and Sindh show a consistent pattern of dominance over a long run.

Figure 0.1: Variations in Expenditure decentralization in Pakistan (1975-2015)

benefits of the decentralization reforms are observed too. The evidence shows that the decentralization reforms succeeded a little in making improvements in the overall welfare of the population. The sub-national governments' capacity to raise revenues has remained very limited throughout the history of Pakistan. The center's dominance on collecting taxes and distributing among sub-national governments has largely been insufficient.

Overall, this chapter contributes to the literature on decentralization and the political economy debate in Pakistan. The results indicate that the reforms have been designed and implemented with aims other than targeting local public services delivery. Moreover, the rift between different tiers of government has further fueled the crisis. Furthermore, the sub-national governments have heavily been dependent on higher tiers' financial support. The limited authority on political and financial decision-making has curtailed the growth of the local government system in the country.

Based on the evidence, the paper outlines some policy recommendations for possible ways to benefit from the decentralized system of government. Besides others, the basic reforms are required on the higher tiers' full support (willingness) in truly devolving authority to lower tiers. Furthermore, Pakistan's diverse geographic division and multi-ethnic and multicultural setup require a policy reform that benefits every region based on their economic endowments. The fiscal opportunities for regional governments need expansion and promotion by the higher tiers. Moreover, the authority to manage finances (taxation and expenditure authority) can possibly bring positive results. On the political front, reforms are required to limit political patronage and ensure stronger political accountability. The decision on local political and economic

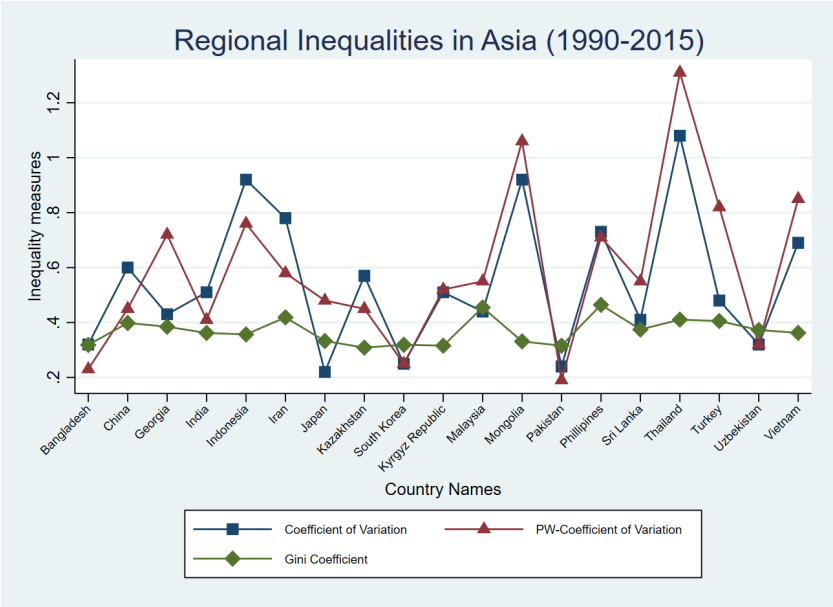
laws is an essential prerequisite. The local representatives have been under political and bureaucratic pressure on uses of local finances. This is due to the unwillingness of the higher tiers of government to share power and authority with local governments. Moreover, corruption is perennial that needs to be addressed.

Chapter 2, *"Decentralization and Regional Inequalities: Evidence from Asia"* deals with more exhaustive analyses of the decentralization reforms. The paper studies the effects of fiscal and political decentralization reforms on regional income inequalities in a set of Asian countries. Given the large population and geographic area, Asian countries suit the decentralization reforms to bifurcate the authority between central and sub-national governments. Moreover, the economic growth in Asia, fueled by technological boom and globalization, has not reduced regional disparities. The decentralization reforms, making sub-national governments powerful to decide on political and economic matters, could narrow significant inequality gaps between regions in the Asian countries.

Many Asian countries introduced some form of decentralization reforms during the 1980s and 1990s. The aim to enable sub-national governments to perform a number of state functionaries were at the heart of these reforms. The fiscal and political authorities were devolved (at different degrees) to decide on local matters. The sub-national governments made efforts to raise revenues and make expenditures for the provision of publicly demanded services. However, the sub-national governments' attempts have largely remained less successful. The revenues raised by sub-national levels have remained sub-optimal to meet the local demands. Furthermore, the local capacity has hampered the delivery of economic and social services. The lack of economic opportunities, limited capacity, lower levels of financial resources, and low services delivery level have increased regional disparities in most Asian countries.

The Asian countries achieved high economic growth by successfully benefiting from globalization (Asian Miracle) but have similarly been hit by the downside of the wave (Asian crisis). The benefits from the decentralization wave have been little known for many Asian economies. The potential causes could be the pace of adopting and implementing decentralization reforms. Some countries tried staying away from the reforms (e.g., Malaysia), whereas others actively pursued the reforms with various experiments (e.g., China). The diversity in Asia is what justifies this study on Asian decentralization and inequalities. This paper tries to find how diversity is relevant and what effects decentralization experiments in various Asian countries have on regional inequalities.

To guide the analysis, I use regional GDP per capita data for several regions from the sample of countries and calculate an indicator of inequality (coefficient of variation and population-weighted coefficient of variation). This inequality indicator is used to compare regional inequalities within a country. Furthermore, I use fiscal and political decentralization indicators to evaluate the reforms and their effects on reducing regional disparities. The analyses include individual and combined models for the decentralization indicators. As a further aside, I equally test if the reforms have resulted in reduced income inequalities by using Gini Index as an alternate outcome variable.



Notes: The average estimates of regional inequalities (CV and PW-CV of regional GDP per capita, and Gini index) in Asia for 1990-2015.

Figure 0.2: Trends in average regional inequalities in Asia (1990-2015)

The findings guide towards two directions. (1) The fiscal decentralization indicators are associated with increasing regional disparities. This suggests that providing more financial decision-making authorities to sub-national governments induces inequalities to rise. It is likely to happen because economically vibrant urban towns and coastal cities benefit more from economic and financial authority devolution than rural and agriculture-based towns. (2) The political decentralization indicators have mixed effects. The autonomy and residual authority on the sub-national level are conducive to reducing inequalities, whereas the elections on lower tiers of government are associated with increasing regional disparities. The evidence brought forward in this paper guide towards understanding the role of sub-national governments in Asian countries.

This paper contributes to the growing literature by using fiscal and political decentralization indicators in a combined scenario. Moreover, it contributes to the limited literature decen-

tralization in Asian economies. Moreover, it adds to the literature by taking economic and institutional channels in exogenously determining decentralization indicators.

Chapter 3, *"State Capacity and Colonialism: Public Services Delivery in Colonial Punjab"* studies how state capacity in generating financial resources in an agrarian economy is associated with providing public services in the districts of colonial Punjab. While the districts' economy in colonial Punjab was heavily dependent on agriculture production, the development of railway infrastructure further supported agriculture production and extension. The land tax revenues were the primary revenue resources for the colonial government. The introduction of decentralization reforms during the 1870s, revised in the 1880s, provided the British Indian provinces an opportunity to make more decisions on the local level. The share of land revenues was the significant financial source to fund local public services. The provincial disparities in health and education outcomes were significant in colonial India. The decentralized authority was extremely limited by any definition.

The province of Punjab was taken over entirely in 1849 after the Sikh war. The British soon realized the potential use of the land in the province. Before 1850 the province was an arid area. It contained vast grassland that supported local pastors for raising their animals, but it had very little cultivation. The monsoon rains often died in the west of the province, leaving most of the area with water shortage. The cultivation was possible only close to rivers or in fewer areas with wells. The province had large rivers that were formed in the Himalayas. Between 1870 and 1920, canals were built in the province. This turned the interfluvial tracts into a large arable land. The availability of water and vast land for cultivation made Punjab the 'bread-basket' of colonial India. The progress of agriculture, coupled with infrastructure development, improved the welfare of people. It brought more food and economy to local masses and the colonial state.

This chapter highlights the importance of state capacity (land tax revenues per acre of cultivated land) and its effects on local public services in colonial Punjab. The land taxation revenues were the primary financing source of the provinces in the colonial era. The districts that produced more and contributed higher land revenues to the provincial finances were supposed to have higher living standards, better schooling, more hospitals and health infrastructure, and a better system of water and sanitation. The decentralization reforms of the 1870s and the establishment of local district boards in the 1880s embodied a larger share of responsibilities for specific services delivery by the district authorities. Local finances were the major differentials that existed among the districts.

In this paper, I analyze health and education outcomes in Punjab during colonial times. While a limited number of studies have taken into account the literacy outcomes in colonial India, there is a lack of scholarship on health outcomes in the context of local public service provision. Moreover, studies have often considered the British Indian territory for analysis; I attempt to analyze the situation in Punjab as a first of its kind.

The analysis is based on the census year data from 1881 to 1931. I leverage the use of archival data with cross-section and panel analysis. The cross-section analysis reveals that the state capacity has had positive effects on health and education outcomes in the earlier years. The overall literacy rates were higher, and the mortality rates were declining. However, these effects have diminished in the later period. Moreover, the railway infrastructure development has supported agriculture production. It helped in increasing the overall income of the people. The trade between regions was facilitated due to the transportation facilities. This also motivated the agriculturalists to produce more and benefit well. The results of an increase in the district land revenues due to the expansion of agriculture and railway infrastructure affected the health and educational outcomes similarly.

The panel data estimates complement the findings from the cross-section analysis that the state capacity has positively affected literacy rates. Moreover, I find the state capacity has been conducive to reducing infant mortality and overall mortalities due to fever and other causes. Besides, the railway infrastructure has worked similarly on health and education outcomes. Hence, colonial land revenues were relevant to improvements in health and education services delivery. The decentralized authority vested in provincial governments and further devolved to district boards to take specific responsibilities played a positive role in increasing the welfare of the population.

This paper contributes to the growing literature on colonial state policies and their effects on people's welfare. The contributions can be listed in three dimensions. 1) The paper explores the colonial state's capacity in extracting resources as an indicator of institutional development in the British colonial era. Unlike limited available literature that often uses the British Indian territory for analysis, this paper particularly focuses on the regional development of Punjab. Furthermore, (2) it contributes to the literature on the historical origins of development contributing to human capital development. Punjab was known for its martial race. Many people from the province were recruited in the British military to support the battles in World War I. Furthermore, an educated bureaucracy was the produce of the province. In addition to the above, (3) the paper contributes to the limited literature on the development and colonial state

of health in Punjab, which is missing from the literature.

Thus, this thesis goes from a historical analysis of policy reforms and their effects on public welfare in colonial Indian province of Punjab, to modern time analysis of Pakistan as a single country case study, and extends to several Asian countries as a panel analysis.

Introduction en français

La décentralisation a, non seulement une valeur administrative, mais aussi une dimension civique, car elle augmente les possibilités pour les citoyens de s'intéresser aux affaires publiques ; elle les habitue à faire usage de la liberté. Et de l'accumulation de ces libertés locales, actives, tatillonnes, naît le contrepoids le plus efficace aux prétentions du gouvernement central, quand bien même il serait soutenu par une volonté collective et impersonnelle." (Alexis de Tocqueville) dans (Vo, 2010)

L'histoire de la décentralisation remonte aux cités-États grecques, dès 200 avant J.-C. Les cités-États étaient considérées comme plus faciles à gérer sur le plan démocratique, avec une administration efficace. Presque tous les pays du monde actuel sont passés par un certain processus de décentralisation au cours de leur histoire. Cependant, dans l'histoire contemporaine, la décentralisation, connue sous le nom de "théorie du fédéralisme fiscal", est apparue et a progressé dans les années 1950 et 1960 (Guziejewska et al., 2018). Les principaux partisans de cette époque sont Kenneth Arrow, Richard Musgrave et Paul Samuelson, ainsi que Wallace Oates. Les pays dotés d'un système fédéral[6] système de gouvernement ont été les premiers à expérimenter le fédéralisme fiscal. Néanmoins, les résultats ont été mitigés. Si de nombreux pays ont constaté des améliorations en matière de participation publique, d'efficacité de l'administration et d'augmentation des capacités locales, presque tous ont été confrontés à de graves problèmes de mise en œuvre des réformes de décentralisation (Rondinelli et al., 1983). Les expériences de réformes décentralisées se poursuivent dans le monde entier. Bien que les objectifs de ces réformes soient divers, ils répondent d'une manière ou d'une autre au besoin public.

La "décentralisation" signifie généralement une division des pouvoirs de décision entre le centre et les unités infranationales. Il s'agit d'un processus, d'un ensemble de réformes de l'État qui sont mises en œuvre à chaque niveau de gouvernance. Les différents types de ces

[6]Le fédéralisme est un mode d'organisation politique qui réunit des États séparés ou d'autres entités politiques au sein d'un système politique global, d'une manière qui à permettre à chacun de maintenir sa propre intégrité (Britannica, consulté le 25 mars 2021 https://www.britannica.com/topic/federalism). Le fédéralisme et la décentralisation sont souvent utilisés de manière unitaire, mais il existe des différences. Pour une discussion détaillée sur ces différences, voir Blume and Voigt (2011).

réformes comprennent des dimensions politiques, administratives et financières. La définition de chaque dimension est donnée dans Ozmen (2014). La décentralisation politique vise à donner aux citoyens ou à leurs représentants élus plus de pouvoir dans la prise de décision publique. La décentralisation administrative vise à redistribuer l'autorité, la responsabilité et les ressources financières pour fournir des services publics entre les différents niveaux de gouvernement. La décentralisation fiscale fait référence à une série de politiques conçues pour accroître l'autonomie financière des gouvernements infranationaux (Falleti, 2005). Toutes ces politiques visent à donner aux gouvernements infranationaux les moyens de prendre des décisions pour fournir de meilleurs services publics.

Ce qui motive la décentralisation?

Les défis auxquels sont confrontés les gouvernements centraux pour fournir une quantité juste et équitable de services publics et des opportunités égales de développement économique à toutes les régions d'un pays se sont multipliés aujourd'hui. Partout, les gouvernements centraux ont perdu leur légitimité dans la prestation de services publics. A l'inverse, la décentralisation est censée offrir une série d'avantages pour pallier ces échecs. Parallèlement, les pays décentralisent les fonctions administratives, fiscales et politiques vers les échelons inférieurs du gouvernement (Azfar et al., 1999). Cette fragmentation des responsabilités gouvernementales réduit le pouvoir du centre et permet aux gouvernements locaux d'être compétitifs au niveau local et de rendre des comptes à la population locale (Devarajan et al., 2009). Elle rend également les gouvernements plus efficaces et plus réactifs aux besoins locaux (Faguet, 2002). La décentralisation favorise la participation du public au processus décisionnel. Elle donne du pouvoir aux masses locales, en particulier aux pauvres, aux femmes, aux jeunes et aux minorités ethniques et religieuses dont les droits ne sont pas suffisamment représentés dans le processus décisionnel (Miller, 2002; Grävingholt et al., 2006). Compte tenu de ces défis et de l'incapacité des gouvernements centraux à résoudre les problèmes dans leur ensemble, le pouvoir et l'autorité sur certaines questions doivent être dévolus à l'échelon local.

En outre, les forces motrices de la décentralisation, comme le note Von Braun and Grote (2002), comprennent également la liberté politique régionale, la participation, la résolution des conflits, la pression de la concurrence mondiale, la demande de stabilisation, la demande d'équité et d'efficacité. Toutes ces forces constituent des défis politiques et économiques auxquels les pays en développement ont été confrontés. Outre plusieurs autres raisons, ces forces ont contraint les pays à décentraliser leurs systèmes de gouvernement pour éviter les conflits civils et réduire la pauvreté et les inégalités.

La décentralisation est initialement poursuivie comme une réforme administrative visant à accroître la prestation de services et l'efficacité économique. Elle est considérée comme un processus essentiel pour renforcer la démocratie dans les pays ayant une histoire de conflits. Les réformes peuvent résulter d'une inspiration politique ; elles ont des effets significatifs sur l'économie, l'administration et la gouvernance. Suite à ces mises en œuvre (effet de gouvernance), les décideurs sont rapprochés des citoyens. Ils disposent vraisemblablement de meilleures informations sur les préférences locales (Oates, 1972). Parallèlement à l'asymétrie d'information, la décentralisation améliore l'efficacité de la fourniture de biens publics (Kahkonen and Lanyi, 2001). De plus, ces politiques figurent sur la liste des priorités de nombreuses organisations internationales et agences de donateurs qui soutiennent les pays en développement. La décentralisation est une étape essentielle vers la démocratisation. C'est pourquoi elle est profondément soutenue par ces organisations (Dickovick, J Tyler, 2013). Elle constitue un outil puissant pour améliorer la gouvernance publique.

Comment ces réformes sont-elles perçues?

La communauté mondiale reconnaît de plus en plus que le secteur public des pays en développement et en transition doit fonctionner plus efficacement pour atteindre les objectifs de développement et réduire la pauvreté et les inégalités croissantes. Il est peu probable que de telles ambitions puissent être réalisées sans tenir compte du rôle vital du secteur public local. Les services sont fournis par les gouvernements locaux, soit par des départements et des ministères déconcentrés[7] soit par le biais de gouvernements déconcentrés[8]. Ainsi, les objectifs de développement économique et de réduction de la pauvreté pourraient être atteints en renforçant la prestation de services publics locaux. Les réformes de décentralisation jouent un rôle essentiel à cet égard, notamment pour les économies en développement et en transition.

Au cours des dernières décennies, une révolution silencieuse a poussé les gouvernements du monde entier à céder une partie de leur autorité financière et politique aux niveaux inférieurs de gouvernement. De la transition politique en cours en Europe de l'Est à la mondialisation, les politiques de division et la quête d'une gouvernance responsable ont contribué à l'accélération de cette révolution. Les économies en développement et en transition du monde entier se sont efforcées de renforcer le rôle des collectivités locales dans le secteur public (Boex and Yilmaz, 2010). Même si la communauté internationale du développement a fait des efforts consid-

[7]La déconcentration signifie que le pouvoir de décision reste entre les mains du gouvernement central. Les niveaux inférieurs de gouvernement sont limités car ils transmettent et mettent en œuvre les décisions prises par l'autorité centrale. Il s'agit plutôt d'une forme limitée de décentralisation.

[8]Transférer les pouvoirs de décision aux élus des juridictions locales, à la société civile et à d'autres représentants similaires au niveau local est connu sous le nom de déconcentration.

érables pour tirer profit de la décentralisation du secteur public, les bénéfices attendus sont toujours restés illusoires. Les réformes ont souvent été critiquées pour la capacité institutionnelle des gouvernements locaux, considérée comme un obstacle important à la fourniture de services publics locaux (Ahmad et al., 2005). La conception inappropriée des politiques, leur mauvaise organisation et leur mauvaise mise en œuvre sont les autres causes de l'échec des réformes dans plusieurs pays.

Les réformes de décentralisation ont été entreprises sur fond de différents objectifs avancés. Il s'agit, entre autres, d'améliorer les prestations des services publics, de renforcer la gestion publique, la bonne gouvernance et la responsabilité. Il s'agit également de stimuler la croissance économique et le développement, d'améliorer les prestations équitables des services ainsi que les résultats sur le développement. Enfin, les objectifs de décentralisation promeuvent des conditions pour un un État plus stable. Les objectifs particuliers attachés à ces réformes reflètent les préférences et les objectifs spécifiques de chaque État. Bien que la décentralisation soit globale et perceptible, nos connaissances sont limitées quant à ses performances (Smoke, 2015). Les chercheurs ont présenté plusieurs études sur les réformes de décentralisation parmi lesquelles Tanzi (1995); Litvack et al. (1998); Ahmad and Tanzi (2002); Bardhan and Mookherjee (2006); Cheema and Rondinelli (2007); Connerley et al. (2010); Faguet (2014).

Bien qu'une certaine forme de décentralisation du secteur public soit universellement pratiquée, la curiosité quant à l'efficacité de ces politiques publiques reste élevée. Pour une majorité de la population, les questions vont de pourquoi les pays décentralisent-ils ? Y a-t-il une justification bien présentée pour cela ? Dans quelle mesure ces politiques fonctionnent-elles ? Par ailleur, comment peuvent-elles accroître le bien-être de la population ? Pour les décideurs politiques, comment concevoir et mettre en œuvre la décentralisation pour en tirer le maximum d'avantages et limiter les menaces potentielles ? Que doivent comprendre les décideurs et les praticiens lorsqu'ils formulent de telles réformes ? Quelle est l'importance du calendrier de mise en œuvre des réformes politiques ? sont quelques-unes des principales préoccupations.

La décentralisation fonctionne-t-elle?

Les partisans promettent de bons résultats des réformes de décentralisation. Les opposants critiquent quant à eux les réformes et leurs résultats promis. Les histoires diffèrent pour les deux écoles de pensée. Lorsqu'il s'agit des représentants politiques qui défendent les réformes, ils doivent défendre la façon dont elles changent le bien-être des gens. Malheureusement, les impacts potentiels des réformes de décentralisation sont encore en cours d'exploration à grande

échelle. Toutefois, les recherches disponibles à ce jour permettent de tirer des conclusions provisoires sur les deux fronts. Il est cependant souvent difficile d'isoler les effets purs de la décentralisation toutes choses étant égales par ailleurs.

Les arguments susmentionnés mettent en évidence l'importance des réformes de décentralisation et la place importante qu'elles occupent dans l'étude de la fourniture de services publics locaux. Ils soulignent le soutien que ces réformes reçoivent de la part des organisations internationales et les canaux possibles par lesquels elles affectent le bien-être des populations. Dans ce contexte, les recherches de cette thèse mettent en lumière les réformes de décentralisation et leurs effets sur la prestation de services publics locaux. Les études présentées discutent des expériences historiques, des réformes décentralisées et de leurs effets sur le bien-être de la population dans le Punjab colonial. Je traite également des développements contemporains des réformes dans le Pakistan actuel, et étend l'analyse des réformes sur les inégalités régionales dans un certain nombre de pays asiatiques. Je présente ci-dessous un résumé de chacun de ces articles.

Chapitre 1, *"Decentralization and Public Services Deliver : A Political Economic Analysis of Pakistan"* étudie comment les réformes de décentralisation ont été mises en œuvre au Pakistan et quels effets ces réformes ont eu sur la prestation des services publics locaux. L'économie politique de la distribution des ressources est au cœur de ce document. J'analyse les critères historiques de distribution des ressources entre les différents niveaux de gouvernement : central, provincial et local. L'article met en lumière la centralisation du système fiscal et la faible capacité financière des gouvernements infra-nationaux. En outre, je discute également des raisons pour lesquelles les réformes ont été un jeu stratégique pour les dirigeants militaires et une pomme de discorde pour les gouvernements démocratiquement élus. L'article examine brièvement les différentes vagues dans les réformes de décentralisation, au cours des dernières décennies et met en exergue ce qui a causé leur échec dans la prestation des services publics.

Le Pakistan est resté sous un régime militaire pendant 33 ans au cours de ses 73 ans d'histoire en 2020. Chaque gouvernement militaire a introduit un panel de réformes des administrations locales. Ces réformes visaient principalement, non à donner du pouvoir aux gouvernements infranationaux et à garantir la fourniture de services publics, mais surtout à légitimer les dirigeants militaires. Cependant, par défaut, les réformes des gouvernements locaux ont conféré aux représentants locaux une certaine autorité dans la prise de décisions sur des services publics locaux spécifiques. Ces pouvoirs sont restés très limités, quelle qu'en soit la définition retenue. Toutes les réformes ont eu leurs défauts et ont partiellement réussi à améliorer le bien-

être des populations locales. La conception des politiques, leur mise en œuvre équitable, la réticence de la bureaucratie à partager son pouvoir avec les représentants locaux et le manque de capacités des collectivités locales ont été les principales causes de ces échecs. Le Pakistan a connu ce que Cheng and Li (2019) appelle l'expérimentation des politiques. Depuis son indépendance, le Pakistan a connu de nombreuses tentatives d'ingénierie des gouvernements locaux. Cependant, il n'a pas réussi à donner aux échelons inférieurs les moyens d'agir. Le plus souvent, les gouvernements locaux sont mis en attente. Même si des élections sont organisées (sous la férule de l'armée ou sur ordre des tribunaux supérieurs), le pouvoir est rarement dévolu aux gouvernements locaux[9].

J'exploite l'utilisation de 41 années de données, de 1975 à 2015, pour étudier les réformes de décentralisation et la prestation de services par les gouvernements infranationaux au Pakistan. Les indicateurs des réformes de décentralisation comprennent les parts de dépenses et de revenus des gouvernements infranationaux. La stratégie empirique utilise les dépenses sectorielles par habitant comme indicateur de la fourniture de services décentralisés (approche par les intrants). Je fournis également des résultats en adoptant une approche plus sectorielle (approche par les résultats). L'exercice comprend des stratégies individuelles, combinées et d'interaction pour compléter les résultats.

Les résultats indiquent une détérioration de l'effet des réformes de décentralisation et de la prestation des services publics. Les preuves empiriques montrent que les dépenses consacrées aux services publics sociaux et économiques spécifiques se sont détériorées sur le long terme. Cependant, certains avantages à court terme des réformes de décentralisation sont également observés. Les preuves montrent que les réformes de décentralisation ont un peu réussi à améliorer le bien-être général de la population. La capacité des gouvernements infranationaux à collecter des revenus est restée très limitée tout au long de l'histoire du Pakistan. La domination du centre sur la collecte des impôts et leur distribution aux gouvernements infranationaux a été largement insuffisante.

Dans l'ensemble, ce chapitre contribue à la littérature sur la décentralisation et au débat sur l'économie politique au Pakistan. Les résultats indiquent que les réformes ont été conçues et mises en œuvre avec d'autres objectifs que la prestation de services publics locaux. Le clivage entre les différents niveaux de gouvernement n'a de cesse d'alimenter la crise. Les gouvernements infranationaux ont été fortement dépendants du soutien financier des niveaux supérieurs. L'autorité limitée en matière de prise de décision politique et financière a freiné la croissance du système de gouvernement local dans le pays.

[9]https://tribune.com.pk/story/2292509/local-government-and-pakistans-reluctant-political-elite

Sur la base de ces éléments, le document présente quelques recommandations politiques sur les moyens possibles de tirer profit du système de gouvernement décentralisé. Entre autres, les réformes de base sont nécessaires pour que les échelons supérieurs soutiennent pleinement (et acceptent) de déléguer véritablement des pouvoirs aux échelons inférieurs. La diversité de la division géographique du Pakistan et sa configuration multiethnique et multiculturelle nécessitent une réforme politique qui puisse profiter à chaque région en fonction de ses dotations économiques. Les opportunités fiscales pour les gouvernements régionaux doivent être étendues et promues par les niveaux supérieurs. L'autorité de gestion des finances (autorité de taxation et de dépenses) pourrait éventuellement contribuer positivement. Sur le plan politique, des réformes sont nécessaires pour limiter le favoritisme politique et assurer une plus grande responsabilité politique. La décision sur les lois politiques et économiques locales est une condition préalable essentielle. Les représentants locaux ont subi des pressions politiques et bureaucratiques sur l'utilisation des finances locales. Cela est dû à la réticence des échelons supérieurs du gouvernement à partager le pouvoir et l'autorité avec les gouvernements locaux. A cela s'ajoute la corruption comme un problème récurrent devant être résolu.

Chapitre 2, «*Decentralization and Regional Inequalities: Evidence form Asia*» traite d'analyses plus exhaustives des réformes de décentralisation. Il étudie les effets des réformes de décentralisation fiscale et politique sur les inégalités de revenus régionales dans un ensemble de pays asiatiques. Compte tenu de l'importance de leur population et de leur zone géographique, les pays asiatiques se prêtent au jeu des réformes de décentralisation pour répartir l'autorité entre les gouvernements centraux et infranationaux. La croissance économique en Asie, alimentée par le boom technologique et la mondialisation, n'a pas réduit les disparités régionales. Les réformes de décentralisation, en donnant aux gouvernements infranationaux le pouvoir de décider des questions politiques et économiques, pourraient réduire les écarts importants d'inégalité entre les régions des pays asiatiques.

De nombreux pays asiatiques ont introduit une certaine forme de réformes de décentralisation au cours des années 1980 et 1990. Les réformes visant à permettre aux gouvernements infranationaux de remplir un certain nombre de fonctions étatiques étaient au cœur de ces réformes. Les pouvoirs fiscaux et politiques ont été dévolus (à différents degrés) pour décider des affaires locales. Les gouvernements infranationaux se sont efforcés de percevoir des recettes et d'engager des dépenses pour la fourniture des services demandés par le public. Cependant, les tentatives des gouvernements infranationaux sont restées en grande partie lettre morte. Les recettes collectées par les niveaux infranationaux demeurent sous-optimales pour répondre aux demandes locales. En outre, les capacités locales ont entravé la fourniture de services

économiques et sociaux. Le manque d'opportunités économiques, les capacités limitées, les faibles niveaux de ressources financières et le faible niveau de prestation de services ont accru les disparités régionales dans la plupart des pays asiatiques.

Les pays asiatiques ont atteint une croissance économique élevée en tirant profit de la mondialisation (le miracle asiatique), mais ont également été frappés par le revers de la médaille (la crise asiatique). Les bénéfices de la vague de décentralisation ont été peu connus pour de nombreuses économies asiatiques. Les causes potentielles principales se trouvent du côté du rythme d'adoption et de mise en œuvre des réformes de décentralisation. Certains pays ont essayé de rester à l'écart des réformes (par exemple, la Malaisie), tandis que d'autres ont poursuivi activement les réformes avec diverses expériences (par exemple, la Chine). La diversité de l'Asie est ce qui justifie cette étude sur la décentralisation et les inégalités en Asie. Cet article tente de déterminer la pertinence de la diversité et les effets des expériences de décentralisation dans divers pays asiatiques sur les inégalités régionales.

Pour guider l'analyse, j'utilise le PIB régional par habitant pour plusieurs régions de l'échantillon de pays et je calcule un indicateur d'inégalité (coefficient de variation et coefficient de variation pondéré par la population). Cet indicateur d'inégalité est utilisé pour comparer les inégalités régionales au sein d'un pays. Par ailleurs, j'utilise des indicateurs de décentralisation fiscale et politique pour évaluer les réformes et leurs effets sur la réduction des disparités régionales. Les analyses comprennent des modèles individuels et combinés pour les indicateurs de décentralisation. Je vérifie également si les réformes ont réduit les inégalités de revenus en utilisant l'indice de Gini comme variable de résultat alternative.

Les résultats orientent vers deux directions. (1) Les indicateurs de décentralisation fiscale sont associés à une augmentation des disparités régionales. Cela suggère que le fait d'accorder davantage de pouvoirs de décision financière aux gouvernements infranationaux entraîne une augmentation des inégalités. Cela peut tenir au fait que les villes urbaines et les villes côtières, économiquement dynamiques, bénéficient davantage de la dévolution des pouvoirs économiques et financiers que les villes rurales et agricoles. (2) Les indicateurs de décentralisation politique ont des effets mitigés. L'autonomie et l'autorité résiduelle au niveau infranational sont propices à la réduction des inégalités, tandis que les élections aux niveaux inférieurs du gouvernement sont associées à une augmentation des disparités régionales. Les preuves mises en avant dans ce document permettent de comprendre le rôle des gouvernements infranationaux dans les pays asiatiques.

Ce document contribue à la littérature croissante en utilisant des indicateurs de décentralisation fiscale et politique dans un scénario combiné. De plus, il contribue à la littérature limitée sur la décentralisation dans les économies asiatiques et il s'ajoute à la littérature en prenant les canaux économiques et institutionnels dans la détermination exogène des indicateurs de décentralisation.

Chapitre 3, *"State Capacity and Colonialism : Public Services Delivery in Colonial Punjab"* étudie comment la capacité de l'État à générer des ressources financières dans une économie agraire est associée à la fourniture de services publics dans les districts du Pendjab colonial. Alors que l'économie des districts du Pendjab colonial dépendait fortement de la production agricole, le développement de l'infrastructure ferroviaire a soutenu davantage la production et l'extension de l'agriculture. Les recettes de l'impôt foncier constituaient les principales sources de revenus du gouvernement colonial. L'introduction de réformes de décentralisation dans les années 1870, révisées dans les années 1880, a donné aux provinces indiennes britanniques l'occasion de prendre davantage de décisions au niveau local. La part des revenus fonciers était la principale source financière pour financer les services publics locaux. Les disparités provinciales en matière de santé et d'éducation étaient importantes dans l'Inde coloniale. L'autorité décentralisée était extrêmement limitée, quelle qu'en soit la définition.

La province du Pendjab a été entièrement reprise en 1849 après la guerre des Sikhs. Les Britanniques se sont vite rendu compte de l'utilisation potentielle des terres de la province. Avant 1850, la province était une zone aride. Elle contenait de vastes prairies qui permettaient aux pasteurs locaux d'élever leurs animaux, mais elle était très peu cultivée. Les pluies de mousson mouraient souvent dans l'ouest de la province, laissant la majeure partie de la région en manque d'eau. La culture n'était possible qu'à proximité des rivières ou dans des zones moins nombreuses dotées de puits. La province possédait de grandes rivières formées dans l'Himalaya. Entre 1870 et 1920, des canaux ont été construits dans la province. Cela a transformé les étendues inter-fluviales en une vaste terre arable. La disponibilité de l'eau et de vastes terres à cultiver a fait du Pendjab le "grenier à blé" de l'Inde coloniale. Le progrès dans l'agriculture, associé au développement des infrastructures, a amélioré le bien-être de la population, apportant une source de nourriture pour la population et dynamisant l'économie l'État colonial.

Ce chapitre met en évidence l'importance de la capacité de l'État (recettes fiscales foncières par acre de terre cultivée) et ses effets sur les services publics locaux dans le Pendjab colonial. Les revenus de l'impôt foncier étaient la principale source de financement des provinces

à l'époque coloniale. Les districts qui produisaient davantage et contribuaient aux finances provinciales par des revenus fonciers plus élevés étaient censés avoir un niveau de vie plus élevé, une meilleure scolarité, davantage d'hôpitaux et d'infrastructures de santé, et un meilleur système d'eau et d'assainissement. Les réformes de décentralisation des années 1870 et la création de conseils de district locaux dans les années 1880 ont entraîné une plus grande part de responsabilité dans la prestation de services spécifiques par les autorités de district. Les finances locales constituaient la principale source d'hétérogénéités entre les districts.

Dans cet article, j'analyse les résultats en matière de santé et d'éducation au Pendjab à l'époque coloniale. Alors qu'un nombre limité d'études ont pris en compte les résultats de l'alphabétisation dans l'Inde coloniale, il y a un manque d'études sur les résultats de la santé dans le contexte de la fourniture de services publics locaux. En outre, les études ont souvent considéré le territoire indien britannique pour l'analyse ; je tente d'analyser la situation au Pendjab comme une première du genre.

L'analyse est basée sur les données des années de recensement de 1881 à 1931. J'exploite l'utilisation de données d'archives avec une analyse en coupe transversale et en panel. L'analyse transversale révèle que la capacité de l'État a eu des effets positifs sur les résultats en matière de santé et d'éducation au cours des premières années. Les taux d'alphabétisation généralement plus élevés s'accordaient avec des taux de mortalitéen baisse. Toutefois, ces effets se sont atténués au cours de la période ultérieure. Le développement de l'infrastructure ferroviaire a soutenu la production agricole. Il a permis d'augmenter le revenu global de la population. Le commerce entre les régions a été facilité par le développement des moyens de transport. Cela a également motivé les agriculteurs à produire davantage et à en tirer profit. Les résultats de l'augmentation des revenus fonciers des districts due à l'expansion de l'agriculture et de l'infrastructure ferroviaire ont affecté de la même manière les résultats en matière de santé et d'éducation.

Les estimations des données de panel complètent les résultats de l'analyse transversale selon lesquels la capacité de l'État a eu un effet positif sur les taux d'alphabétisation. Je constate que la capacité de l'État a permis de réduire significativement la mortalité infantile et la mortalité globale due entre autres à la fièvre. De plus, l'infrastructure ferroviaire a eu un effet similaire sur les résultats en matière de santé et d'éducation. Par conséquent, les revenus fonciers coloniaux étaient pertinents pour améliorer la prestation des services de santé et d'éducation. L'autorité décentralisée confiée aux gouvernements provinciaux, puis aux conseils de district pour assumer des responsabilités spécifiques, a joué un rôle positif dans l'amélioration du bien-

être de la population.

Cet article contribue à la littérature croissante sur les politiques de l'État colonial et leurs effets sur le bien-être des populations. Les contributions peuvent être énumérées en trois dimensions. 1) L'article explore la capacité de l'État colonial à extraire des ressources comme indicateur du développement institutionnel à l'époque coloniale britannique. Contrairement à la littérature disponible limitée qui utilise souvent le territoire indien britannique pour l'analyse, cet article se concentre particulièrement sur le développement régional du Pendjab. En outre, (2) il contribue à la littérature sur les origines historiques du développement contribuant au développement du capital humain. Le Pendjab était connu pour ses guerriers. Un grand nombre de personnes originaires de la province ont été recrutées dans l'armée britannique pour soutenir les batailles de la Première Guerre mondiale. En plus de ce qui précède, (3) l'article contribue à la littérature limitée sur le développement et l'état colonial de la santé au Pendjab.

Ainsi, cette thèse, partant d'une analyse historique des réformes politiques et de leurs effets sur le bien-être public dans la province indienne coloniale du Pendjab, délivre une analyse moderne centrée sur le Pakistan via une étude de cas d'un seul pays, et s'étend enfin à plusieurs pays asiatiques via une approche en panel.

Bibliography

Ahmad, E. and Tanzi, V. (2002). *Managing fiscal decentralization*. Routledge.

Ahmad, J., Devarajan, S., Khemani, S., and Shah, S. (2005). *Decentralization and service delivery*. The World Bank.

Azfar, O., Kahkonen, S., Lanyi, A., Meagher, P., and Rutherford, D. (1999). Decentralization, governance and public services: The impact of institutional arrangements. *Centre for Institutional Reform and the Informal Sector, University of Maryland Baltimore, MD*, pages 1–37.

Bardhan, P. (2002). Decentralization of governance and development. *Journal of Economic Perspectives*, 16(4):185–205.

Bardhan, P. K. and Mookherjee, D. (2006). *Decentralization and local governance in developing countries: a comparative perspective*. MIT Press.

Blume, L. and Voigt, S. (2011). Federalism and decentralization—a critical survey of frequently used indicators. *Constitutional Political Economy*, 22(3):238–264.

Boex, J. and Yilmaz, S. (2010). An analytical framework for assessing decentralized local governance and the local public sector. *IDG Working paper. Urban Institute Centre on International Development and Governance*, 6(10).

Cheema, G. S. and Rondinelli, D. A. (2007). *Decentralizing governance: Emerging concepts and practices*. Brookings Institution Press, Washindton, D.C.

Cheng, C. and Li, C. (2019). Laboratories of democracy: Policy experimentation under decentralization. *American Economic Journal: Microeconomics*, 11(3):125–54.

Connerley, E., Eaton, K., and Smoke, P. J. (2010). *Making decentralization work: Democracy, development, and security*. Lynne Rienner Publishers Boulder, CO.

Devarajan, S., Khemani, S., and Shah, S. (2009). The politics of partial decentralization. *In "Does decentralization enhance service delivery and poverty reduction?"*, pages 102–121.

Dickovick, J Tyler (2013). Foreign Aid and Decentralization: Policies for autonomy and programming for responsiveness. Working Paper 2013/044, UNU-WIDER.

Faguet, J.-P. (2002). *Decentralizing the provision of public services in Bolivia: Institutions, political competition and the effectiveness of local government*. PhD thesis, The London School of Economics and Political Science (LSE).

Faguet, J.-P. (2014). Decentralization and governance. *World Development*, 53:2–13.

Falleti, T. G. (2005). A sequential theory of decentralization: Latin American cases in comparative perspective. *American Political Science Review*, (3):327–346.

Grävingholt, J., Doerr, B., Meissner, K., Pletziger, S., Rümker, J. v., and Weikert, J. (2006). *Strengthening participation through decentralisation: Findings on local economic development in Kyrgyzstan*, volume 16. DEU.

Guziejewska, B. et al. (2018). Normative versus positive approach to fiscal decentralisation and the measures of decentralisation. an analysis based on the example of selected countries of central and eastern europe. *Comparative Economic Research. Central and Eastern Europe*, 21(1):101–117.

Ivanyna, M. and Shah, A. (2014). How close is your government to its people? worldwide indicators on localization and decentralization. *Economics: The Open-Access, Open-Assessment E-Journal*, 8(2014-3):1–61.

Kahkonen, S. and Lanyi, A. (2001). Decentralization and governance: Does decentralization improve public service delivery? *World Bank, Washington, D.C.*, PREM Notes(55).

Litvack, J., Ahmad, J., and Bird, R. (1998). *Rethinking decentralization in developing countries*. The World Bank.

Miller, K. (2002). Advantages and disadvantages of local government decentralization. In *Presentation to the Caribbean conference on 'Local Government and Decentralization', Ocean International Hotel, Georgetown Guyana*, pages 25–28.

Oates, W. E. (1972). Fiscal federalism. *New York: Harcourt Brace Jovanovich.*

Ozmen, A. (2014). Notes on the concept of decentralization. *European Scientific Journal*, 10(10).

Rondinelli, D. A., Nellis, J. R., and Cheema, G. S. (1983). Decentralization in developing countries. *World Bank staff working paper*, 581.

Smoke, P. (2015). Rethinking decentralization: Assessing challenges to a popular public sector reform. *Public Administration and Development*, 35(2):97–112.

Tanzi, V. (1995). *Fiscal federalism and decentralization: A review of some efficiency and macroeconomic aspects*. World Bank Washington D.C.

Vo, D. H. (2010). The economics of fiscal decentralization. *Journal of Economic Surveys*, 24(4):657–679.

Von Braun, J. and Grote, U. (2002). Does decentralization serve the poor? In *Managing fiscal decentralization*, pages 84–112. Routledge.

Chapter 1

Decentralization and Public Services Delivery: A Political Economic Analysis of Pakistan

1.1 Introduction

Central governments everywhere have lost their legitimacy in public services delivery, whereas decentralization is believed to offer a range of benefits to cater for those failures (Bardhan, 2002). The past few decades have seen decentralization reforms being implemented widely around the world. The countries are decentralizing administrative, fiscal, and political functions to lower tiers of government (Azfar et al., 1999). This fragmentation in government responsibilities reduces the center's power and enables local governments (LGs) for more competition and accountability (Devarajan et al., 2009) at the local level. It also makes governments more efficient and responsive to local needs (Faguet, 2002). Decentralization promotes local participation in decision making, empowering local masses, particularly the poor, women, youth, and ethnic and religious minorities whose rights are not adequately represented in decision making (Miller, 2002; Grävingholt et al., 2006).

Although such reforms[1] are inspired politically, they have significant economic, administrative, and governance effects. Consequent upon such implementations (governance effect), the decision-makers are brought closer to citizens that presumably have better information about local needs. Owing to information asymmetry, decentralization improves (productive and allocative) the efficient (Kahkonen and Lanyi, 2001) provision of public goods. Furthermore, such policies are on the main agenda list of many international organizations and donor agencies that support developing countries. Since decentralization is regarded as an important step towards democratization (Arzaghi and Henderson, 2005) and a powerful tool in enhancing public governance, it is supported by these organizations profoundly (Dickovick, J Tyler, 2013).

The powers and authority, when devolved to lower tiers, enforces responsibility upon local people. The elected representatives in LGs are empowered by acknowledging their general competencies on specific policies and providing basic services (Bonfiglioli, 2003). This is a more vital form of decentralization achieved by employing full devolution of authority to local tiers. Following this line, Pakistan has experienced a (weak[2]) local government system in one form or another for decades (pre and post 1947 periods). Military rulers have often made attempts to revive the local government system, but they have weakly been supported by the elected governments. However, the introduction of devolution reforms in 2001 was seen as broad-based decentralization efforts undertaken in the country by the military government of General Pervez Musharraf[3]. These reforms were arguably (primarily) implemented to create political allies for the military regime's legitimacy and establish a counter opponent political force on a local and national level[4] against other political forces.

[1] It is initially pursued as an administrative reform to increase service delivery and economic efficiency; decentralization is seen as an essential process for strengthening democracy in countries with a history of conflicts.

[2] Since LGs had no constitutional guarantee before the devolution reforms of 2001, they were at the mercy of higher tiers of government(s) for their existence and functioning.

[3] Pervez Musharraf ousted the elected government of Nawaz Sharif in October 1999. He remained in power in different positions until 2008.

[4] This was an act of decentralization reforms similar to the previous military governments' takeover of 1958 by Field Martial Ayub Khan, who ruled from 1958-1969, and General Zia ul-Haq 1977-1988. They created non-party-based local governments to empower their central force and block out the way of national political parties from opposing them.

With the explicit (nominal) aim of decentralizing administrative and financial matters to local governments, the devolution plan was implemented in Pakistan in 2001. It resulted in a wide-scale alteration to governance and public finance in the country. These modifications in governance and financial authority to lower tiers of government aimed for a broad change and extensively improve the provision of essential social and economic services. The proximity and accountability of local governments to local people were more proficient and valuable in increasing services meant to benefit local communities, particularly the poor and disadvantaged masses of the society.

While locally elected bodies have been established time and again in Pakistan (historically present in sub-continent as *Panchayats*, they have always been pulled down by upper tiers of governments. By establishing local governments (mainly by the military rulers), the country has followed a democratic culture, but disbanding these established authorities has proven to deviate away from it. Democratically elected governments have (nominally) supported the establishment of local bodies but have always hindered their way to flourish by delaying elections or dissolving these governments [see Cheema et al. (2010)]. Moreover, to fail sub-national governments on the provision of services, higher tiers have used delay tactics to provide financial support. This is also a way to create a sense of distrust (inefficient in the provision of public goods) on local governments.

Pakistan's deviation from the core values of democratization (fragmentation in government responsibilities) and an ever-growing rift between higher and lower-level governments makes it an interesting case study[5]. Furthermore, the local government elections were always conducted on a non-party[6] basis and under pure military or quasi-democratic rule. The political parties, not being a part of local elections, established opposition to such local bodies when they came to power[7]. This rift between upper and lower tiers makes local governance and service delivery more challenging and less efficient.

The provision of financial decision-making to local authorities means more autonomy in decision making (in expenditures and taxation) for the preferences of the local population. This paper aims to critically analyze decentralization and its impacts on public sector expenditures in Pakistan. We investigate the investment patterns (increase/decrease) in public sectors as indicators for service delivery. We initially focus on understanding the effects of decentralized decision making authorities (financial resource availability at the disposal of sub-national[8] governments for spending) on public services like improvements in Agriculture (livelihood)[9], Irrigation (water management), water and sanitation, rural development, infrastructure development, Basic health services, Basic Education services, social security and welfare services provision (Social Safety net), urban development (Urbanization and industrial development),

[5]Devolution has resulted in considerable political tension between the provincial and local governments, particularly in provinces where the provincial and district governments are run by opposing political parties (World Bank 2004b).

[6]The non-party elections for LGs had a long-lasting impact on Pakistani Politics (Malik and Rana, 2019).

[7]See (Wilder, 1999) for further discussion on Patronage Politics created by the LG systems introduced in Pakistan during the 1960s and 1980s.

[8]Sub-national and local governments are interchangeably used in this paper. In a broader sense sub-national governments mean the provincial and local governments.

[9]About 62% of the population reside in the rural area and is directly or indirectly involved in Agricultural activities (Economic survey of Pakistan 2017). Furthermore, the Agriculture sector contributes 18.5% to GDP and provides 38.5% employment to the national labor force (Economic survey of Pakistan 2019).

transport and communication (roads and communication installation), Rural Development, Social Services. In chalking out these sectors, we follow (Faguet, 2004; Aslam and Yilmaz, 2011; Ahmed, 2013). As a matter of fact, the public goods/social services provision is ideally measured in quality-adjusted units (Faguet, 2004). In Pakistan (as with many developing countries) it is not easy to analyze the impact in quality-adjusted units. The data on such outcomes is not available on sub-national levels. We, therefore, follow the expenditure criteria on the sectors mentioned above to analyze whether these sectors have had more resources directed to them over time and particularly as a result of the decentralization reforms of 2001. Nevertheless, we attempt to provide some evidence with a few sectoral outcome indicators as well.

We use data for four provincial governments of Pakistan for the period 1975-2015 (41 years) to analyze decentralization reforms and their impacts on services delivery in the provinces of Pakistan. We attempt to find answers to the questions; Have decentralization reforms increased (decreased) expenditures on public services? Have such increases resulted in improving output indicators?

The remaining paper is distributed in the following manner: Section 1.2 provides a brief presentation of the available literature on the impact of decentralization on service delivery. Section 1.3 briefly discusses the political economy of resource distribution in Pakistan. Section 1.4 gives a brief historical background and recent developments of local governments in Pakistan. Section 1.5 explains the econometric framework, hypothesis, data, estimation design, and stepwise empirical results, along with some robustness checks. The discussion and policy recommendations are presented in section 1.6. Section 1.7 concludes the paper.

1.2 Decentralization and services delivery: A review of the literature

Decentralization reforms undertaken by many countries have had various motivations across the board. It has been a part of the political and economic transformation in Eastern Europe and the Soviet Union; reinforcing transition towards democracy in Latin America; it was a response to ethnic/regional conflict in South Africa, Sri Lanka, and Indonesia; it was aimed at improving the delivery of basic services in Chile, Uganda, and Cote d'Ivoire (Shah et al., 2004). Even though it has been implemented on different motivating grounds, service delivery has remained one of the most important integral parts of the efforts for decentralization. It works through different channels that make service delivery efficient and helps maximize people's welfare.

Many researchers and policymakers advocate decentralization in contemporary times. They argue that it makes governments more responsive and approachable *(proximity argument)* to local needs (Faguet, 2004; Shah, 1999; Wallis and Oates, 1988). Moreover, several scholars argue that decentralization can reduce poverty (Crook, 2003; Ahmed, 2013; Caldeira et al., 2012) by providing public services to people at grass-roots level, such as providing basic health and education services, provision of clean drinking water, a better sanitation system, and others. As a result, it improves general social welfare, and people become better off. The efficient provision of public goods by local governments may occur because of their ability to consider local determinants while providing services, such as health and education (Oates, 1972). It may also be due to competition, as local governments encourage efficient public services and lower

tax burdens on the lower strata of society (Brennan and Buchanan, 1980).

Democracy, participation, government responsiveness, and accountability are some profound merits through which the benefits of decentralization flow and are considered to address the poor public better (Sisk, 2001). An extensive literature in economics and political science study decentralization and its impacts on services delivery in developing (Channa and Faguet, 2016) countries[10]. Decentralization removes/mitigates information asymmetries (Hayek, 1948), makes local bodies more accountable (Devarajan et al., 2009), prioritizes local needs; are several benefits that the fiscal federalism theory discusses at length. A major focus in this literature has been on the economic efficiency of sub-national governments in local public goods provision. However, given the complexities and nature of political conditions of developing countries where the mechanism of "voting by feet" is less relevant, such prescriptions may fit fine for developed countries (Caldeira et al., 2012). Hence, the judgement for decentralization in developing countries raises some appealing issues like the reforms necessitates local public goods provision and the limits of such reforms with respect to countries with institutional and geographical constraints.

Furthermore, decentralization enhances the accountability and responsiveness of local governments, increases citizen's voice (Faguet, 2012) and mitigates corruption (Shah, 2006). In addition to matching policies with local preferences, decentralization is seen as an important step towards popular democracy because it allows more local population to participate in the decision-making process (*popular participation argument*). This empowers local masses, particularly the poor, women, youth, and ethnic and religious minorities whose rights are not adequately represented in decision making (Grävingholt et al., 2006). Hence, decentralized governments are expected to ensure accountability, assuming well-informed voters, mobile citizens, and active participation in political decision-making. This paves the way for better service delivery.

Although the arguments presented above show how decentralization improves services delivery through channels of information, local preferences, accountability, better targeting of services, mitigating corruption and financial leakages, it is criticized to increase vulnerabilities of services provided on a sub-national level. The following paragraphs discuss the opposite arguments briefly.

It is argued that increasing the decision-making powers of local governments may adversely affect corruption (Tanzi, 1995; Prud'Homme, 1995; Manor, 1999). When the local elite are elected to represent the local governments, they benefit from rent-seeking and corruption because they can utilize the resources at their disposal. As rightly put by (Keefer et al., 2003), for rural elites being elected there is little incentive to advocate for better governance. Furthermore, the presence of theoretical uncertainties on the importance of elite capture is pointed out by (Mookherjee and Bardhan, 2000). Bardhan (2002) further argues that local governments may have better local information and accountability pressure. They may be more vulnerable to capture by local elites, who will then receive a disproportionate share of spending on public goods. Similarly, Stiglitz (1982) elaborates that the communities controlled and commanded by

[10] Channa and Faguet (2016) make a detailed study of literature review on Health and Education services delivery in developing countries.

landowners who also control the public sectors, the goods provided are incorrect in kind and level. In addition, whatever goods are provided, they are supplied insufficiently in contrast to people's demands.

Furthermore, corruption mitigation and more fragmentation in the system of government are criticized by Treisman (2000). He finds that federal states have a higher degree of corruption. He also argues that more tiers of government induce higher perceived corruption. Several other researchers find a similar relationship between corruption and decentralization (Huther and Shah, 1998; IMF, 2001; Fisman and Gatti, 2002). The corruption in the government system makes it difficult to provide services to the local population as the expenditures targeted to specific sectors would always be short.

Moreover, Prud'Homme (1995) emphasizes numerous shortcomings of decentralization reforms in developing countries. According to him, decentralization augments disparities among jurisdictions [see also (Lessmann, 2012)]. It endangers macroeconomic stability by making it challenging to implement macroeconomic policies. It creates an ethnic bias in local elections. It is coupled with the low capacities of the local bureaucracies and an ever-growing presence of rift between the principal (locally elected representative) and the agent (bureaucracy). This hampers the provision of public services.

Local governments lack human capital (managerial capacities), have inappropriate financial resources (means to meet ends), and notably lag behind in technical expertise important for services delivery (Azfar et al., 1999; Fan et al., 2009). Such deficiencies prevent local governments from providing appropriate public services. According to Samoff (1990), decentralization has primarily failed as a policy tool. In the same line, Slater (1989) finds that decentralization failed to increase local capacities in implanting local programs in Tanzania. Based on such grounds, the opponents emphasize that power should remain in the hands of central governments that are relatively resource-rich (Crook and Sverrisson, 1999; Smith, 1985) and better equipped technically and endowed with a large amount of human resource.

The arguments in favor of decentralization and those against it have their strengths and weaknesses. The existing literature is divided over if decentralization reforms can work as successful for all the countries. Moreover, it is even more complicated when these reforms have different outcomes in different countries with different magnitude of outcomes. However, it has generally been considered an important policy measure, and it could be gauged by the magnitude of how rapidly countries around the world have decentralized. Furthermore, positive outcomes in improving public services delivery and thereby uplifting social standards, when people are provided with an opportunity to make decisions for themselves, has been an encouraging outcome in many countries.

The positive outcomes of decentralization reforms and their effects on the poor population's welfare are vital to look deep into the practices of such reforms. We seek to understand decentralization reforms in Pakistan and their impacts on public services delivery. We investigate the matter with a political-economic approach (theoretically), trying to look into the reasons (political, economic, and administrative) why decentralization has had slow (positive/negative) progress in Pakistan and why the expected outcomes have not been realized so far.

To our knowledge, there are no studies that have undertaken macro data (for all provinces) for analyzing decentralization and its impact on service delivery[11]. We try to fill this gap by constructing a database for provincial comparison. Moreover, the study provides a comprehensive analysis of expenditures specifically met from local/provincial revenues.

1.3 An overview of political economy of resource distribution (Local governments system in practice)

1.3.1 Basic facts

Pakistan is a multi-ethnic[12] and multi-lingual[13] federal country. It is the sixth most populated country globally, with an estimated population of 207.8 million (Census 2017, Pakistan). It is composed of four federating units called Provinces[14], a Federally Administered Tribal Areas (FATA)[15], an autonomous territory of Gilgit Baltistan, and the Capital Territory Islamabad. The federating units differ from one another in many ways in population, geography, ethnicity, and demography. The province of Punjab has the highest number of inhabitants (53% of the total population and major ethnic group). In contrast, Balochistan, which is 44% of the entire national territory, homes only 6% of the total population (Census 2017, Pakistan).

Pakistan is one of the most heterogeneous and multi-ethnic societies due to its diverse ethnic features. All provinces are marked with different national inhabitants with different cultures and languages. Punjab homes Punjabis; Sindh is populated by Sindhis (native dwellers) and Mohajirs (migrated from India at the time of partition in 1974); Pashtuns live in Khyber Pakhtunkhwa, and Balochistan is the province that inhabits Baloch and Pashtoon people. Several other ethnic groups reside within these provinces and have their own culture(s) and language(s).

Pakistan is a developing country and is among the top 50 largest economies of the world according to World Bank GDP rankings of 2019[16]. She has important strategic endowments and development potential. The increasing proportion of Pakistan's youth provides the country with a potential demographic dividend and a challenge to provide adequate services and employment (World Bank 2018)[17]. With a rapidly growing population (2.4% Census 2017 PBS (2017)) and economic challenges for Pakistan, she must have a mechanism for steady resource mobilization and maintain a sustainable growth rate for long-run survival. However, the fiscal history of Pakistan portrays a sad picture. It has remained in fiscal deficit for quite a long time, particularly during the 1970s and 1990s. One of the prime causes of long-lasting fiscal deficits is

[11] Except Ahmed (2013) who uses a similar database for analyzing fiscal decentralization and the political economy of poverty eradication in Pakistan.

[12] Punjabi 44.7%, Pashtun (Pathan) 15.4%, Sindhi 14.1%, Saraiki 8.4%, Muhajirs 7.6%, Balochi 3.6%, others 6.3%

[13] Punjabi 48%, Sindhi 12%, Saraiki (a Punjabi variant) 10%, Pashto (alternate name, Pashtu) 8%, Urdu (National Language) 8%, Balochi 3%, Hindko 2%, Brahui 1%, English (official; lingua franca of Pakistani elite and most government ministries), Burushaski, and other 8%) (CIA Factbook: https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html). According to Ethnologue (https://www.ethnologue.com/country/PK) database, there are 74 languages in Pakistan.

[14] Punjab, Sindh, Khyber Pakhtunkhwa (KPK), and Balochistan are the names of the provinces in Pakistan.

[15] The 25^{th} constitutional amendment 2018 merged FATA with the province of KPK.

[16] https://databank.worldbank.org/data/download/GDP.pdf

[17] https://www.worldbank.org/en/country/pakistan

due to non-development[18] public expenditures that have remained high all time and have kept rising with every passing fiscal year. These non-development expenditures do not contribute to the development process much but burden the economy with more deficits.

To finance the government expenditures, the Federal Board of Revenue (FBR), a central agency, is assigned for tax collection in Pakistan (See Table 1.1 for details share of expenditure and revenue collection share in the government's order). This centralized body is responsible for collecting around 80% of all the tax revenues in the country. The tax collection is then distributed among the Federal and Provincial governments. Each region and its interest groups (politicians, bureaucracy, business class) put efforts to get the highest possible financial allocation for them during the budget-making process. The powerful and strong lobbying group succeeds in fetching more resources in this process.

Consequently, the distribution of resources is skewed towards more prominent groups, leaving smaller groups short of resources and often vulnerably dependent on central transfers. With the rising deficits and low revenue generation in the country[19], more resource generation methods need to be devised. At the same time, the issue of rising non-development expenditures that traps the country into deficits needs to be addressed on an emergency basis.

Table 1.1: The shifting sands of power in Pakistan: Expenditure and revenue collection shares by order of government (percentage)

GOVERNMENT	1955	1965	1985	1995	2005	2010	2011
Expenditure Share							
Federal	60	60	65	67	70	66	67
Provincial	35	30	30	29	20	25	28
Local	5	10	5	4	10	9	5
All	100	100	100	100	100	100	100
Revenue Share							
Federal	70	85	90	90	93	94	93
Provincial	25	10	5	5	6	5	6
Local	5	5	5	5	1	1	1
All	100	100	100	100	100	100	100

Notes: Adopted from (Shah, 2012).

The political economy of Pakistan is in moderate correspondence to Lockwood (2002) model where the dominant region due to her population has dominating status. The power of dominance of such region in legislation making and administrative control enables her to influence the selection of funding of projects. In the case of Pakistan, the province of Punjab (53% of the population, (PBS, 2017)) enjoys such predominant status in sketching public policies. Indeed, the need for more resources for a large population is justified to an extent but cutting down the share(s) of other regions is a merely inappropriate use of bestowed powers. Having more seats in the legislation (National Assembly)[20], the province remains a favorite destination of projects and funds during elected governments. The province enjoys similar treatment in dictatorial

[18] Employees' Salaries, office maintenance, office stationery, miscellaneous charges, operation, management, etc., are the main non-development expenditures. They consist of 70 to 80 percent of the total budget in Pakistan and provinces.

[19] The tax to GDP ratio in 2015-16 remained as low as 12.2% (Cevik, 2018).

[20] 183/342 seats in National Assembly (148 general seats, 35 women's seats) [http://www.na.gov.pk/en/composition.php]

regimes, because of having more military and civil bureaucracy personnel belonging to her. Hence, in a federation like Pakistan where non-cooperativeness persists to some degree, one federating unit has more than half of the entire country's population and more representation in public institutions, legislation bodies, and bureaucracy, the geographical concentration[21] is more likely to occur[22].

Furthermore, during the 1970s, 1980s, and 1990s, the budget deficits have remained higher in Pakistan[23]. The elected democratic governments were in rule during a large part of this period. Democratic governments strongly rely on public support to come to power (majority votes). To stay in power for later terms in the future, these representatives have to prioritize and spend more on demanded social services. As a result of high expenditures on social services, the budget deficit is sure to rise. This rise in deficit is then financed by internal and external borrowings that create several other economic issues like inflation, increase in the unemployment rate, foreign debts and many more.

Having discussed some basic historical facts about Pakistan, the following is a detailed discussion on resource distribution and economic relations between central government and provinces, and among provincial governments. In short, we discuss the political economy of decentralization in Pakistan in the following section.

1.3.2 Political Economy of Decentralization in Pakistan

Pakistan has remained under military rule for over three decades (33 years). Each military government tried to legitimize its government by taking specific steps; the local government systems being one of the most important ones. Despite the fact local government system was undertaken by military rulers, it has always been resisted by military, civil bureaucracy, and other centralist forces. Such efforts have aimed to hinder the progress of local governments. These forces use their powers/delay tactics to prove that local governments cannot deliver to the demands of the local population. A most common way of doing so is delaying the funding of resources to these local bodies. Such challenges are among the driving forces for decentralization which cuts down the power of bureaucracy and centralist forces and empowers public representatives.

National Finance Commission (NFC) Awards is a channel through which resource distribution is governed in Pakistan. The awards give the legislative provisions of resource distribution between the central and provincial governments and among the provincial governments. Established under Article 160 (1) of the constitution of 1973, the awards ensure the distribution of resources mobilized by the federal government and shared with the provinces. With a limited resource mobilization authority, the provincial governments rely on federal transfers to finance most of their budgetary requirements. Therefore, prudent, efficient, and judicious NFC Awards is necessary for a smooth running of provincial finances (Ahmed, 2013). In brief, the purpose of NFC awards is to support provincial governments to meet the expenditure liabilities (for

[21] Almost all democratically elected governments (since 1971) that ruled have come from two political parties (Pakistan Muslim League (N) and Pakistan People's Party) that belong to Punjab and Sindh, that are more developed provinces compared to KPK and Balochistan.

[22] For details on the dominance of Punjab ethnicity in Pakistan see (Wright, 1991).

[23] See (Hasan et al., 1997) for a detailed discussion on fiscal deficits in Pakistan during the 1950s to 1990s.

details on NFC award see (Khawaja and ud Din, 2013). This criteria under the NFC Awards has been opposed by centralist forces time and again.

The political tension between federal and provincial governments and further among provincial governments over NFC awards and their distribution has remained a chronic issue. The political economy debate in Pakistan clarifies to a great extent how forces hostile to decentralization and provincial autonomy have always tried to sabotage any attempts that were undertaken for economic and political self-rules. Moreover, provincial autonomy means the limited role of the center in matters of provinces and the distribution of resources. In the same vein, local bodies' autonomy means the limited authority of provinces over the lower tier of government matters. It is the distribution of power and authority that is hurtful for the higher tiers of government. The unwillingness of upper governments (federal/provincial) has remained one of the major reasons for the unsuccessful local government system in the country. Since the establishment of the NFC awards in 1973, only a few have been agreed upon successfully. Hence, the NFC Award is an inevitable policy measure to promote provincial autonomy and fiscal decentralization in Pakistan.

Looking at the NFC awards from a game theory perspective, it could be understood that the distribution will remain in practice as earlier if the stakeholders disagree on new criteria. Suppose stakeholders fail to devise a new consensus-based Award; they must adopt the recommendations of the existing one. Remembering Lockwood (2002) model of dominant province status, the continuation of the earlier distribution criteria would benefit the Punjab province because the awards before the 7^{th} NFC award have dominantly been distributed based on population. The most significant opposition of the previous awards by the provinces was primarily based on the question that population should not be the only criterion for horizontal resource distribution. Since the province of Punjab is the most populous region, it would benefit the most from the continuation of such distribution criteria. Hence, keeping the game theoretical framework given Punjab, being a dominant stakeholder, resists any move driving to branch out the distributional criteria. It would mean more resources to other provinces and less to it.

The seventh NFC Awards (2010) is viewed as a landmark in the modern history of Pakistan, particularly over resource distribution and provincial autonomy. There was a long-term deadlock preventing consensus on establishing awards that were due in 2001, and then in 2006, the seventh NFC awards put an end to it. The contribution of two important changes proved to end the deadlock. One the share of the federal government in the divisible pool was reduced by 10 percent. Two, the multiple indicator criteria were introduced to distribute the divisible pool instead of the population. As agreed by the 7^{th} NFC, the distribution criteria can be seen in Table 1.2 along with previous existing awards criteria for comparison on changes.

Equitable resource distribution is an important factor that empowers less-developed provinces to be economically strong and perform towards achieving national economic goals. A fair and equitable share of resources from the divisible pool[24] will allow provinces to be fiscally more capable of financing their development projects. Keeping in view such importance of resource distribution, NFC Awards could be seen as the only mechanism through which federating units can guarantee their fiscal autonomy in Pakistan. The previous awards have heavily

[24]This is one of the major components of NFC awards and comprises all major federally collected taxes (including personal and corporate income tax, GST on goods, customs duties, etc.).

Table 1.2: Criteria for Distribution of National Revenues

	Presidential Order 2006	7^{th} NFC Award 2010
Provincial Share in Divisible Pool	46.25%	56% increasing to 57.5%
Grants and Subventions	3.75%	–
Indicators and weights		
Population	**100%**	**82.00%**
Poverty		10.30%
Revenue Generation		5%
Inverse Population Density		2.70%
Given the weights, the provincial share in the Divisible Pool remains as follows		
Punjab	53.01%	51.74%
Sindh	24.94%	24.55%
Khyber Pakhtunkhwa	14.88%	14.62%
Balochistan	7.17%	9.01%

Notes: Adopted from 'Pulling Back from the Abyss: Third Annual Report', Institute of Public Policy, Beacon house National University.

been based on population criteria which have concentrated power and resources towards dominant population province(s) and empowered her(their) central political establishment. The conflict of interests overpowers, and resource distribution has aggravated federal-provincial and provincial-provincial relations. Such clashes have prevented NFC Awards from being decided and distributed timely.

The theory of decentralization suggests that political competition moderates political distortions within many circumstances [see (Keefer et al., 2003).]. The fundamental reason d'être for democracy is that political competition shall induce democratic political parties to offer better public services with a lower cost of corruption (Myerson, 2014). Nevertheless, the success of decentralization largely depends on a firm institutional framework like democracy, the rule of law, and equity [see (Acemoglu et al., 2005)]. In the Pakistani context, it is worth considering the role of the rural elite or landlords in policymaking. Since most of the population lives in rural areas (63.6% (PBS, 2017)), and rural elites capture the local politics, it would not be wrong to expect decentralization to worsen the outcomes, at least in rural areas. However, elite capture is not the only cause that inversely affects the beneficial outcomes of decentralization. Although corruption by these local political elites is a challenge, systematic change and awareness among communities are inevitable to curtail this evil.

The facts presented above provide insight for understanding the issues on Pakistan's political-economic situation. Based on these facts, it is more important to understand whether decentralization is good/bad in a federation like Pakistan. In addition if the reforms help in improving public services delivery quantitative and qualitatively.

The central government's influence has always remained influentially strong (on policy design and implementation at SNG level) in Pakistan. The devolution plan of 2001 and further the 18^{th} Constitutional amendment in 2010 are crucial steps towards provincial autonomy. Even though overall expenditure has nominally increased on public services, their status does not present a good picture, at least when it comes to analyzing real per capita expenditures on the services. For example, the combined spending on education and health by the provinces has

increased from Two hundred forty-three billion rupees (Rs.243 billion) in 2009-10 (before the seventh NFC) to Six hundred eighteen billion rupees (Rs.618 billion) in 2013-14, a cumulative increase of 2.54 times in nominal terms. However, the impact on the ground of this supposed increased expenditure is not showing up[25]. Knowing this fact and many more on similar patterns, it is plausible to say that decentralization has had mixed effects in Pakistan, and it is yet in the infancy stage. The local government system is yet to produce remarkable outcomes.

Moreover, total provincial autonomy is yet to be realized fully. The partial decentralization may plausibly prove a less workable policy for a federation like Pakistan. Such partiality induces the public to keep their expectations on the central government's doorsteps (Devarajan et al., 2009). Moreover, yet overlapping of authorities on some sectors, e.g., health and education, creates doubts about the policy reforms' outcomes.

1.4 Local Government System in Pakistan: A Short Historical Background

1.4.1 Pre-partition System of Local Governments

The local government system was introduced in the subcontinent in the 19^{th} century by the British Indian government. The system's primary aim was to benefit the local elites who supported the British government's agenda in the subcontinent. The system of local government implemented by the British Raj was without any special powers because it was not established through a democratic process, i.e., through elections. Instead, the central bureaucracy nominated the representatives of the local. The system worked through a top-down style and with bounded functions of local representatives. The key administrative role at the local level was performed by the agents of the central bureaucracy[26], the Deputy Commissioner, and other bureaucratic operatives, such as the Assistant Commissioner, *Tehsildars*, *Naib tehsildar* and *Patwaris* (Tinker, 1954).

1.4.2 Post Partition System of Local Governments

After the British left and divided the subcontinent into different countries, Pakistan came into being in 1947. The local government system introduced by the British Raj remained in practice. After the independence, during the late 1940s and in the 1950s, an ever-increasing trend to centralization gave birth to a powerful military bureaucracy that diluted the already limited subnational governments (Waseem, 2007; Talbot, 1998). Like the local governments' pre-partition style, the local bodies system in the 1960s was incredibly forced by the central bureaucracy through its appointed officials at the local level. These officials had unrestricted power to hamper any actions the elected representatives might want to pass or execute. Although the system assigned several regulatory and development functions to the local governments, especially at the lowest tiers and at the district level, few functions could be performed due to a severely curtailed fiscal capacity (Siddiqui, 1992). However, the local governments were pushed to the background and hence remained dysfunctional during the period of elected government from 1971 to 1977.

[25] https://www.dawn.com/news/1182032

[26] Although there have been many attempts to change the local government structure in Pakistan, the system of the local agents, as present in the British Raj, has remained inherent, of course with slight changes.

The local government system revived again in 1979 with the arrival of the dictatorial military regime. The structure (political and administrative) of over-centralization of administrative and economic power at the provincial and federal levels were implemented just like the 1960s. Political centralization was achieved during the early years (1977-85) of the regime through the imposition of Martial Law, which held the 1973 Constitution in abeyance and was followed in 1985 by the 8^{th} Constitutional Amendment that established indirect military rule through a quasi-Presidential form of government.

It is very interesting to take a deep note that with the death of Zia-ul-Haq and later with the beginning of democracy in the year 1988, the local governments were left out again (1988 general elections were held at both federal and provincial levels with all political parties' participation). In the last three decades, local governments have paradoxically thrived under military governments but were considerably weakened under democratic governments (Monshipouri and Samuel, 1995). Thus, until the year 1999, the local governments were inactive or in abeyance by one means or the other.

1.4.3 Devolution Reforms 2000-01

The local government system was reinstated once again in the year 2001 after the military coup of 1999. However, this time the local government system was presented with a completely different structure. The functions and responsibilities were defined under the patronage of the devolution plan of 2000-01. This new devolution plan clearly described all responsibilities and power of local governments, the expenditures, and revenue-raising powers.

The local governments were permitted to assign and allocate resources given their priorities without any meddling or directions from the federal and provincial governments (upper tiers of governments). However, according to Bahl et al. (2009), the provincial governments very regularly exercised control over local budgetary functions, particularly on expenditures that were through conditional transfers from the provinces to local governments. They further show that the local governments have large imbalances between their source revenues and expenditures. They have a small fraction of revenue raised locally, and therefore are largely dependent on the provincial transfers.

Their study further explores that the local governments have always had a weak constitutional status. Local government is treated as a provincial subject. It is neither mentioned in the federal nor in the concurrent list of expenditure responsibilities. At the same time, there is a declaration in its favor in the "Principles of Policy" in the 1973 Constitution. However, the 18^{th} amendment of 2010 in the constitution of Pakistan, under article 140-A binds all provincial governments to establish local governments and devolve political, administrative, and financial responsibility and authority to the elected representatives of the local governments.

As mentioned earlier and rightly put by Monshipouri and Samuel (1995), local governments have thrived under military governments during the last four decades, and they remained weakened under democratic governments. The main reason for this is dual-faceted. One is partly due to attempts made by military regimes at engineering new political leadership through the election of local governments. The other is that provincial governments, elected democratically, often see local governments as the competitors at the constituency level.

An additional meaningful change that accompanied the new devolution plan was introducing a system of resource sharing, formula-based, between the provincial and local governments. All federating units (provinces) have established their respective Provincial Finance Commissions (PFC) in 2001 to transfer resources mechanism and distribution of finances between provincial governments and the local governments. The criterion of resource distribution, between provincial and local governments, under the PFC, is presented in Table 1.3.

Table 1.3: Intergovernmental Resource Transfer Criteria (Provincial Operating Transfers to Districts) PFA 2002-2003

Total Pool and Distribution Criteria				
	Punjab	Sindh	KPK	Balochistan
Local share of the Provincial Divisible Pool	39.8%	40%	40%	31%
Formula factors with weight				
POPULATION	75%	50%	50%	50%
Backwardness of Districts	10%	17.5%	25%	
Tax Collection Efforts	5%	7.5%		
Fiscal Austerity	5%			
AREA				50%
Development Incentive/Infrastructure Deficiency	5%		25%	
District Governments' Deficit Transfers		25%		
Total	100%	100%	100%	100%

Source: Shah (2003).

1.4.4 Provincial Autonomy – 18^{th} Amendment 2010

In April 2010, the 18^{th} amendment to the constitution was passed from the parliament. It is considered a significant reform package and a move forward towards the establishing federalism and decentralization in the country. This amendment was brought after comprehensive consultations and negotiations. The amendment is coupled with around a hundred small and major changes to the constitution of 1973. It is thought to be a way forward towards federalism and decentralization of the country by providing provincial governments with higher provincial autonomy. Some of the salient characteristics relating distinctively to fiscal federalism and provincial autonomy are explained as follows:

1- The Concurrent[27] List is removed, and powers together with the residuary ones are transferred to provinces. Laws concerning policing, law and order, education, healthcare among others are to be devolved entirely to the provinces and they oversee making laws and, consequently, executing them.

2- The National Finance Commission (NFC), the only method for both vertical and horizontal distribution of resources, cannot reduce the provincial share as agreed in the seventh NFC Award under Article 160 (3A) of the constitution 1973. This may be taken as a major constitutional development towards fiscal decentralization. Theoretically, the provinces are provided

[27]Concurrency means the simultaneous authority of the two autonomous orders of government over subjects of mutual importance. The Concurrent Legislative List (Article 70(4)) contained 47 subjects that the parliament and provincial assemblies could make laws for simultaneously. The 18^{th} amendment abolished this list, and the decision-making authority was devolved to provinces.

with more expenditure responsibilities with more funds made available through a greater share in the divisible pool (SPDC, 2012).

3- The Council of Common Interest (CCI), a forum of federal-provincial jointly, the function relating to the subjects of common legislature interest between the center and province(s) and among the provinces, has been regenerated, and its practical responsibilities have been exposited as indicated above.

Although the 18^{th} amendment brought a dramatic shift in the political economy of fiscal federalism, incongruously, it has not been successful in correcting some of the important dynamics that often caused greater inequality among provinces and cutting short (controlling) military role in the country's civil order. This ultimately causes the democratic process to be weak in the country. Therefore, without debasing role of the military in the political economy of the country the strength of true federalism is challenging to practice in Pakistan's scenario.

Another important area where this amendment has failed is to deal with the non-existence of constitutional guarantees to the local governments. Although article 140(A) binds provinces to establish local governments, it took provinces a few years to establish them. In fact, the establishment of local bodies did not change much as they remained without explicit autonomy/authority to make decisions on district levels. Moreover, the local governments undergo difficulties due to overlapping of the power and functions between the provincial and local governments.

Since provincial governments have an upper hierarchy, they often interfere in local governments' subjects and utilize them to accomplish their political and economic demands, specifically for electoral politics. Therefore, such constitutional guarantee shall be ensured for the local governments so that it helps wider political and democratic participation by encouraging potentials at grass-roots levels. Pakistan's lack of political will to implement full decentralization is one of the main hurdles in the local governments' successes. On the other hand, the low capacity of local governments in economic, political, and administrative efficiencies is another cause of such reforms' failure. To avoid certain unforeseen circumstances like military takeovers, regional conflicts, a rift in resource distribution among federating stakeholders, Pakistan needs to use a better political economy approach.

1.5 Econometric Framework

In this section, I provide a detailed empirical strategy that is used for analysis in the paper. The section briefly explains hypothesis development, data and variables, and methodologies used for econometric model testing.

Hypothesis Development

Constitutionally, Pakistan has three tiers of government (Article 140-A), namely, the federal or central government, the provincial government, and the local or district governments. By considering the nature of the relationship between federal and provincial governments (fiscal, political, and administrative), we examine a broad research question: whether fiscal powers (expenditures and revenues) from center to provincial, and further to local governments help

in improving resource allocation to different public sectors. To empirically probe this question, I work with the following hypotheses:

Hypothesis: Controlling for all other matters, the sub-national governments will channel more resources towards public services if the available share of their expenditures (revenues) increases in total national expenditures (revenues). Putting it in simple words, if the sub-national governments have more resources at their disposal, they will spend more on public demanded services.

Through the theoretical analysis presented in the paper earlier, it is assumed that lower tiers of government can identify public demands and chalking out specific areas where public resources could efficiently be spent for maximizing the welfare of the local population. Moreover, sub-national governments provide social services as preferred (demanded) by local people at a particular time. It is because of the nearness of the elected representatives to their constituency, enabling them better to understand contemporary social needs (proximity argument). Furthermore, the provision of services is also driven by the fear of being voted out of office if elected representatives performed sub-optimally during their elected tenure. The sub-national government in this analysis is referred to as the provincial governments. There is a lack of systematic data on the district administrative level for comparative analysis. Additionally, the provincial governments' expenditures reflect expenditures (funds allocated/transferred to local bodies) of the local governments, so it is plausible to use provincial data for the analysis. Based on these caveats and shortcomings, our results hinge on the strengths and weaknesses of the data limitations.

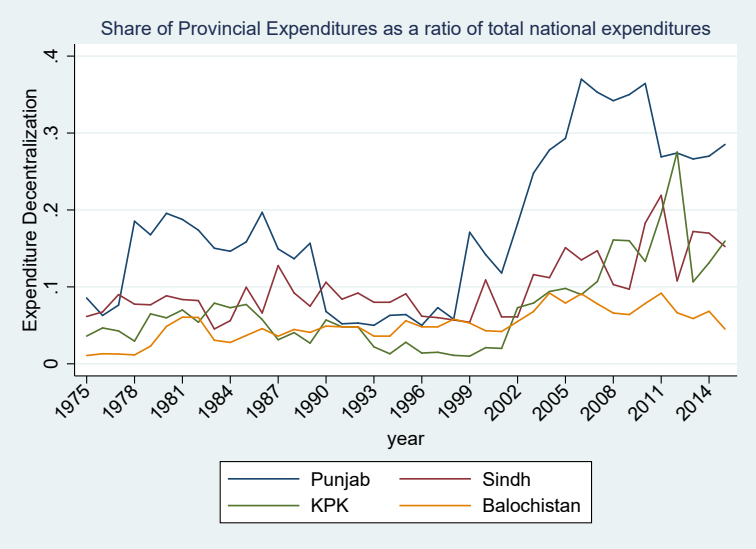
Data and Variables

The degree of decentralization (expenditure/revenues) used in this study is calculated according to methods given as under:

1. Provincial governments' expenditures as a ratio of total national expenditures (ED). Figure 1 below shows the expenditure share of all provinces. It shows the expenditures made on provincial level have remained low (maximum at 37% in Punjab).

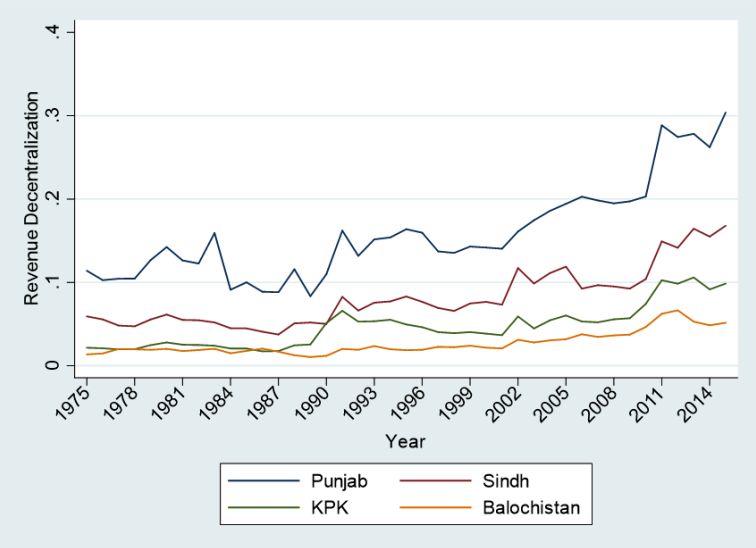
2. Provincial governments' revenues as a ratio of total national revenues (RD). Figure 2 shows the revenue share of provinces which is lower than 10% for less developed provinces of Balochistan and KPK. It has remained below 30% at maximum for the province of Punjab. Table 1A.14 in Appendix explains the data source for variables used to calculate degree of decentralization.

We use inflation-adjusted real values for all expenditures on each sector. The analysis is based on per capita expenditure and its relation to the degree of decentralization to capture policy reforms' real effect. The details of all variables, their measurement, components (where applicable), and their data source are given in detail in Table 1A.13 in Appendix. The descriptive statistics of the main variables is given in Table 1.4.



Notes: The figure shows the expenditure share of provincial governments in total national expenditures. *Source*: Author's own compilation.

Figure 1.1: Trends of Expenditure Decentralization in Pakistan



Notes: The figure shows the revenue share of provincial governments in total national revenues. *Source*: Author's own compilation.

Figure 1.2: Trends of Revenue Decentralization in Pakistan

1.5.1 Estimation Design and Results

The econometric technique of Feasible Generalized Least Square (FGLS) estimation is used to test the hypothesis presented above. The FGLS estimation fits panel-data linear models. This allows estimation in the presence of AR(1) auto-correlation within panels and cross-sectional correlation and heteroskedasticity across panels. This is an appropriate method when panel data is a time-series cross-sectional. Since in this study Time (T) dimension (41 years) is greater than Cross Sections (N) dimension (4 provinces), the FGLS method is an appropriate estimation method for it (Reed and Ye, 2011). Moreover, FGLS also helps to solve the issues related to

Table 1.4: Descriptive Statistics

VARIABLES	Obs.	Mean	Std. Dev.	Min.	Max.
Expenditure Decentralization	164	.1	.077	.01	.372
Revenue Decentralization	164	.078	.062	.01	.304
Economic Reforms Dummy	164	.341	.476	0	1
Health Expenditure*	164	895.52	2188.93	1.145	17488.59
Education Expenditure*	164	1744.104	4098.047	2.858	38665.94
Social Expenditure*	164	2832.632	6604.577	3.368	57473.04
Welfare Expenditure*	164	225.112	867.784	.009	8454.508
Agriculture Expenditure*	164	373.539	867.882	.956	8949.973
Water Management Expenditure*	164	315.689	617.575	.501	5022.106
Rural Development Expenditure*	164	72.002	223.166	.002	2054.654
Infrastructure Development*	164	377.603	671.364	2.57	5914.44
Population**	164	30.938	27.041	2.764	106.629
Urbanization Rate**	164	9.603	9.155	.454	33.343
GDP per capita**	164	28565.66	10277.44	12550.14	56634.7
Government Size	164	.044	.064	.002	.418
Ratio of Rural/Urban population	164	3.37	1.733	1.042	6.111
Adult Literacy Rate (10 +)	164	36.05	14.834	9	63
Gross Primary Enrolment	164	59.957	19.92	19.6	100
Per capita hospital/dispensary beds	164	1569.009	438.707	1118.563	3232.62
Misery Index	159	13.986	4.144	5.54	25.53
Area in sq. km	164	192000	101000	74521	347190
Fertility Rate	164	5.365	1.272	3.61	7.965
Unemployment Rate	159	5.107	2.456	1.41	13.11
Infant Mortality Rates	164	90.5	19.834	49	155
Pupil Teacher Ratio (Primary)	164	37.067	7.829	21.385	62
Secondary School Enrolment (Female)	160	15.691	9.458	2.5	43.046
Fertilizer Consumption (000)	164	610.057	773.96	2.3	3146.6

Notes: *Real expenditures in millions of rupees. ** Population in millions.

group-wise heteroskedasticity[28], and serial auto-correlation[29] in panel data.

We analyze the case from a quantitative aspect at large as the quality-adjusted provision of public goods/social services is difficult, and such data is not available at ease. Nevertheless, we can only test health, education, and agriculture outcomes from a qualitative aspect, but usual data caveats hold in these outcomes. The rest of the sectors lack data on the output indicators. The data set constructed is a simple time-series cross-section panel data for four provinces for a period of (41) forty-one years (1975-2015) to explore the relationship at the provincial level.

Since our data is a Time-series cross-sectional, we test for the stationarity of our variables before estimating our models. We use a Fisher-type panel unit root test. Fisher-type tests approach testing for panel-data unit-roots from a meta-analysis perspective. These tests conduct unit-root tests for each panel individually and then combine the p-values from these tests to produce an overall test[30]. The results of the stationary test are presented in Table 1A.1 in Appendix.

The estimation analysis of our study is carried out in three steps for understanding the link between decentralization and resource channelization to public services under study. Such

[28]Wald test for group-wise heteroskedasticity was checked for each sector.

[29]Wooldridge test for auto-correlation in panel data was tested for all models.

[30]It includes two lags in Augmented Dicky Fuller (ADF) regressions. We remove the cross-section means and include drift as an option for the test. For details see STATA Manual at – https://www.stata.com/manuals/xt.pdf

exercise aims to observe the relationship patterns of main interest variables to our outcome variables. This also allows us to understand if policy changes have had a stronger effect on changing expenditure patterns in provinces. Besides individual effects, we also check for the interaction between decentralization indicators and economic reforms. The results of the three-step exercises are presented one by one in the text below.

Individual effects

The basic empirical model for the first step takes the following form for both Expenditure Decentralization (ED) and Revenue Decentralization (RD) respectively.

$$SECTEXP_{j,i,t} = \alpha_i + \beta_1 DEC_{i,t} + \sum_{j,t,t}^{k,n} \beta_j CONTROL_{i,t} + \mu_t + \varepsilon_{i,t} \tag{1.1}$$

$SECTEXP_{i,t}$ reflects the real per capita expenditures on one of the alternative sectors j in region i in period t. $DEC_{i,t}$ is an alternative measure of degree of decentralization (ED and RD). $CONTROL_{i,t}$ are k exogenous control variables that include regional GDP per capita, urbanization rate (urban population in millions), government size (the ratio of regional government expenditures to total national expenditures), primary gross enrolment rate, population density, adult literacy rate, rural/urban population ratio, unemployment rate, infant mortality rate, misery index, area, fertility rate, and hospital/dispensary beds per capita). Each model is tested with a set of different controls relevant to the sector. All the regressions include time (μ_t) and regional (α_i) dummies to control for regional heterogeneities over time[31]. $\varepsilon_{i,t}$ is a usual random error term capturing any information not taken care in the models. All models include an intercept term.

The results of equation (1) are presented in Appendix Table 1A.2 for ED. Looking at the results, we observe that the relationship between public expenditure and ED is negative for health, education, agriculture, and water management sectors. However, it is statistically significant for health sector only. The relationship is positive for social, welfare, rural development, and infrastructure development sectors. The statistical significance can be observed on all these models (except rural development). These positive coefficients indicate that these sectors received a significant portion of per capita provincial expenditures than other sectors. The negative results show that the overall per capita expenditures have deteriorated over time and have remained insufficient. The lack of resources at the sub-national level has affected most of the services to underperform.

The sub-national governments have always been in resource deficit, this is likely to expect lower spending on certain sectors. We observed in Table 1.1 above how the shares of expenditure of provincial and Local governments have remained low and have shrunk over time. The resource availability at the disposal of sub-national governments being minimal, hinders their way in channelizing more resources to specific public sectors. Similarly, this increases the dependency of lower tiers of government on upper tiers to transfer funds to meet the financial needs. Furthermore, the central government's dominance in tax collection and expenditures limits the performance of sub-national governments in the provision of services on their own.

[31]We also included Period Dummies which splits our data into three groups of periods that captures possible variations pre reforms period (0 if year 1975-2001), first period when devolution takes place (1 if year 2002-2009) and the effects of 18^{th} Constitutional Amendment (2 if year 2010-2015).

Following ED, we further investigate the relationship between public expenditures and RD. The results for RD are presented in Table 1A.3. We observe that the relationship is negative and significant for all the models. This is a stronger depiction of local resource constraints. The revenues collected at provincial levels have remained sufficiently low. This makes sub-national governments vulnerable and dependent on upper-tier grants.

Combined effects

Knowing the average long-term relationship of the sectoral expenditures with the degree of decentralization (ED and RD) from the first set of analyses, we now incorporate economic reforms dummy in the model. This defines the second step of our analysis. The relationship defined by ER dummy captures the effects of institutional, administrative, and policy changes that came into effect after the devolution reforms were placed in force in 2002. Since these reforms are considered one of the most outstanding decentralization reforms in the modern history of Pakistan, they were expected to have a sizeable effect on the allocation of resources to the public sectors, consequently improving the services delivery. When including the Economic Reforms (ER) Dummy, the estimation equation transforms into the following form:

$$SECTEXP_{i,t} = \alpha_i + \beta_1 DEC_{i,t} + \beta_2 ER_{i,t} + \sum_{j,i,t}^{k,n} \beta_j CONTROL_{i,t} + \mu_t + \varepsilon_{i,t} \tag{1.2}$$

The result derived from analyzing equation (2) are presented in Table 1A.4 and 1A.5 in Appendix for both the indicators of decentralization, i.e. ED and RD. Looking at the results in Table 1A.4 we observe no significant deviation for the ED variable from the baseline results[32]. However, besides ED, the main interest in this new set-up is to see how economic reforms are associated with the outcome variables. We can observe that the ER dummy is positive for all models and is statistically significant for all except one. These results denote that the economic reforms significantly changed the size and magnitude of public sector investments. The investment patterns captured by the ER dummy are prominent. This indicates the sub-national governments being more responsive to providing services to the rural population in the aftermath of economic reforms.

Turning to Table 1A.5 to see the results for RD, we observe that the coefficients of all sectors maintain their signs and significance level as obtained from the baseline model for RD. The changes can be compared on the coefficient sizes which indicates some improvements for some sectors. The difference can be observed on infrastructure development sector that changes into positive in contrast to earlier results. However, the ER dummy is negative and significant with this model. The ER dummy is positive and statistically significant with all the remaining sectors. This suggests more resources were forwarded to the sectors after the devolution reforms were implemented. Furthermore, this also suggests that however small the share of the revenues of the sub-national governments were, the investment patterns observed some changes in the aftermath of 2001 reforms. Local governments had more fiscal and political autonomy to decide on the use of resources towards sectors of the economy.

[32] Analyzing the equation with the exact specifications as in equation (1) there is no difference in coefficients and standard errors of ED as in the previous case.

Interaction Effect

Given the results in the previous two models, we lack clear evidence of any larger changes brought by the reforms of 2001. The results provide an insight that the overall expenditures on public sectors have remained low (negative for a larger part without taking economic reforms into account) as a share of the expenditures of the sub-national governments. The policy reforms have improved the local public services delivery a little, if at all. The results from our analysis show similar behavior (positive effect of ER dummy for most of the sectors), which is in line with the available literature (Ahmed, 2013; Aslam and Yilmaz, 2011). However, looking at the individual effects in the models with the ER dummies may not provide a comprehensive analysis. The two indicators may better be seen in combination to assess their combined effects in improving the overall expenditure share of the sub-national governments.

We find public sector investments have had a mixed behavior despite the fact provincial and local governments had, *per se*, more autonomy to distribute resources among those sectors. This denotes that the policy aimed at bringing a considerable change failed on realizing its goals at full length. However, suspecting dual effects (positive/negative) of the decentralization reforms, as explained in the empirical literature, it is possible to have a positive, negative, or an inconclusive effect of the reforms. The results are contingent on a country specific condition. Keeping in mind this line of reasoning, we estimate the models with an interaction approach. This would equally be an indicator of the local autonomy, showing actual decentralized authority to sub-national governments. The significance of the individual and interaction coefficients provide us information on the direction of the effects of the reforms. The significance of the interaction term indicates the presence of a combined effect to be a substitute or complementary. The interaction equation takes the following form:

$$SECTEXP_{i,t} = \alpha_i + \beta_1 DEC_{i,t} + \beta_2 ER_{i,t} + \beta_3 DEC_{i,t} * ER_{i,t} + \sum_{j,i,t}^{k,n} \beta_j CONTROL_{i,t} + \mu_t + \varepsilon_{i,t} \qquad (1.3)$$

The results for ED and RD with the interaction are presented in Table 1A.6 and 1A.7 in Appendix. These specifications test the main hypothesis that economic reforms moderate the decentralization-services delivery relationship, with statistically significant coefficients on interaction rendering support for the hypothesis.

Briefly looking at individual associations of the variables in Table 1A.6 shows a mix of results. The ED is negatively associated with outcome variables in three out of eight models. It is statistically significant for one of these negatively associated models. It is positive for the remaining models and statistically significant with social, welfare, and Infrastructure development sectors. The change in this new set-up is the positive association of ED in the education model. However, it fails to any level of significance. Furthermore, the ER dummy is positive and statistically significant for all the models. These individual results are partial in nature. One cannot interpret these individual results in question without taking the partial effects of others into account. We must see how they interact and jointly reflect the true effects.

Looking at the interaction term coefficients, we can observe that the coefficients are negatively associated to sectoral expenditures in all the models (except for health sector). The

interaction coefficients are statistically significant for six out of seven negative models. This significant association renders support for the hypothesis that the economic reforms moderated the effect of decentralized expenditures. The negative and significant results show that the overall effect of economic reforms further deteriorated the sectoral expenditures. Though individual effects of both the variables show a different pattern, the interaction considers their combined effect on the outcome variables. However, the nature of this term is a mere indication of the joint effect of the ED and ER.

While looking at the joint association of ED and ER and finding an overall negative effect, I further see the net marginal effect of the interaction between the two, which is a more important indicator to all those individual and interaction coefficients. In multiplicative interaction models, one is less interested in the statistical significance of the estimated parameters *per se* (Brambor et al., 2006). Instead, the interest is in finding the marginal effect of X on Y. This effect can be calculated using β_1 and β_3 given the ED [see equation three (3) above]. The results of this joint significance are presented at the bottom of Table 1A.6 for ED. The equation for calculation of the marginal effect is as follows:

$$\frac{\partial SECTEXP}{\partial DEC_m} = \beta_1 + \beta_3 ER \tag{1.4}$$

This interaction model asserts that the effect of changes, if any, of expenditure decentralization on the level of public sector expenditures is seen through the values of the conditioning (moderating) variable, i.e. presence of *Economic Reforms*. The joint significance would indicate the net direction of the relationship of the dependent variable (*SECTEXP*) and independent variable (*DEC*) through modifying ER channel. A significant value of $\beta_1 + \beta_3$ indicates that the sector(s) on average received significantly more/less (if $\beta_1 + \beta_3 > 0$ and/or less (if $\beta_1 + \beta_3 < 0$) resources in the aftermath of the reforms. By looking at the results in Table 1A.6 this is evident that the joint significance can be observed for health, welfare, agriculture, and infrastructure development sectors. The coefficients have a negative sign for health and agriculture sectors. The welfare services and infrastructure development sector have positive signs on the joint test coefficients. This means that even if the economic reforms were seen as agent of change in bringing more opportunities for sub-national governments through large financial inflows, the net effect is negative for some of the sectors. The negative signs indicate the sectors further suffered cuts on their funds. The positive sign on joint test renders evidence for an improvement in the resources to these sectors. However, the statistically significant coefficients show an observable change. As explained earlier in the paper, the fear of being voted out of the office, the public representatives make sure to provide evidence-based development indicators. The infrastructure development such as small roads, pavements in streets, construction of sewerage system, and streetlights were some of the priorities for local representatives. Therefore, more resources were directed to this sector. Moreover, welfare services saw an increase in their resource availability. The governments' aim at reducing poverty and inequality among regions through social and welfare schemes was on the priority list in this regard.

Moving further and looking at the interaction model results with RD, we observe in Table 1A.7 significance of the interaction term with a larger number of models. However, the magnitude of the relationships is stronger than the ones observed by ED. Looking at the joint test coefficients and thereby finding the results through equation (4), we can observe that the net

effect is negative and significant for five sectors among eight models. This suggests that the revenues at the disposal of provincial governments were very low. The overall effects of economic reforms further deteriorated the per capita expenditures on the public services from sub-national governments' revenues. This is plausible because of the shortage of revenues and collecting authority of sub-national governments, and further, the resource distribution mechanism is flawed.

These results presented in the previous section for expenditure and revenue decentralization and their relation to sectoral expenditures do not show an encouraging picture. The negative individual, combined, and interaction results that are further confirmed through marginal (net) negative effects suggest shortcomings of policy design and its implementation. The sub-national governments face a huge resource availability problem to finance the public sector and better service delivery. The situation is further aggravated due to the higher tier's dominance in collecting revenues and redistributing among sub-nationals on criteria that have been criticized from the very beginning. This discourages sub-national governments in decision-making and diverting available resources towards more demanded public services.

Furthermore, a lack of political and institutional capacity cannot be overlooked in directing these results. A large rural population, coupled with illiteracy and lack of healthy and skilled human resource, are yet other matters in hindering the way of successful decentralization. Moreover, the funds' distribution through bureaucratic channels makes it further difficult to achieve positive outcomes. These channels often use corrupt means and delay tactics. Hence, to have more encouraging and expected positive outcomes, the issues related to policy design, good governance, and institutional capacity are necessary steps to make the decentralized system function well.

To further investigate the effects of decentralization reforms in Pakistan, we attempt to see if the outcome indicators of the sectors presented above show an improving trend. Although it would be an addition if we could test for all the sectors and further sub-sectors to assess a more profound impact of the reforms, data shortage makes it extremely difficult. However, we could collect data on some indicators related to health, education, and agriculture-related outcomes and test the same for quality-adjusted outcomes of economic reforms. The indicator for health sector outcomes is Infant Mortality Rates (IMR). The education sector outcome indicator is Adult Literacy Rate (LITERACY)[33]. The agriculture sector outcome is proxied by Fertilizer consumption. Although it is an input for the agriculture sector, a growing demand and fertilizer usage is an indicator of more agriculture activity. We only analyze the interaction models for these outcomes. The equation form of outcome models takes the following form:

$$SECTOUT_{i,t} = \alpha_i + \beta_1 DEC_{i,t} + \beta_2 ER_{i,t} + \beta_3 DEC_{i,t} * ER_{i,t} + \sum_{j,i,t}^{k,n} \beta_j CONTROL_{i,t} + \mu_t + \varepsilon_{i,t} \qquad (1.5)$$

$SECTOUT_{i,t}$ reflects *IMR*, *LITERACY*, and *FERTILIZER* consumption for health, education, and agriculture sectors j in region i in period t. $CONTROL_{i,t}$ are k exogenous control variables that include the variables explained under equation (1). All the regressions include time (μ_t)

[33]The literacy rates are for the population of age 10 and above.

and regional (α_i) dummies to control for regional heterogeneities over time. $\varepsilon_{i,t}$ is a usual random error term capturing any information not taken care in the models. The results for each outcome indicators are presented in Table 1A.8 for Health, 1A.9 for Education, and 1A.10 for Agriculture outcomes. We only present the result with an interaction model and report the net effects of the policy reforms.

The improvement indicators would suggest that the reforms helped increase the welfare of the common masses. The results for health outcomes in Table 1A.8 (column 1 and 5) show the outcomes of FGLS model for ED and RD respectively. There is a positive and significant conditional association of ED to IMR. The ER coefficient is positive and statistically significant as well. The interaction coefficient is negative and statistically significant, lending support for a combined effect of the ED and ER. The net effect calculated by equation (4) is reported at the bottom of the table. We can observe that the coefficient on $\beta_1 + \beta_3$ is positive and significant at the 1% level. This suggests that the overall effect of expenditures on the health sector had worsened health conditions and was not successful in reducing IMR substantially. However, looking at the results from RD (column 5) in Table 1A.8 the net effect is negative and statistically significant at the 1% level. This means that the sub-national governments spent more on health-related activities, mainly targeting mother and child health, which helped to reduce overall IMR. Though we do not find any significance on the interaction coefficient, this does not affect the interpretation of the net effect of the model (see Brambor et al. (2006) for details). Hence, the unambiguous effect of decentralization is at work in this case. It is improving with some indicators of fiscal decentralization and worsening with the others.

Turning to education outcomes, we report the results of the estimations in Table 1A.9 column 1 for ED and column 5 for RD indicators, respectively. The results in column 1 (for ED) show a significant association on individual constitutive terms and negative association on interaction coefficients. The net effect presented at the bottom of the table suggests that there is an improvement in adult literacy rates. While looking at the results for RD (column 5), we find that the net effect has remained negative and significant. This suggests that the education sector received lower finance from the overall revenues available at the disposal of regional governments. This has translated into deteriorating the literacy rates in the provinces. The lack of revenues is more relevant to the education sector as a larger policy design was made at federal level and implementation was designated to sub-national governments. The sub-national governments were the financing agency for the sector, which often made it difficult due to ambitious policy plans from higher tiers which required more finances and more skilled human resources.

Furthermore, to see how agriculture sector outcomes reacted to the sectoral expenditures, we turn to Table 1A.10. The results for ED and RD are presented in columns 1 and 5, respectively. The conditioning individual and interaction coefficients are significant in the ED model and partially significant with RD. Looking at the net effects the ED model is positive and statistically significant whereas the RD model is negative and statistically significant at 10% level. The results show a mix of outcomes. It is improving with one of the indicators for decentralization and shows deteriorating evidence for another. To further explore the relationship for the sectoral outcomes, we test the models with different specifications. The details are given in the next section.

Robustness checks

Although we believe our baseline results are robust because the models take consider an extensive range of specifications in each regression to control for several econometric issues. I further test for endogeneity and reverse causality effects of sectoral expenditures and decentralization relationship. In this regard, I use a Two-Stage Least Squares Instrumental Variable (IV-2SLS) method. I instrument the decentralization indicators (ED and RD) by their first lag and include population in natural logs in the list of instruments. I also include the year of local governments' elections (a political decentralization indicator) with some models. The lagged values cater to the issues of causality since lagged values precede the main dependent variable in time. The causality is assumed to run entirely from the lagged values. This attempts to make more specification tests to find if our baseline results hold when we use a different method and particularly try to use exogenous instrumental variables for decentralization indicators. I apply the IV methods to interaction models only and report the results.

The results for the ED with IV approach are presented in Table 1A.11. We can observe the individual constitutive and interaction coefficients with mixed results and some deviation from the baseline results association (positive/negative signs). The significance of interaction term rendering evidence of a joint effect. Furthermore, the interest resting in net effect from a multiplicative interaction model, shows that the effect calculated using equation (4) the marginal effect is negative for a larger number of models and statistically significant with four out of six models. This is partially in line with our baseline results that the economic reforms have had an overall deteriorating effect on resource channelization. Sargan Statistics further validates the validity of our instrumented variable reported at the bottom panel of the table with some other diagnostics for first-stage regression outcomes.

Furthermore, the results from RD estimation models with IV are reported in Table 1A.12. The constitutive RD and ER, along with interaction coefficients following the results at large from our baseline results (exceptions of sign changes on social and welfare sectors). Looking at the bottom panel for the net effect estimation outcomes, we can observe that the results are negative in six models out of seven and statistically significant for five models. This is in line with what we find in the baseline results. Thus, this indicates our results from ED (partially) and RD are robust to the use of alternative methods.

We also attempt to use an IV estimation technique with outcome indicators and report the results along with the FGLS model outcomes. The results provide evidence of what we find in baseline results on the individual constitutive and interaction coefficients. The net effect models show evidence that our baseline outcomes are robust[34].

1.6 Discussion and Policy recommendations

The results in the models above explain that we could jointly determine the effect of the policy reforms to have adversely affected the public sector spending from the sub-national governments' resources (expenditure and revenue shares). From the results obtained by our analysis,

[34]Given the data caveats the results of outcome indicator are however less relevant.

we could plausibly conclude that decentralization reforms of 2001 have had a slight positive effect in improving public services in Pakistan for a short period and at least for a few sectors but have not succeeded at large. The net negative effects provide an insight into the shortcomings of the decentralization reform policies in the country.

Although the investments have remained negatively associated with the expenditure and revenue shares of the provincial governments (degree of decentralization), the real per capita expenditures on public services, have arguably increased slightly. The possible reasons for the long-run negative association could be traced in history. Sub-national governments have always been at the mercy of higher tiers of the government for meeting their expenditure demands. Moreover, decentralization reforms were always introduced by the military governments; therefore, the political parties largely opposed such movements for sharing power and resources to lower tiers. Consequently, they opposed any larger resource diversions to LGs. This is rightly explained by Cheema et al. (2005) that 'as a result of non-party basis politics of local tiers, the political linkages were absent between different tiers of government'. This pressurized tensions between provincial and local political representatives that were being seen as competing for a structure of patronage Wilder (1999). The unwillingness to share powers (politically and financially) by higher tiers makes it impossible for lower tiers to perform well in services delivery (observed by looking at the expenditure and revenue shares in the order of government in Table 1). The efficiency of local governments, strict financial constraints, and the dearth of human resource availability further limit the growth of local governments in the provision of services. Iqbal et al. (2012) present that low institutional capacity at the local/provincial level causes decentralization failure in bringing positive outcomes. The low institutional capacity in the proper provision of services cannot be ruled out in the case of Pakistan. The revenue shares being at the minimum, the sub-national decisions are influenced by the higher tiers to obtain their economic and political goals. While transferring resources to LGs it is more often decided at the provincial or federal level to be spent on a specific sector.

Furthermore, diverse regional differences, the efficiency of the provincial/local governments (Prud'Homme, 1995) in proper planning, budgeting, and utilization of resources could be among some critical factors affecting expenditures on public sectors. The argument that local governments lack human, financial, and technical efficiency in handling important service delivery (Crook and Sverrisson, 1999; Adams, 1986) seems true in this case. Moreover, partial (limited or partial authority on decision making) decentralization is yet another factor worth consideration especially in the case of Pakistan. This weakens local sub-national governments' incentives to allocate more resources for demanded local needs (Devarajan et al., 2009). Pakistan is yet experimenting with decentralization reforms. The local governments have not flourished well in Pakistan, neither under military nor elected governments (Ali, 2018). The delays in elections time and again, and further resource transferring tactics being played by higher governments suggest that power and resource sharing are not easy for them (political elite capture). The forces supporting centralization have made it difficult for policymakers to implement a decentralized governance structure fully. In addition to the above, often, sub-national governments use fewer resources to invest in the sectors that might receive parallel funding from donors or the higher tiers of governments. Our study shows that the investment patterns from the share of sub-national governments' resources to the sectors have remained insufficient. This asserts the presence of incomplete decentralization in the country. The partial authority given to local governments is not sufficient for fulfilling the needs.

The recommendations for improving local autonomy and thereby making decentralization work may include both political and economic considerations jointly. Making changes in policy reforms and creating a political will to change the status quo stands at first. The delays in elections for sub-national governments portray the intentions of elected central and provincial governments in making decentralization work. Furthermore, reforms supported by the political party in power are often for political reasons and not indeed intended for power devolution. It is a tactic used for suppressing political competition by undermining the opposition. Improving governance requires increasing political competition and citizen participation, which tends powerfully towards improved accountability (Faguet, 2012). Moreover, politicians' and bureaucrats' resentment of power devolution is another area that needs a considerable solution. The bureaucracy sees local government representatives as an opposition in the administrative power division. The policy reforms must clearly define the duties and responsibilities of all stakeholders at length to avoid overlapping and conflict of interests.

On the economic front, it is necessary to increase the resource mobilization of sub-national governments. The central government and the provincial governments need to ensure they provide more revenue collection powers to lower tiers. Depending on the local economic composition, setting a tax base shall fall in the authorities of LGs. Provincial autonomy and local self-governance are meaningless if taxation rights, and equitable distribution of income and wealth are absent. The perpetual economic and political crises cannot be solved without giving sufficient resources, and rights to generate own revenues to LGs. This would be utilized for the welfare of the residents who pay the taxes and not for the elites.

Furthermore, lack of resources limits sub-national governments from meeting the demands of the population. The dependency on the transfer of resources from higher tiers makes LGs vulnerable. The transfers are often on certain conditions (political patronage) and sectors (higher tiers goals for sectors) that undermine the need criteria at the sub-national level. This also creates inequality among jurisdictions. More funds are transferred to jurisdictions that support the party's political ideology in power at the center or province leaves other constituencies with minimum resources. Moreover, the higher tiers' support in promoting sub-national governments' growth and success needs to remain high. The equitable financial resources distribution and its timely availability is a necessary condition in this regard.

1.7 Conclusion

The link between decentralization and service delivery remains a debatable area to date. The results have been mixed for different countries and regions, as observed by the available literature. This paper investigates the link between decentralization reforms and their impact on service delivery in Pakistan. We investigate if the investment patterns from the share of sub-national governments' resources have improved towards social and economic sectors after the reforms were implemented. The results show that decentralization reforms have had a mixed effect overall but at large have remained negative.

Our analysis focuses on the overall effect of decentralization reforms on service delivery by looking at the resources directed to these services. The empirical attempt to examine the increase/decrease in expenditure patterns suggests that decentralization reforms have improved,

if at all, the investments in a few public sectors in short run. Though overall public expenditures are negatively associated with the degree of decentralization, the reforms made a small significant change in empowering sub-national governments to spend more on the public sector. However, the sub-national governments failed to benefit from such increases in the authority and resources at their disposal.

The low financial capacity, lack of adequate institutional setup (elite political capture, bureaucratic autocracy that is inclined to centralist tendencies), and a dearth of the human resource have hindered ways for lower tiers to enjoy the benefits of decentralization reforms fully. Keefer et al. (2003) puts it right that the root of public service failure in Pakistan is not only an absence of sufficient resources but also in poor execution of public programs. The dependence of lower tiers of government on higher government resources makes them vulnerable in making certain decisions on the political and economic fronts. Not having enough resources to finance basic public services, lower tiers look up to upper tiers for financial help. The findings suggest that for decentralization to be beneficial, lower tiers of government must improve their capacity on all fronts; political, economic, and administrative. The financial constraints pressure LGs to remain at the mercy of higher tiers. The low financial resources channelized to sectors from sub-national governments' own resources are evident in our analysis.

Bibliography

Acemoglu, D., Johnson, S., and Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. *Handbook of economic growth*, 1:385–472.

Adams, C. T. (1986). Decentralization: The Territorial Dimension of the State. By Brian C. Smith. (Winchester, MA: Allen & Unwin, Inc., 1985.). *American Political Science Review*, 80(2):706–707.

Ahmed, M. (2013). *Fiscal Decentralisation and Political Economy of Poverty Reduction: Theory and Evidence from Pakistan*. PhD thesis, Durham University.

Ali, S. M. (2018). *Devolution of Power in Pakistan*. United States Institute of Peace. Washington, D.C.

Arzaghi, M. and Henderson, J. V. (2005). Why countries are fiscally decentralizing. *Journal of Public Economics*, 89(7):1157–1189.

Aslam, G. and Yilmaz, S. (2011). Impact of decentralization reforms in pakistan on service delivery—an empirical study. *Public Administration and Development*, 31(3):159–171.

Azfar, O., Kahkonen, S., Lanyi, A., Meagher, P., and Rutherford, D. (1999). Decentralization, governance and public services: The impact of institutional arrangements. *Centre for Institutional Reform and the Informal Sector, University of Maryland Baltimore, MD*, pages 1–37.

Bahl, R., Cyan, M., et al. (2009). Local government taxation in Pakistan. Technical report, International Center for Public Policy, Andrew Young School of Policy Studies, Georgia State Uiversity.

Bardhan, P. (2002). Decentralization of governance and development. *Journal of Economic Perspectives*, 16(4):185–205.

Bonfiglioli, A. M. (2003). *Empowering the poor: Local governance for poverty reduction*. United Nations Publications.

Brambor, T., Clark, W. R., and Golder, M. (2006). Understanding interaction models: Improving empirical analyses. *Political analysis*, pages 63–82.

Brennan, G. and Buchanan, J. (1980). *The power to tax: Analytic foundations of a fiscal constitution*. Cambridge University Press.

Caldeira, E., Foucault, M., and Rota-Graziosi, G. (2012). Does Decentralization Facilitate Access to Poverty-Related Services? Evidence from Benin. Working Paper 18118, National Bureau of Economic Research.

Cevik, S. (2018). Unlocking Pakistan's Revenue Potential. *South Asian Journal of Macroeconomics and Public Finance*, 7(1):17–36.

Channa, A. and Faguet, J.-P. (2016). Decentralization of health and education in developing countries: A quality-adjusted review of the empirical literature. *The World Bank Research Observer*, 31(2):199–241.

Cheema, A., Khan, A. Q., and Myerson, R. (2010). Breaking the countercyclical pattern of local democracy in pakistan. *Unpublished manuscript. Available from http://home.uchicago.edu/rmyerson/research/pakdemoc.pdf*.

Cheema, A., Khwaja, A. I., and Khan, A. (2005). Decentralization in pakistan: Context, content and causes. *KSG Faculty Research Working Paper Series*, (RWP05-034).

Crook, R. C. (2003). Decentralisation and poverty reduction in africa: the politics of local–central relations. *Public Administration and Development: The International Journal of Management Research and Practice*, 23(1):77–88.

Crook, R. C. and Sverrisson, A. S. (1999). To what extent can decentralized forms of government enhance the development of pro-poor policies and improve poverty-alleviation outcomes? *Available at: https://citeseerx.ist.psu.edu/viewdoc/download?*

Devarajan, S., Khemani, S., and Shah, S. (2009). The politics of partial decentralization. *In "Does decentralization enhance service delivery and poverty reduction?"*, pages 102–121.

Dickovick, J Tyler (2013). Foreign Aid and Decentralization: Policies for autonomy and programming for responsiveness. Working Paper 2013/044, UNU-WIDER.

Faguet, J.-P. (2002). *Decentralizing the provision of public services in Bolivia: Institutions, political competition and the effectiveness of local government*. PhD thesis, The London School of Economics and Political Science (LSE).

Faguet, J.-P. (2004). Does decentralization increase government responsiveness to local needs?: Evidence from bolivia. *Journal of Public Economics*, 88(3-4):867–893.

Faguet, J. P. (2012). *Decentralization and Popular Democracy: Governance from Below in Bolivia*. University of Michigan Press.

Fan, C. S., Lin, C., and Treisman, D. (2009). Political decentralization and corruption: Evidence from around the world. *Journal of Public Economics*, 93(1-2):14–34.

Fisman, R. and Gatti, R. (2002). Decentralization and corruption: Evidence across countries. *Journal of Public Economics*, 83(3):325–345.

Grävingholt, J., Doerr, B., Meissner, K., Pletziger, S., Rümker, J. v., and Weikert, J. (2006). *Strengthening participation through decentralisation: Findings on local economic development in Kyrgyzstan*, volume 16. DEU.

Hasan, P., Kemal, A. R., and Naseem, S. M. (1997). Learning from the Past: A Fifty-year Perspective on Pakistan's Development. *The Pakistan Development Review*, 36(4):355–402.

Hayek, F. A. (1948). *Individualism and economic order*. University of Chicago Press.

Huther, J. and Shah, A. (1998). Applying a simple measure of good governance to the debate on fiscal decentralization. Policy Research Working Paper Series 1894, The World Bank.

IMF (2001). Fiscal Decentralization and Governance; A Cross-Country Analysis. IMF Working Papers 01/71, International Monetary Fund. Available at: https://ideas.repec.org/p/imf/imfwpa/01-71.html.

Iqbal, N., Din, M. U., and Ghani, E. (2012). Fiscal decentralisation and economic growth: Role of democratic institutions. *The Pakistan Development Review*, pages 173–195.

Kahkonen, S. and Lanyi, A. (2001). Decentralization and governance: Does decentralization improve public service delivery? *World Bank, Washington, D.C.*, PREM Notes(55).

Keefer, P., Narayan, A., and Vishwanath, T. (2003). The political economy of decentralization in Pakistan. *Development Research Group, World Bank, Washington, DC Processed*.

Khawaja, I. and ud Din, M. (2013). Intergovernmental Transfers: An Evaluation of Mechanism and Design of Transfers in Pakistan. *The Pakistan Development Review*, 52(1):45–68.

Lessmann, C. (2012). Regional inequality and decentralization: An empirical analysis. *Environment and Planning A: Economy and Space*, 44(6):1363–1388.

Lockwood, B. (2002). Distributive politics and the costs of centralization. *The Review of Economic Studies*, 69(2):313–337.

Malik, N. and Rana, A. (2019). The History of Local Governance in Pakistan: What Lessons to Learn? *Journal of International Politics*, 1(3):26–35.

Manor, J. (1999). *The Political Economy of Democratic Decentralization*. The World Bank.

Miller, K. (2002). Advantages and disadvantages of local government decentralization. In *Presentation to the Caribbean conference on 'Local Government and Decentralization', Ocean International Hotel, Georgetown Guyana*, pages 25–28.

Monshipouri, M. and Samuel, A. (1995). Development and Democracy in Pakistan: Tenuous or Plausible Nexus? *Asian Survey*, 35(11):973–989.

Mookherjee, D. and Bardhan, P. (2000). Capture and governance at local and national levels. *American Economic Review*, 90(2):135–139.

Myerson, R. (2014). Constitutional structures for a strong democracy: Considerations on the government of Pakistan. *World Development*, 53:46–54.

Oates, W. E. (1972). Fiscal federalism. *New York: Harcourt Brace Jovanovich.*

PBS, P. (2017). Provisional summary results of 6^{th} population and housing census–2017.

Prud'Homme, R. (1995). The dangers of decentralization. *The World Bank Research Observer*, 10(2):201–220.

Reed, W. R. and Ye, H. (2011). Which panel data estimator should i use? *Applied Economics*, 43(8):985–1000.

Samoff, J. (1990). Decentralization: The politics of interventionism. *Development and Change*, 21(3):513–530.

Shah, A. (1999). Balance, accountability, and responsiveness: lessons about decentralization. *World Bank Policy Research Working Paper*, (2021).

Shah, A. (2006). *Corruption and decentralized public governance*. The World Bank.

Shah, A. (2012). The 18^{th} constitutional amendment: Glue or solvent for nation building and citizenship in Pakistan? *The Lahore Journal of Economics*, 17:387.

Shah, A., Thompson, T., and Zou, H.-f. (2004). The impact of decentralization on service delivery, corruption, fiscal management and growth in developing and emerging market economies: A synthesis of empirical evidence. *CESifo DICE Report*, 1(2004):10–14.

Siddiqui, K. (1992). *Local government in South Asia: A comparative study*. University Press.

Sisk, T. D. (2001). *Democracy at the local level: The international IDEA handbook on participation, representation, conflict management, and governance*, volume 4. International Idea.

Slater, D. (1989). Territorial power and the peripheral state: the issue of decentralization. *Development and Change*, 20(3):501–531.

Smith, B. C. (1985). *Decentralization: the territorial dimension of the state*. Taylor & Francis.

SPDC (2012). Social Policy Development Centre. *Social Development in Pakistan: Devolution and Social Development-Annual Review*, 2011-2012.

Stiglitz, J. E. (1982). The Theory of Local Public Goods Twenty-Five Years After Tiebout: A Perspective. Working Paper 954, National Bureau of Economic Research.

Talbot, I. (1998). Pakistan: A modern history.

Tanzi, V. (1995). *Fiscal federalism and decentralization: A review of some efficiency and macroeconomic aspects*. World Bank Washington DC.

Tinker, H. (1954). *The Foundations of the Local Self-government in India, Pakistan and Burma*, volume 1. London: University of London, Athlone Press.

Treisman, D. (2000). The causes of corruption: A cross-national study. *Journal of Public Economics*, 76:399–457.

Wallis, J. J. and Oates, W. E. (1988). Decentralization in the public sector: An empirical study of state and local government. In *Fiscal federalism: Quantitative studies*, pages 5–32. University of Chicago Press.

Waseem, M. (2007). Politics and the State in Pakistan (Islamabad, National Institute of Historical and Cultural Research).

Wilder, A. R. (1999). *The Pakistani voter, electoral politics and voting behaviour in the Punjab*. Oxford University Press Karachi.

Wright, T. P. (1991). Center-periphery relations and ethnic conflict in pakistan: Sindhis, muhajirs, and punjabis. *Comparative Politics*, 23(3):299–312.

Appendix 1A. Tables

Table 1A.1: Stationary Test

Variables	Inverse Normal Z Statistics	P- values	Inverse Chi-sqr p-statistics	P- values
Expenditure Decentralization	-3.9480	0.0000	29.8240	0.0002
Revenue Decentralization	-4.4393	0.0000	35.6859	0.0000
Per Capita Health Expenditure	-4.5573	0.0000	36.5821	0.0000
Education Expenditure*	-4.0939	0.0000	31.9339	0.0001
Social Services Expenditure*	-5.0924	0.0000	42.6466	0.0000
Welfare Services Expenditure*	-3.4973	0.0002	26.7217	0.0008
Agriculture Services Expenditure*	-2.5294	0.0057	19.3235	0.0132
Irrigation Services Expenditure*	-1.9698	0.0244	16.1442	0.0404
Rural Development Expenditure*	-3.5433	0.0002	26.3522	0.0009
Infrastructure Development*	-3.9328	0.0000	30.1612	0.0002
GDP Per capita	-1.9579	0.0251	15.1308	0.0567
Population	-5.6392	0.0000	48.2813	0.0000
Urbanization Rate	-2.8808	0.0020	20.8595	0.0075
Government Size	-3.9611	0.0000	30.0628	0.0002
Rural/Urban population Ratio	-2.2446	0.0124	16.7068	0.0333
Adult Literacy Rate	-2.0633	0.0195	15.4466	0.0510
Gross Primary Enrolments	-3.4640	0.0003	25.5483	0.0013
Hospital/Dispensary beds (per capita)	-4.6302	0.0000	36.7294	0.0000
Misery Index	-4.0632	0.0000	31.2476	0.0001
Fertility Rate	-3.7784	0.0001	29.3903	0.0003
Unemployment Rate	-3.8333	0.0001	29.0518	0.0003
Infant Mortality Rate	-5.3661	0.0000	45.1220	0.0000
Pupil Teacher Ratio (Primary)	-2.6915	0.0036	21.5587	0.0058
Secondary School Enrolments (Female)	-2.5811	0.0049	23.8851	0.0024
Fertilizer Consumption*	-2.8387	0.0023	20.5146	0.0086

Notes: Number of Observations 164 (N=4, T=41). Panel means and drifts Included. Number of lags taken is 2.
* Values in per capita. All values in natural logs.

Table 1A.2: Expenditures on Public Services and Expenditure Decentralization (ED)

VARIABLES	(1) Health Services	(2) Education Services	(3) Social Services	(4) Welfare Services	(5) Agriculture Services	(6) Water Management	(7) Rural Development	(8) Infrastructure Development
Expenditure Decentralization	-0.744***	-0.148	0.571*	2.202***	-0.321	-0.325	0.496	2.028**
	(0.261)	(0.653)	(0.322)	(0.658)	(0.265)	(0.278)	(1.201)	(0.862)
GDP per capita*	-0.273	-1.683*	-1.292**	-2.493**	-1.200***	-1.009**	-6.779***	0.233
	(0.307)	(0.906)	(0.529)	(0.999)	(0.416)	(0.397)	(1.833)	(1.270)
Government Size*	0.646**	-0.074	-0.542	-1.883***	0.179	0.191	-1.516	-1.726*
	(0.275)	(0.668)	(0.335)	(0.677)	(0.278)	(0.285)	(1.232)	(0.882)
Constant	-0.724	7.614	4.080	22.512***	-63.838***	-14.649	-65.885	-128.699***
	(1.509)	(7.983)	(3.277)	(8.321)	(10.116)	(9.366)	(42.222)	(28.920)
Regional Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	164	164	156	156	159	156	156	156

Notes: Robust standard errors are in parentheses. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1. Controls for serial correlation, and heteroskedasticity. *All values in natural logs. Population in millions. All regressions include regional and time fixed effects. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio* , Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Water management (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita).

Table 1A.3: Expenditures on Public Services and Revenue Decentralization (RD)

VARIABLES	(1) Health Services	(2) Education Services	(3) Social Services	(4) Welfare Services	(5) Agriculture Services	(6) Water Management	(7) Rural Development	(8) Infrastructure Development
Revenue Decentralization	-2.089*	-8.418***	-4.940***	-13.958***	-2.148*	-1.223	-11.536*	-0.221
	(1.168)	(2.381)	(1.650)	(2.994)	(1.102)	(1.110)	(5.985)	(4.043)
GDP per capita*	-0.724***	-0.837	-0.493	0.511	-1.489***	-1.338***	-5.469***	2.624***
	(0.240)	(0.621)	(0.304)	(0.617)	(0.270)	(0.248)	(1.386)	(0.790)
Government Size*	-0.116**	-0.223**	0.020	0.282**	-0.161***	-0.143***	-1.038***	0.330**
	(0.048)	(0.101)	(0.063)	(0.112)	(0.050)	(0.041)	(0.195)	(0.151)
Constant	1.957	4.624	1.475	11.684*	-54.225***	-10.956	-94.047***	-173.771***
	(1.215)	(5.321)	(2.480)	(6.196)	(6.850)	(8.137)	(28.751)	(23.248)
Regional Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	164	164	156	156	159	156	156	156

Notes: Robust standard errors are in parentheses. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1. Controls for serial correlation, and heteroskedasticity. *All values in natural logs. Population in millions. All regressions include regional and time fixed effects. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Water management (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita).

Table 1A.4: Expenditures on Public Services (FGLS Models) (Expenditure Decentralization)

VARIABLES	(1) Health Services	(2) Education Services	(3) Social Services	(4) Welfare Services	(5) Agriculture Services	(6) Water Management	(7) Rural Development	(8) Infrastructure Development
Expenditure Decentralization*	-0.744***	-0.148	0.571*	2.202***	-0.321	-0.325	0.496	2.028**
	(0.261)	(0.653)	(0.322)	(0.658)	(0.265)	(0.278)	(1.201)	(0.862)
Economic Reforms Dummy	5.074***	9.109**	12.782***	21.815***	8.856***	5.755***	30.700***	8.842
	(1.444)	(4.294)	(2.161)	(4.690)	(1.747)	(1.907)	(7.383)	(5.900)
GDP per capita*	-0.273	-1.683*	-1.292**	-2.493**	-1.200***	-1.009**	-6.779***	0.233
	(0.307)	(0.906)	(0.529)	(0.999)	(0.416)	(0.397)	(1.833)	(1.270)
Government Size*	0.646**	-0.074	-0.542	-1.883***	0.179	0.191	-1.516	-1.726*
	(0.275)	(0.668)	(0.335)	(0.677)	(0.278)	(0.285)	(1.232)	(0.882)
Constant	-0.724	7.614	4.080	22.512***	-63.838***	-14.649	-65.885	-128.699***
	(1.509)	(7.983)	(3.277)	(8.321)	(10.116)	(9.366)	(42.222)	(28.920)
Regional Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	164	164	156	156	159	156	156	156

Notes: Robust standard errors are in parentheses. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1. Controls for serial correlation, and heteroskedasticity. *All values in natural logs. Population in millions. All regressions include regional and fixed effects. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Water management (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita).

Table 1A.5: Expenditures on Public Services (FGLS Models) (Revenue Decentralization)

VARIABLES	(1) Health Services	(2) Education Services	(3) Social Services	(4) Welfare Services	(5) Agriculture Services	(6) Water Management	(7) Rural Development	(8) Infrastructure Development
Revenue Decentralization	-2.536*	-6.408**	-5.074***	-8.665***	-2.515**	-2.259**	-11.536*	2.084
	(1.318)	(2.547)	(1.754)	(3.084)	(1.124)	(1.099)	(5.985)	(3.835)
Economic Reforms Dummy	9.563***	10.884***	7.118***	10.568***	10.147***	8.641***	27.515***	-6.015***
	(0.615)	(1.287)	(1.211)	(2.070)	(0.727)	(0.646)	(3.154)	(2.103)
GDP per capita	-0.671***	-0.892*	-0.408	-0.029	-1.533***	-1.068***	-5.469***	1.990***
	(0.241)	(0.474)	(0.419)	(0.824)	(0.270)	(0.240)	(1.386)	(0.763)
Government Size*	-0.093*	-0.231**	-0.003	0.313***	-0.155***	-0.142***	-1.038***	0.309**
	(0.048)	(0.097)	(0.065)	(0.116)	(0.051)	(0.042)	(0.195)	(0.153)
Constant	2.062*	0.406	-0.517	-4.428	-43.077***	-23.840***	-94.047***	-137.423***
	(1.244)	(3.035)	(3.777)	(8.759)	(5.534)	(4.720)	(28.751)	(16.080)
Regional Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	159	159	156	159	159	156	156	156

Notes: Robust standard errors are in parentheses. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1. Controls for serial correlation, and heteroskedasticity. *All values in natural logs. Population in millions. All regressions include regional and time fixed effects. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Water management (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita).

Table 1A.6: Expenditures on Public Services (FGLS Models) (Expenditure Decentralization)

VARIABLES	(1) Health Services	(2) Education Services	(3) Social Services	(4) Welfare Services	(5) Agriculture Services	(6) Water Management	(7) Rural Development	(8) Infrastructure Development
Expenditure Decentralization	-0.761***	0.629	0.595*	2.713***	-0.419	-0.256	1.112	2.863***
	(0.276)	(0.669)	(0.311)	(0.638)	(0.258)	(0.284)	(1.224)	(0.848)
Economic Reforms Dummy	5.014***	10.519**	11.383***	22.825***	6.940***	5.763***	29.338***	12.112**
	(1.478)	(4.188)	(2.132)	(4.472)	(1.804)	(1.915)	(7.360)	(5.702)
Interaction	0.012	-0.692***	-0.341***	-0.685***	-0.231***	-0.098	-0.729*	-0.826***
	(0.093)	(0.186)	(0.096)	(0.194)	(0.069)	(0.069)	(0.378)	(0.245)
GDP per capita*	-0.272	-1.276	-1.082**	-2.212**	-0.805*	-0.939**	-6.020***	0.101
	(0.307)	(0.883)	(0.514)	(0.959)	(0.422)	(0.399)	(1.857)	(1.230)
Government Size*	0.660**	-0.683	-0.513	-2.288***	0.313	0.137	-1.997	-2.389***
	(0.284)	(0.671)	(0.323)	(0.651)	(0.272)	(0.289)	(1.240)	(0.857)
Constant	-0.781	11.690	4.045	30.969***	-56.038***	-12.734	-34.091	-107.075***
	(1.552)	(7.746)	(3.157)	(8.354)	(9.838)	(9.444)	(44.250)	(28.939)
$\beta_1+\beta_3$	-0.748	-0.063	0.254	2.028	-0.650	-0.354	0.383	2.037
Std.Err	(0.260)	(0.638)	(0.326)	(0.624)	(0.278)	(0.280)	(1.192)	(0.822)
P-value	0.004	0.921	0.435	0.001	0.020	0.206	0.748	0.013
χ^2	8.262	0.010	0.609	10.569	5.455	1.598	0.103	6.143
P-value	0.004	0.921	0.435	0.001	0.020	0.206	0.748	0.013
Observations	164	164	156	156	159	156	156	156

Notes: Robust standard errors are in parentheses. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1. Controls for serial correlation, and heteroskedasticity. *All values in natural logs. Population in millions. All regressions include regional and time fixed effects. Interaction includes Expenditure Decentralization x Economic Reforms Dummy. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Water management (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita).

Table 1A.7: Expenditures on Public Services (FGLS Models) (Revenue Decentralization)

VARIABLES	(1) Health Services	(2) Education Services	(3) Social Services	(4) Welfare Services	(5) Agriculture Services	(6) Water Management	(7) Rural Development	(8) Infrastructure Development
Revenue Decentralization	-5.985***	-3.236	0.724	-4.802	-1.178	1.347	-15.913*	19.051***
	(1.920)	(3.435)	(2.406)	(4.132)	(1.752)	(1.549)	(8.151)	(5.162)
Economic Reforms Dummy	9.102***	8.641***	9.234***	8.801***	10.573***	7.629***	28.290***	-4.516**
	(0.608)	(1.575)	(0.882)	(1.837)	(0.799)	(0.731)	(3.279)	(2.166)
Interaction	2.742**	-4.097**	-3.770***	-6.486***	-0.622	-1.797**	3.291	-14.299***
	(1.069)	(1.974)	(1.207)	(2.054)	(0.867)	(0.746)	(4.153)	(2.607)
GDP per capita*	-0.796***	-0.393	-0.337	1.125*	-1.441***	-1.136***	-5.920***	3.603***
	(0.240)	(0.657)	(0.303)	(0.625)	(0.278)	(0.257)	(1.484)	(0.769)
Government Size*	-0.153***	-0.161	0.058	0.335***	-0.154***	-0.125***	-1.073***	0.528***
	(0.049)	(0.105)	(0.063)	(0.110)	(0.050)	(0.041)	(0.200)	(0.141)
Constant	2.127*	2.485	0.119	10.408*	-51.511***	-6.354	-104.224***	-132.591***
	(1.213)	(5.387)	(2.472)	(6.025)	(7.805)	(8.295)	(31.329)	(23.395)
$\beta_1+\beta_3$	-3.242	-7.333	-3.045	-11.288	-1.799	-0.450	-12.621	4.752
Std.Err	(1.234)	(2.400)	(1.694)	(3.040)	(1.206)	(1.138)	(6.143)	(3.768)
P-value	0.009	0.002	0.072	0.000	0.136	0.693	0.040	0.207
χ^2	6.900	9.338	3.233	13.792	2.225	0.156	4.222	1.590
P-value	0.009	0.002	0.072	0.000	0.136	0.693	0.040	0.207
Observations	164	164	156	156	159	156	156	156

Notes: Robust standard errors are in parentheses. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1. Controls for serial correlation, and heteroskedasticity. *All values in natural logs. Population in millions. All regressions include regional and time fixed effects. Interaction includes Revenue Decentralization x Economic Reforms Dummy. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Water management (Population density, Rural/Urban Ratio* , Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita).

Table 1A.8: Health Outcomes and Decentralization

Dependent Variable: IMR(ln)	Exp. Decentralization			Rev. Decentralization		
	FGLS	IV	*First-stage*	FGLS	IV	*First-stage*
Expenditure Decentralization	0.661***	0.765***				
	(0.119)	(0.136)				
Revenue Decentralization				-1.179*	-1.105	
				(0.626)	(1.139)	
Economic Reforms Dummy	3.635***	3.719***	-4.927***	0.369	-0.028	0.040
	(0.695)	(0.839)	(0.284)	(0.473)	(0.557)	(0.038)
Interaction	-0.076**	-0.134***	0.084**	-0.033	-0.487	0.199***
	(0.030)	(0.050)	(0.040)	(0.385)	(0.638)	(0.054)
GDP per capita*	-0.842***	-1.190***	0.898***	-0.063	0.060	0.029**
	(0.164)	(0.237)	(0.066)	(0.123)	(0.077)	(0.013)
Government Size*	-0.640***	-0.728***	0.975***	0.023	0.064*	-0.004*
	(0.121)	(0.142)	(0.014)	(0.024)	(0.033)	(0.002)
Gross Enrollments Primary*	0.098	0.296***	-0.066	0.059	0.112	-0.010
	(0.079)	(0.107)	(0.040)	(0.085)	(0.126)	(0.009)
Adult Literacy Rate*	0.054	-0.037	0.200*	0.119	-0.075	-0.034**
	(0.127)	(0.198)	(0.114)	(0.129)	(0.176)	(0.015)
Health Services*	-0.022	-0.020	-0.007	-0.027	-0.010	-0.008*
	(0.031)	(0.048)	(0.027)	(0.036)	(0.056)	(0.004)
Secondary School Enrolment (Female)*	-0.088**	-0.121**	-0.009	-0.101**	-0.103*	0.002
	(0.036)	(0.053)	(0.012)	(0.042)	(0.062)	(0.003)
Hospital/dispensary beds per capita*	0.181**	-0.029	0.020	0.300***	0.336***	0.013*
	(0.074)	(0.118)	(0.025)	(0.068)	(0.104)	(0.007)
Population*			0.846***			0.035***
			(0.089)			(0.011)
Exp. Decent.$_{t-1}$			0.031**			
			(0.015)			
Rev. Decent.$_{t-1}$						0.502***
						(0.104)
Constant	6.852***	11.056***	-7.042***	2.405**	1.791*	-0.270***
	(1.153)	(1.815)	(0.446)	(1.005)	(0.922)	(0.085)
$\beta_1+\beta_3$	0.585	0.631		-1.212	-1.592	
Std.Err	(0.113)	(0.126)		(0.462)	(0.873)	
P-value	0.000	0.000		0.009	0.071	
χ^2	26.645	.		6.891	.	
p-value	0.000	0.000		0.009	0.071	
First-stage regression diagnostics						
Sargan Statistics		0.626			0.176	
p-value		0.237			1.830	
F-statistics		107.946			75.215	
p-value		0.000			0.000	
Observations	157	153	156	157	153	156

Notes: Robust Standard errors in parentheses. Coefficients significant at 1% level *** p < 0.01, at 5% level ** p < 0.05, at 10% level * p < 0.1. Controls for serial correlation, and heteroskedasticity. Dependent variable in FGLS and IV models is IMR in natural log. *All values in natural logs. The interaction in column one to three are ED x ER and in columns four to six are RD x ER. The Expenditure and revenue decentralization are instrumented by their first lag and natural log of provincial population. All models include time and region fixed effects.

Table 1A.9: Education Outcomes and Decentralization

Dep. var.: Literacy rate (ln)	Exp. Decentralization			Rev. Decentralization		
	FGLS	IV	*First-stage*	FGLS	IV	*First-stage*
Expenditure Decentralization	0.411***	0.597***				
	(0.078)	(0.158)				
Revenue Decentralization				-1.356**	-3.047**	
				(0.659)	(1.382)	
Economic Reforms Dummy	0.493	1.704**	-5.060***	1.996***	2.129***	0.085**
	(0.513)	(0.788)	(0.296)	(0.249)	(0.322)	(0.033)
Interaction	-0.229***	-0.224***	0.070*	-1.761***	-1.057*	0.213***
	(0.026)	(0.032)	(0.037)	(0.339)	(0.577)	(0.053)
GDP per capita*	0.486***	0.222	0.991***	-0.042	0.008	0.006
	(0.128)	(0.205)	(0.077)	(0.049)	(0.066)	(0.006)
Government Size*	-0.370***	-0.558***	0.974***	-0.000	-0.011	-0.005*
	(0.083)	(0.166)	(0.016)	(0.017)	(0.025)	(0.002)
Rural/Urban Ratio*	0.309**	0.149	-0.099	-0.145**	0.020	0.039***
	(0.132)	(0.165)	(0.088)	(0.068)	(0.130)	(0.009)
Gross Primary Enrolment	0.006***	0.005***	-0.001	0.016***	0.015***	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Pupil teacher ratio primary	-0.003**	-0.002	-0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)
Health Services	-0.065***	-0.059*	-0.023	-0.163***	-0.190***	-0.006
	(0.025)	(0.030)	(0.034)	(0.027)	(0.036)	(0.004)
Exp. Decent.$_{t-1}$			0.031**			
			(0.014)			
Rev. Decent.$_{t-1}$						0.537***
						(0.102)
Population (ln)			1.027***			
			(0.067)			
LG Election Year						0.000
						(0.012)
Constant	-1.314*	-0.023	-7.646***	2.366***	1.839***	-0.137**
	(0.756)	(1.227)	(0.685)	(0.419)	(0.678)	(0.056)
$\beta_1+\beta_3$	0.183	0.373		-3.116	-4.104	
Std.Err.	0.083	0.164		0.465	0.903	
P-value	0.027	0.025		0.000	0.000	
χ^2	4.867	.		44.857	.	
p-value	0.027	0.025		0.000	0.000	
First-stage regression diagnostics						
Sargan statistics		0.441			0.596	
p-value		0.593			0.282	
F-Statistics		35.068			26.963	
p-value		0.000			0.000	
Observations	164	160	160	164	160	160

Notes: Robust Standard errors in parentheses. Coefficients significant at 1% level *** p < 0.01, at 5% level ** p < 0.05, at 10% level * p < 0.1. Controls for serial correlation, and heteroskedasticity. Dependent variable in FGLS and IV models is Literacy rate in natural log. * values in natural logs. All models include time and region fixed effects. Rural/Urban Ratio is the ration of rural population to urban population. Pupil Teacher Ratio is taken on primary level. Health Services is the real per capita expenditures on public health. The interaction in column one to three are ED x ER and in columns four to six are RD x ER. Expenditure and Revenue Decentralization are instrumented by their first lag along with log of population for ED and Local Government Election Year for RD models.

Table 1A.10: Agriculture Outcomes and Decentralization

Dep. var.: Fertilizer cons (ln).	Exp. Decentralization			Rev. Decentralization		
	FGLS	IV	*First-stage*	FGLS	IV	*First-stage*
Expenditure Decentralization	0.691***	3.175***				
	(0.176)	(0.674)				
Revenue Decentralization				-2.468*	-7.896***	
				(1.273)	(2.771)	
Economic Reforms Dummy	2.076*	12.593***	-4.881***	-0.541	-1.483***	0.075***
	(1.075)	(3.090)	(0.240)	(0.555)	(0.466)	(0.022)
Interaction	-0.122**	-0.300**	0.089**	0.749	0.676	0.177***
	(0.055)	(0.117)	(0.041)	(0.717)	(1.004)	(0.048)
GDP per capita*	-0.147	-2.221***	0.827***	0.229	1.544***	0.001
	(0.284)	(0.695)	(0.106)	(0.283)	(0.267)	(0.012)
Government Size*	-0.620***	-3.087***	0.977***	0.042	0.002	-0.005**
	(0.179)	(0.682)	(0.015)	(0.036)	(0.053)	(0.002)
Rural/Urban Ratio*	-1.152***	-1.619***	-0.050	-1.342***	1.365***	0.020***
	(0.289)	(0.493)	(0.068)	(0.317)	(0.172)	(0.006)
Area*	4.265***	-0.781	0.457*	6.487***	3.567***	0.061***
	(0.571)	(1.571)	(0.275)	(0.501)	(0.350)	(0.014)
Misery Index*	-0.330**	0.159	-0.071	-0.490***	-0.849***	-0.019*
	(0.159)	(0.313)	(0.056)	(0.156)	(0.239)	(0.010)
Adult Literacy Rate*	1.272***	0.420	0.195	1.518***	1.329***	-0.005
	(0.161)	(0.366)	(0.121)	(0.171)	(0.218)	(0.009)
Exp. Decent.$_{t-1}$			0.029**			
			(0.015)			
Rev. Decent.$_{t-1}$						0.463***
						(0.111)
Population (ln)			0.788***			
			(0.124)			
LG Election Year						-0.025***
						(0.005)
Constant	-48.922***	21.743	-11.625***	-76.311***		-0.673***
	(6.978)	(20.738)	(2.642)	(5.539)		(0.211)
$\beta_1+\beta_3$	0.569	2.875		-1.719	-7.220	
Std.Err	0.175	0.639		0.964	1.996	
p-value	0.001	0.000		0.074	0.000	
χ^2	10.549	.		3.183	13.087	
p-value	0.001	0.000		0.074	0.000	
First-stage regression diagnostic						
Sargan Statistic		0.141			0.354	
p-value		2.169			0.860	
F-Statistics		18.099			22.423	
p-value		0.000			0.000	
Observations	159	155	155	159	155	155

Notes: Robust Standard errors in parentheses. Coefficients significant at 1% level *** p < 0.01, at 5% level ** p < 0.05, at 10% level * p < 0.1. Controls for serial correlation, and heteroskedasticity. Dependent variable in FGLS and IV models is Fertilizer consumption in natural log. * values in natural logs. All models include time and region fixed effects. The interaction in column one to three are ED x ER and in columns four to six are RD x ER. Expenditure and Revenue Decentralization are instrumented by their first lag along with log of population for ED and Local Government Election Year for RD models.

Table 1A.11: Expenditures on Public Services (2SLS Models) (Expenditure Decentralization)

	(1) Health Services		(2) Education Services		(3) Social Services		(4) Welfare Services		(5) Agriculture Services		(6) Infrastructure Development	
	IV	First	IV	First	IV	First	IV	First	IV	First	IV	First
Exp. Decent.	-0.299		-0.315**		-0.215**		-0.297*		-0.319***		1.463***	
	(0.191)		(0.158)		(0.084)		(0.172)		(0.098)		(0.299)	
ER dummy	4.948***	-5.188***	4.255***	-5.000***	5.797***	-5.325***	4.748***	-5.325***	4.092***	-5.356***	-3.943**	-5.274***
	(0.764)	(0.116)	(1.355)	(0.176)	(0.727)	(0.143)	(1.492)	(0.143)	(0.666)	(0.141)	(1.643)	(0.151)
Inter	-0.083	0.049**	-0.790***	0.077**	-0.348***	0.064**	0.062	0.064**	-0.456***	0.059**	-0.943***	0.062**
	(0.087)	(0.023)	(0.193)	(0.035)	(0.107)	(0.029)	(0.220)	(0.029)	(0.096)	(0.027)	(0.272)	(0.028)
GDPPC*	0.247**	0.980***	-0.133	0.872***	-0.006	0.997***	0.374	0.997***	-0.064	0.997***	2.994***	1.037***
	(0.116)	(0.058)	(0.676)	(0.080)	(0.206)	(0.063)	(0.424)	(0.063)	(0.245)	(0.073)	(0.693)	(0.077)
Govt. Size*	0.257	0.981***	0.251	0.974***	0.332***	0.986***	0.627***	0.986***	0.160	0.988***	-0.976***	0.982***
	(0.197)	(0.013)	(0.157)	(0.014)	(0.092)	(0.014)	(0.188)	(0.014)	(0.110)	(0.014)	(0.312)	(0.013)
Exp. Decent.$_{t-1}$		0.031**		0.031**		0.028*		0.028*		0.028*		0.030*
		(0.015)		(0.014)		(0.016)		(0.016)		(0.015)		(0.015)
Population*		0.991***		0.946***		0.967***		0.967***		0.969***		0.986***
		(0.046)		(0.024)		(0.018)		(0.018)		(0.019)		(0.025)
Constant	-2.045*	-7.487***	2.168	-6.938***	-1.047	-7.368***	-4.342	-7.368***	-4.588**	-7.257***	-0.485	-7.751***
	(1.172)	(0.515)	(4.848)	(0.530)	(2.416)	(0.547)	(4.960)	(0.547)	(2.037)	(0.585)	(6.970)	(0.466)
$\beta_1+\beta_3$	-0.383		-1.105		-0.563		-0.235		-0.776		0.520	
Std.Err	(0.178)		(0.159)		(0.103)		(0.212)		(0.109)		(0.323)	
p-value	0.033		0.000		0.000		0.270		0.000		0.110	
Sargan Statistic	0.128		0.618		0.729		0.160		0.515		0.570	
p-value	2.317		0.248		0.120		1.973		0.424		0.323	
F-Statistic	269.791		1542.233		1795.920		1795.920		1153.228		867.528	
p-value	0.000		0.000		0.000		0.000		0.000		0.000	
Observations	160		160		152		152		155		152	

Notes: Robust Standard errors in parentheses. Coefficients significant at 1% level *** p < 0.01, at 5% level ** p < 0.05, at 10% level * p < 0.1. * values in natural logs. Interaction includes Expenditure Decentralization x Economic Reforms Dummy. Each model includes a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita). All regressions include time dummies and Balochistan KPK interaction to control for year and regional fixed effects. All even numbered columns are First stage regression results.

Table 1A.12: Expenditures on Public Services (2SLS Models) (Revenue Decentralization)

	(1) Health Services		(2) Education Services		(3) Social Services		(4) Welfare Services		(5) Agriculture Services		(6) Rural Development		(7) Infrastructure Development	
	IV	First	IV	First	IV	First	IV	First	IV	First	IV	First	IV	First
Rev. Decent.	-2.002		-2.892		-2.682**		0.888		-6.833***		-13.223		29.434***	
	(1.347)		(2.097)		(1.150)		(2.185)		(2.107)		(9.091)		(4.897)	
ER Dummy	6.420***	-0.042*	8.550***	0.025	8.091***	-0.026	9.763***	0.024	7.476***	0.024	20.619***	0.010	-9.773***	0.032
	(0.457)	(0.021)	(1.456)	(0.024)	(0.773)	(0.019)	(1.771)	(0.021)	(0.954)	(0.021)	(3.131)	(0.024)	(2.198)	(0.022)
Interaction	0.688	0.217***	-5.289**	0.252***	-2.619**	0.142***	-3.659*	0.206***	-0.132	0.206***	-0.621	0.193***	-20.062***	0.207***
	(0.981)	(0.056)	(2.162)	(0.052)	(1.095)	(0.052)	(2.089)	(0.053)	(1.348)	(0.053)	(5.528)	(0.048)	(3.039)	(0.054)
GDPPC*	0.199*	0.036***	-0.030	0.002	-0.033	0.011	-1.713**	-0.017**	-0.335	-0.017**	-2.952**	-0.008	5.021***	-0.012
	(0.120)	(0.011)	(0.753)	(0.012)	(0.211)	(0.008)	(0.678)	(0.008)	(0.357)	(0.008)	(1.369)	(0.012)	(0.815)	(0.008)
Govt. Size*	-0.071	-0.003	-0.201*	-0.004**	0.047	-0.004*	0.399***	-0.004*	-0.280***	-0.004*	-1.008***	-0.004*	0.596***	-0.005**
	(0.059)	(0.002)	(0.119)	(0.002)	(0.077)	(0.003)	(0.146)	(0.002)	(0.078)	(0.002)	(0.258)	(0.002)	(0.184)	(0.002)
Rev. Decent.$_{t-1}$		0.574***		0.457***		0.651***		0.472***		0.472***		0.453***		0.451***
		(0.103)		(0.103)		(0.097)		(0.106)		(0.106)		(0.114)		(0.112)
Population*		0.057***		0.041***		0.021***		0.039***		0.039***		0.028***		0.028***
		(0.015)		(0.008)		(0.006)		(0.008)		(0.008)		(0.008)		(0.007)
$\beta_1+\beta_3$	-1.314		-8.181		-5.301		-2.771		-6.965		-13.845		9.372	
Std.Err	0.850		1.230		0.916		1.777		1.316		5.153		3.310	
p-value	0.125		0.000		0.000		0.122		0.000		0.008		0.006	
First-stage regression diagnostic														
Sargan Statistics	0.111		0.341		0.180		0.649		0.169		0.878		0.319	
p-value	2.544		0.906		1.795		0.207		1.895		0.024		0.994	
F-statistics	202.897		337.504		377.254		453.797		143.427		73.366		138.429	
p-value	0.000		0.000		0.000		0.000		0.000		0.000		0.000	
Observations	160	160	160	160	152	152	152	152	155	152	152	152	152	152

Notes: Robust Standard errors in parentheses. Coefficients significant at 1% level *** p < 0.01, at 5% level ** p < 0.05, at 10% level * p < 0.1. * values in natural logs. Interaction includes Revenue Decentralization x Economic Reforms Dummy. Each model includes a constant term and a range of different controls. The sectors and the controls (in parentheses) are: Health (Urbanization rate and Primary gross enrolment rate), Education (population density, adult literacy rate, and rural/urban ratio), Social services (rural/urban ratio, Unemployment rate, infant mortality rate, and misery index), Welfare Services (Population density, Rural/Urban Ratio*, Unemployment Rate*, Infant Mortality Rate*, Misery Index*), Agriculture Services (Rural/Urban Ratio*, Unemployment Rate*, Misery Index*, Area), Rural Development (Adult literacy rate, rural/urban ratio, Unemployment Rate*, Infant Mortality Rate*, Misery Index*, Area, Fertility rate), Infrastructure Development (Population density, rural/urban ratio, Infant mortality rate, Misery Index, Area, hospital/dispensary beds per capita). All regressions include time dummies and Balochistan KPK interaction to control for year and regional fixed effects. All even numbered columns are First stage regression results.

Table 1A.13: The data, definition, and sources

Variables	Measurement/Definitions/Source
GDP Per Capita	(Overall as well as Provincial level) Per capita income is gross domestic product divided by midyear population, at Constant Factor Cost of 1999-00. Data source: Bengali and Sadaqat (2000); Handbook of Pakistan Economy, SBP (2015), Arby (2008) Federal & Provincial Budget Documents (various issues). World Bank 2012.
Population	Midyear population (in Millions). The population of provinces is calculated from their relevant share in relevant population censuses (1972, 1981, 1998). The 6th Housing census was conducted in 2017. Data source: Handbook of Pakistan Economy, State Bank of Pakistan (2015), Economic Survey of Pakistan (Various Issues), and Pakistan Bureau of Statistics (various years).
Urbanization Rate	Midyear urban population (in Millions). Urbanization Rate is proxy by the Urban population of provinces from their share in relevant housing censuses (1972, 1981, 1998). Data source: Handbook of Pakistan Economy, State Bank of Pakistan (2015), Economic Survey of Pakistan (Various Issues), and PBS (various years). Urbanization Rate is proxy by Urban population.
Health Expenditures	Total investment in million rupees to Health Expenditures. This includes expenditures on Basic Health services and General Health Services. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments budget documents (various issues).
Education Expenditures	Total investment in million rupees to the Education sector Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments budget documents (various issues).
Social Sector Expenditures	Total investment in million rupees to social sector. This includes different programs of health (training), education (teachers training), rural development (Empowerment of rural local communities through skill development), training and support for productivity measure, Housing allowances, subsidies on rents, cash benefits to low-income households, food subsidies, disability allowances etc. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments budget documents (various issues).

Expenditure on Social Security and Welfare Services	Total investment on Social Security and Welfare Sector. This includes programs of social safety net, pensions, old age benefits etc. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments budget documents (various issues).
Expenditures on Agriculture Services	Total investment on Agriculture Sector. This includes expenditures on high yielding seeds, farm mechanization, fertilizer production, plant protection, agriculture research and extension, training, agriculture market infrastructure development, expenditures on livestock, poultry, and fisheries etc. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments budget documents (various issues).
Expenditures on Water sector	Total investment on Irrigation (water management) Sector. This includes investment on irrigation infrastructure, provision of water source for domestic use and agriculture farms etc. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments budget documents (various issues).
Expenditures on Rural Development	Total investment on Rural Development Sector. This includes investment on rural employ-ability schemes, livelihood programs, rural support programs, micro-credit schemes, capacity building, agriculture support programs etc. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Federal and provincial governments' budget documents (various issues).
Expenditures on Infrastructure Development	Infrastructure Development (Proxy by Civil Work Expenditure). This includes expenditures on roads, highways, communication channels etc. by Federal and provincial governments. Data source: Economic Survey of Pakistan (various issues), Federal Bureau of Statistics (various Issues) and provincial governments budget documents (various issues).
Gross Primary Enrolment Rate	The number of students enrolled in primary level classes (I to V) as a percentage of the population aged 5 to 9 years. Data source: SPDC annual reviews (various issues). Development Statistics of Provincial Governments. Government of Pakistan School Statistics, Pakistan Bureau of Statistics (various issues).

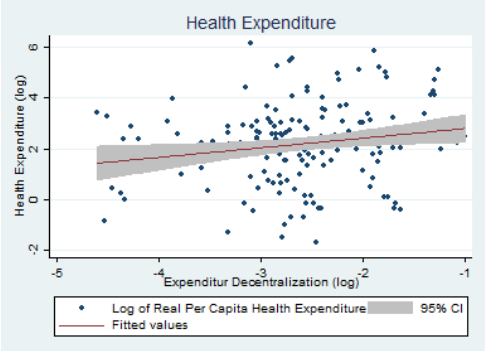
Adult Literacy Rate	The number of literate persons as a percentage of population aged 10 and above. Data source: SPDC annual reviews (various issues). Development Statistics of Provincial Governments. Government of Pakistan labor force surveys, Pakistan Bureau of Statistics (various issues).
Pupil Teacher Ratio (Primary)	The number of pupils enrolled in primary level classes (i to V) divided the number of teachers in primary schools. Data source: SPDC annual reviews (various issues). Development Statistics of Provincial Governments. Government of Pakistan labor force surveys, Pakistan Bureau of Statistics (various issues).
Secondary School Enrolment Rate (Female)	The number of female students enrolled in secondary level classes (VI to X) as a percentage of female population aged 10 to 14. Data source: SPDC annual reviews (various issues). Development Statistics of Provincial Governments. Government of Pakistan labor force surveys, Pakistan Bureau of Statistics (various issues).
Unemployment Rate	Data source: Labor force surveys (various issues), Economic survey of Pakistan (Various issues).
Misery Index	An index that is created by the sum of the inflation rate and the unemployment rate, following Arthur Okun's method. Economic Survey of Pakistan (various issues), Federal Bureau of Statistics (various Issues).
Infant Mortality Rate	The number of deaths of children (under age of one year) per one thousand live births during a year. Data source: SPDC annual reviews (various issues), Demographic survey of Pakistan, Pakistan Bureau of Statistics (various issues).
Fertility Rate	The average number of children that would be born to a woman if she were to live to the end of her childbearing age and bear children at each age in accordance with the prevailing fertility rates. Data source: SPDC annual reviews (various issues), Development Statistics of Provincial Governments. Government of Pakistan labor force surveys, Pakistan Bureau of Statistics (various issues).
Hospital/Dispensary Beds	Data source: SPDC annual reviews (various issues). Economic Survey of Pakistan (various issues), Federal Bureau of Statistics, statistical yearbook (various Issues), Provincial governments' development statistics (various issues).
Fertilizer Consumption	Total fertilizer consumption in thousand tonnes. Data source: Agriculture statistics, Economic Survey of Pakistan (various issues), Pakistan Bureau of Statistics yearbook (various issues).

Source: Compiled by author using resources mentioned in the table.

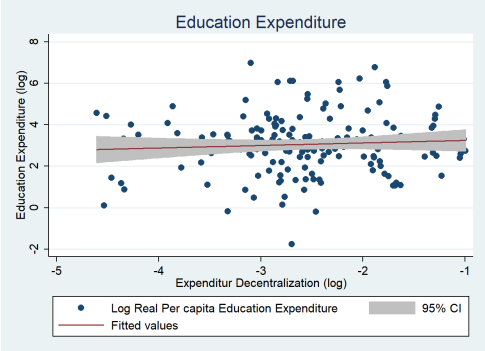
Table 1A.14: Variables Used for Calculating Decentralization and the sources of data (Expenditure and Revenue)

Variables	Data source
Federal Government Expenditures (1975-2015)	Pakistan Statistical Yearbook (various issues), Federal Bureau of Statistics Government of Pakistan; Economic Survey of Pakistan (various issues) Ministry of Finance Government of Pakistan, State Bank of Pakistan (SBP) various issues.
Provincial Government Expenditures (1975-2015)	Pakistan Statistical Yearbook (various issues), Federal Bureau of Statistics Government of Pakistan; Budget Documents (various issues), Finance Divisions and Planning and Development Departments of the Provincial governments, State Bank of Pakistan (SBP) various issues.
Federal Government Revenues (1975-2015)	Pakistan Statistical Yearbook (various issues), Federal Bureau of Statistics Government of Pakistan; Economic Survey of Pakistan (various issues) Ministry of Finance Government of Pakistan, State Bank of Pakistan (SBP) various issues.
Provincial Government Revenues (1975-2015)	Pakistan Statistical Yearbook (various issues), Federal Bureau of Statistics Government of Pakistan; Budget Documents (various issues), Finance Divisions and Planning and Development Departments of the Provincial governments, State Bank of Pakistan (SBP) various issues.
Debt Payments	Pakistan Statistical Yearbook (various issues), Federal Bureau of Statistics Government of Pakistan; Economic Survey of Pakistan (various issues) Ministry of Finance Government of Pakistan, State Bank of Pakistan (SBP) various issues.
Grants (Federal Government to Provincial Government(s)	Pakistan Statistical Yearbook (various issues), Federal Bureau of Statistics Government of Pakistan; Budget Documents (various issues), Finance Divisions and Planning and Development Departments of the Provincial governments, State Bank of Pakistan (SBP) various issues.
GDP Deflator/Consumer Price Index	Handbook of Statistics of Pakistan Economy, SBP (2015).

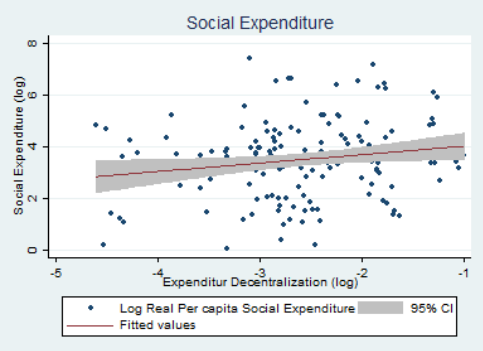
Source:As defined by (Ahmed, 2013), and compiled by author using resources listed in the table.



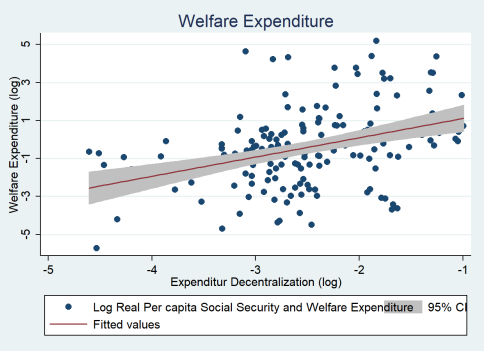
(a) Share of Expenditure Decentralization and Real Health Expenditure



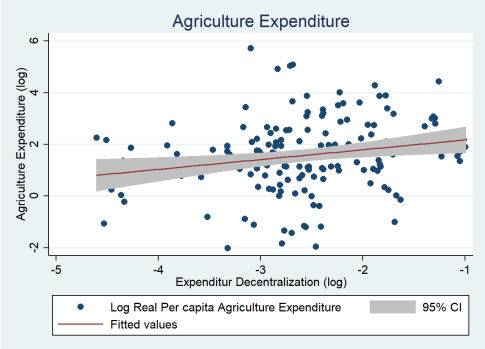
(b) Share of Expenditure Decentralization and Real Education Expenditure



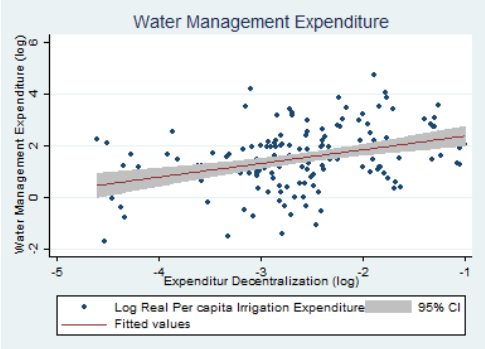
(c) Share of Expenditure Decentralization and Real Social Expenditure



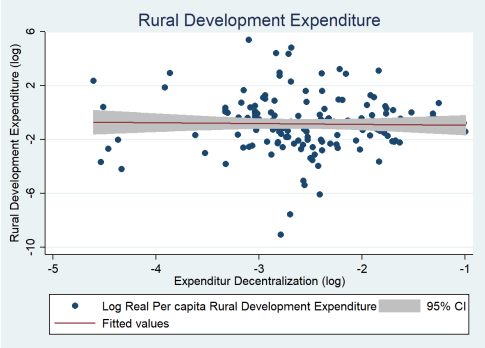
(d) Share of Expenditure Decentralization and Real Welfare Expenditure



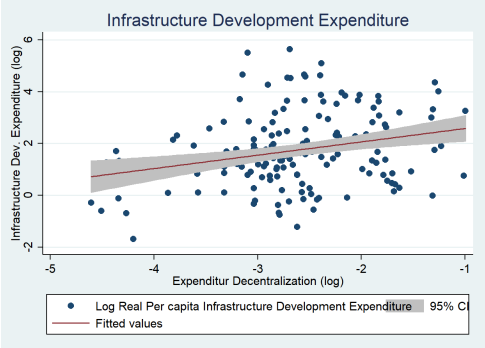
(e) Share of Expenditure Decentralization and Real Agriculture Expenditure



(f) Share of Expenditure Decentralization and Real Irrigation Expenditure



(g) Share of Expenditure Decentralization and Real Rural Development Expenditure



(h) Share of Expenditure Decentralization and Real Infrastructure Development Expenditure

Figure 1.3: Decentralization and sectoral expenditures

Chapter 2

Decentralization and Regional Inequalities: Evidence from Asia

2.1 Introduction

Face to the failure of central governments to promote economic development since their independence; several developing countries engage in 2000s in a decentralization process fueled by donors such as the World Bank. This process should reduce poverty and inequality in developing countries. However, the institutional arrangements to benefit from a decentralized governance system have often failed in these countries (Martinez-Vazquez and Vaillancourt, 2011). Limited state capacity to raise revenues and deliver public services (Gadenne and Singhal, 2014) is one of the root causes of such failures. Moreover, whether decentralization reduces spatial disparities or not remains a puzzle.

The proponents of the decentralization reforms argue that the fiscal capacity of sub-national governments plays an important role in promoting regional convergence (Bartolini et al., 2016). The proximity to the local population, making locally preferred policies (based on better information on regional preferences and needs (Hayek, 1945)), makes them a powerful institution in targeting pro-poor services. Inter jurisdictional competition enhances productivity to compete for national and international markets. Moreover, the sub-national governments make efforts to maintain or amplify their tax base in competition with other regions. The local political experience and accountability of local politicians (Ferraz and Finan, 2011) reduce resource embezzlements. Such active sub-national political and economic activities translate into growth and prosperity.

The opponents argue that a decentralized governance system reduces the re-distributive capacity of higher levels of government (Prud'Homme, 1995). Moreover, regions which are rich in natural resource, having more industries or coastal regions will be more competitive (in production and distribution) for fiscal resources. These endowments crowd out the poorer regions from competition for resources and pushes for more disparities among regions. This means a low level of development for such regions and a consequent increase in income inequalities [see Lessmann (2012)]. Further, sub-national governments are constrained by factors like resource dearth (fiscal and human capital shortfall), institutional capacity (lack of political and administrative experience), influenced by local elite capture (Bardhan, 2002), and corruption. These limitations hinder their way in delivering to the poor and hence incite more inequalities.

The economic literature on decentralization is various (Shah and Thompson, 2004) but focuses mainly on a few sets of questions (Jütting et al., 2004). The first set explores the causes and consequences of this reform (Oates, 1972; Manor, 1999) whereas the second set investigates its link to corruption (Fisman and Gatti, 2002; Fan et al., 2009), government quality (Treisman, 2002), government responsiveness to meet the local people's needs (Faguet, 2002), efficient public service delivery (Litvack and Seddon, 1999), income inequalities (Lessmann, 2012), and political stability (Annan, 2002). All these channels work in a direction to improve governance and increase population welfare. Thus whatever the aims of the reforms are, decentralization generally aims at reducing inequalities among regions on political and financial fronts.

Inequalities, which are growing, may trigger political instabilities. Regional disparities in income, economic opportunities, and social needs (e.g., health, education) are emerging issues in contemporary times. The element of spatial inequalities has been a driving force for policymakers' interest in this matter. Spatial disparities matter because they often result in ethnic

conflicts and establish a ground where the separatist tendencies grow (Kanbur and Venables, 2005). Income inequalities are a defining challenge of modern-day (Dabla-Norris et al., 2015). Moreover, it is related to lower levels of well-being, lower level of political involvement, and more personal worries (Van de Werfhorst and Salverda, 2012). Furthermore, lower Income inequality negatively affects growth and its sustainability (Ostry et al., 2014; Berg and Ostry, 2017). Hence, growing inequalities increase the risk of economic and political challenges for the countries and may often cause the systems to fail.

Spatial inequalities are an important concern of the present-day political arena. However, a few systematic studies focus on this issue. Such a shortage of studies is due to the non-availability of comparable, comprehensive, and reliable data for a genuine analysis of regional inequalities. Moreover, the few studies on this topic study developed countries. Their results provide insight for further research, but it is often difficult to generalize those results to the rest of the world. It is worth noting that the developed countries have stronger economic and political institutions [See (Acemoglu et al., 2005)], which are prerequisites for effective implementation of such policy reforms.

This article studies the impact of decentralization reforms and their effects on regional inequalities, focusing on Asian countries. Knowing the fact that economic growth in Asia during the last five decades has remained remarkable, yet inequalities (in per capita income) among people and between countries have remained high, and many countries have struggled hard to converge (Nayyar, 2019). Moreover, Asian countries at large have often been ignored in most comparative studies. It is the largest continent both in geographical area and population, which makes it a solid ground for research on decentralized reforms and their effects on spatial inequalities. To this end, we construct a unique dataset[1] from different resources for our sample of countries that include different income group classifications.

Several Asian countries introduced decentralization reforms in the 1980s and 1990s. The reforms in these countries have generally aimed at giving more authority to sub-national governments to perform a range of important responsibilities. The local governments have attempted to raise revenues and make expenditures on the most demanded public services. However, the revenues raised by these sub-national governments have often remained sub-optimal, due to which they have heavily relied on intergovernmental transfers. The limited capacity of lower levels of governments has affected their power and authority in dealing with population welfare schemes, which has resulted in widening inequalities among regions. Hence, several Asian countries face the challenges of regional disparities in income and opportunities. The decentralization reforms in these countries have been motivated to curtail spatial disparities within and among regions. We shed light on the effects of such reforms on reducing regional inequalities.

As mentioned above, the role of decentralization and its impact on regional inequalities have received great attention in public debates recently. Such debates center on the arguments that decentralization improves the efficiency of the public sector (Oates, 1972), but it is also likely to reduce the inter-jurisdictional redistribution powers, which consequently encourages regional

[1]Data for regional GDP per capita is calculated using Gennaioli et al. (2014) dataset along with data from regional statistical centers.

inequalities (Prud'Homme, 1995). Hence, there exists a rift between redistribution and efficiency in the decentralization debate. Since public sector decentralization is trending globally, this question is rather very important for several countries (Watts, 2008). Given that the World Bank and other international institutions consider decentralization as an important policy tool on their development agenda, decentralization and its effects are more relevant to developing countries (Bank, 2008).

Political decentralization refers to the degree to which central government permits sub-national governments to take political functions of decision making, governance, and representation. Fiscal decentralization refers to how much fiscal authority is ceded by the central government to the sub-national governments (Schneider, 2003). These devolved authorities to the sub-national level empower regional governments to frame policies targeted to reducing inequalities. Keeping in mind the importance of decentralized policy reforms and their impacts on reducing regional disparities within and among regions, we seek answers to questions such as: Does decentralization reduce regional inequalities? Do political and fiscal decentralization reforms complement each other in improving regional equalities?

This paper contributes to the growing literature in three different ways: 1) It explores the link between decentralization reforms on fiscal and political fronts individually and in a combined scenario: 2) It contributes to the limited literature on regional comparison of economic policy reforms focusing on Asian countries: 3) It further adds to the literature by taking economic as well as institutional channels in exogenously determining decentralization indicators.

This paper participates in the growing literature on the political economy of geographic disparities. The paper sheds light on how decentralization reforms are associated with regional inequalities in Asian countries. The diverse range of income groups, regional economic conditions, ethnic and linguistic differences, and large geography and population are rich comparative features of the continent. Moreover, the growth of countries through a fundamental transition in improving and maintaining such large countries and their population is worth considering in the studies. The rapid growth of Asian countries through a great technological change, benefiting from globalization, and making reforms for growing markets are one side of the picture. Growing inequalities and the lack of policy designs to empower subnational governments are the other. To this end, we focus on a set of Asian countries and construct a dataset for 1990-2015. The panel is highly imbalance. The dataset comes from different sources. Table 2A.1[2] in the appendix lists all countries, the period for which data is calculated, and their potential sources.

The rest of the paper is organized as follows: Section 2.2 discusses theoretical and empirical studies on the relationship between decentralization and regional inequalities: Section 2.3 sheds light on decentralization in Asia: Section 2.4 displays the data, and estimation techniques. Section 2.5 presents the results of the empirical analysis. Section 2.6 provides a summary and concludes the paper.

[2]The table of summary statistics is given in Table 2A.3 in Appendix

2.2 Decentralization and regional disparities

2.2.1 Theoretical background

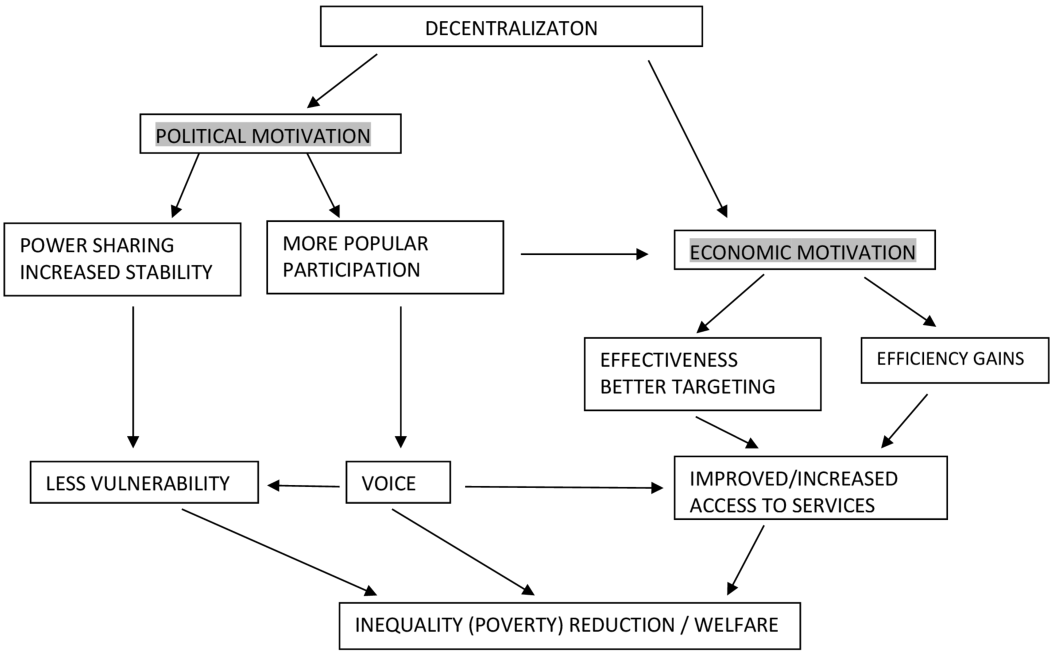
Inequalities and resource redistribution are closely linked. Income inequalities around the world have continued to rise (ECOSOC, 2019) particularly within many developing countries (Dabla-Norris et al., 2015). An equal distribution of resources is essential for development and convergence and having the right instruments for implementing such policy is complementary. The inequalities among households and between regions make up the national inequality measures [see (Gbohoui et al., 2019)]. Understanding that inequalities (in income and opportunity), social and political exclusion, deprivation, and lack of participation are among several factors for rising global inequality and poverty, it is essential to establish channels for social integration, economic opportunities, and institutional arrangements to cure for it. Decentralization, in this regard, could play a vital role in making redistribution more equitable and enabling regions to make efforts to grow and converge.

The literature on income inequality signifies the role of government's redistribution as a key element for inter-regional and cross-country variances (Dollar and Kraay, 2002; Gustafsson and Johansson, 1999; Lundberg and Squire, 2003). The fiscal federalism literature asserts fiscal decentralization as an effective tool in enhancing the re-distributive efficiency of the government. Although the empirical literature shows how these two strands are related, the theoretical connection between decentralization and inequalities remains ambiguous.

The theory on decentralization and its relationship to income inequalities is largely underdeveloped and growing. A limited number of studies carried out in this regard find either mixed or inconclusive results in an attempt to establish a relationship between the two through different and indirect channels (Ezcurra and Pascual, 2008; Rodríguez-Pose and Ezcurra, 2010). Figure 2.1 shows how political and fiscal channels under decentralization relate to reducing overall inequalities. The reforms come with a large change on the sub-national level. The Figure elaborates these channels.

The 'first-generation (FG) theory' on fiscal federalism criticizes sub-national governments' involvement in income redistribution (challenges with efficient provision of services) [see (Oates, 2008)]. The decentralized redistribution provides opportunities for both 'poor' and the 'rich' households to migrate into jurisdiction with a more generous redistribution mechanism (for poor) and minimal tax and/or transfer schemes (for rich) (Musgrave, 1959). This phenomenon of 'voting by feet' would be self-defeating and unsustainable in sub-national governments due to factor mobility (Tiebout, 1956; Prud'Homme, 1995). In such circumstances, the income inequalities in the homogeneous income regions may decrease (due to in-migration of the poor households and out-migration of the rich households), but national income inequalities will be left unchanged. Oates (1972) asserts that in such cases, sub-national would rather not engage in the redistribution process (provision of public services). Hence, according to this strand in literature, the redistribution on a local level will be less effective in changing national income distribution. It can, therefore, be expected that the inequalities would rise when re-distributive policies are decentralized[3].

[3]This literature assumes that fiscal decentralization increases disparities among regions as the gap between rich and poor tends to rise.



Notes: The figure capture systematic flow of effects of political and fiscal decentralization and their links to reducing inequalities between and within regions. The figure is adopted from (Jütting et al., 2004) with modifications by author.

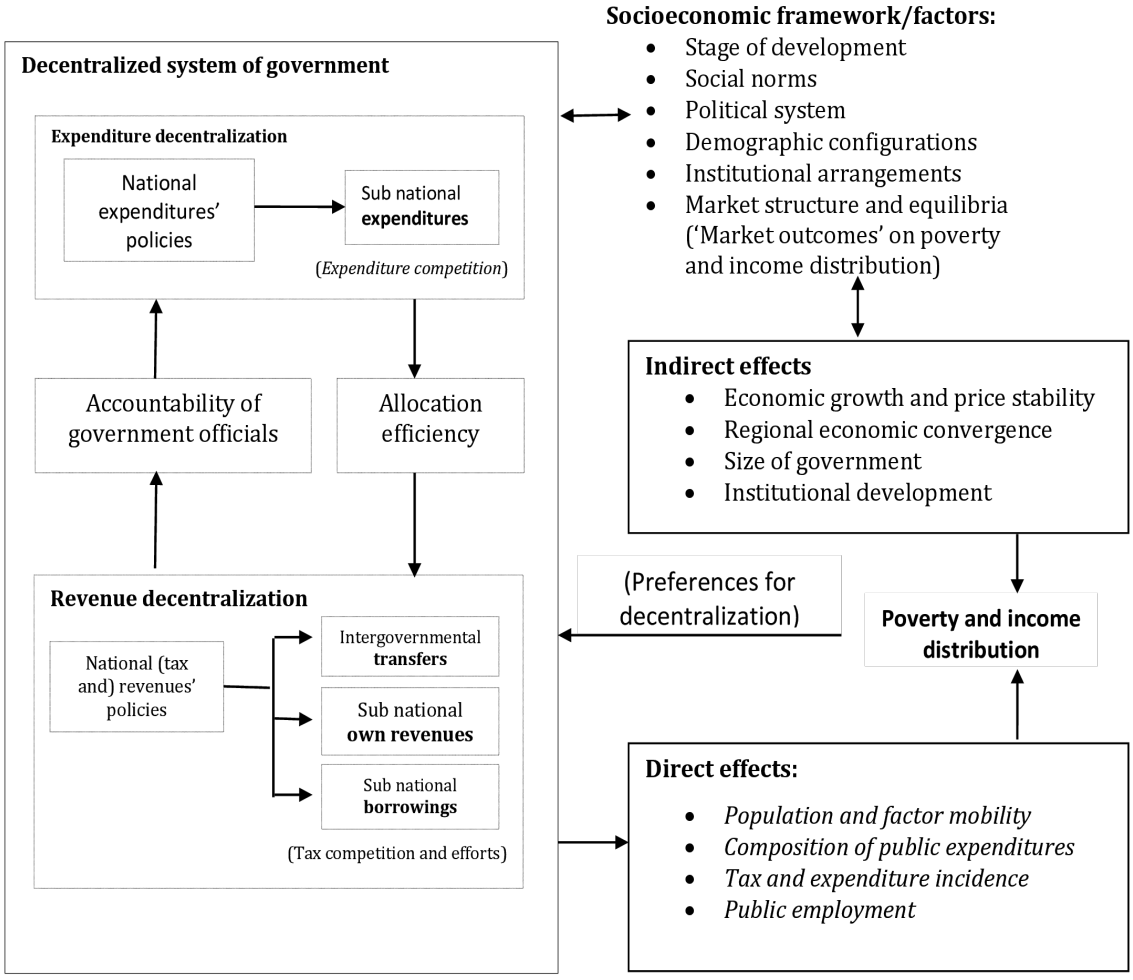
Figure 2.1: Decentralization channels of influence

On the contrary, the 'second-generation (SG) theory' of fiscal federalism opposes this assertion. According to this literature the inter-jurisdictional competition, as a result of decentralization, could be an effective tool in reducing regional inequalities in contrast to central governments dictated distribution (Weingast, 1995; McKinnon, 1997; Qian and Weingast, 1997). Lower tax rates and less generous welfare schemes in the poorer regions could be an opportunity for local governments to attract investment and boost regional growth (McKinnon, 1997). This factor mobility could reduce regional income inequalities which would equally decrease national income inequalities. Moreover, the SG theory also emphasizes the role of transfers from central governments to sub-nationals [see Weingast (2014)]. The dependency of lower levels of government on central transfers undermines their local targeted preferences for public service delivery. The dependency on local own revenues will, on the other hand, induce equalization [See (Padovano, 2007)].

The FG theory is normative and assumes that the decision-makers are benevolent in maximizing social welfare (Musgrave, 1959; Oates, 1972; Rubinfeld, 1987). The SG theory builds on FG but recognizes that public officials' goals are motivated by political institutions that are systematically (often) diverging from maximizing population welfare (Qian and Weingast, 1997). Along with the fiscal arrangements from the fiscal federalism theories, the institutional arrangements are complementary in strengthening a decentralized system of government. This could be understood by looking at post-communist and post-authoritarian countries[4] that inherited a decentralized structure but have often faced political obstacles in implementing greater economic reforms packages (Treisman, 2002).

[4]Yugoslavia, Russia, Brazil for example.

Owing to commitments to reduce poverty and inequality among regions, several countries have adopted decentralization policies from a small to a large scale [see (Shah and Thompson, 2004)]. Besides several reasons growing number of federal countries and a large population share living in such countries [40% of the world population (Watts, 2008)] is putting more pressure for shifting or/and sharing decision making authority among higher and lower tiers of governments. In response, countries around the world are not only decentralizing economic responsibilities but also face higher demand for political power devolution (decision-making authority to subnational governments). The benefits of such a political and administrative (organizational) setup are manifold. It fosters integration among jurisdictions, ensures free trade and factor mobility, establishes a sense of accountability, and promotes regional development and convergence. Furthermore, it makes governments more responsive to local preferences (Oates, 1972; Wallis and Oates, 1988).



Notes: The figure shows how decentralization system of government works through different interconnected social and economic channels affecting poverty and income distribution. *Source*: Adopted from (Sepulveda and Martinez-Vazquez, 2011).

Figure 2.2: Effects of fiscal decentralization on poverty and income inequality.

The theoretical discussion presented above involves that the urge for decentralization is generally based on two major arguments that could be retrieved from the literature on fiscal fed-

eralism. (1) Decentralization increases allocative efficiency (Ahmad and Tanzi, 2002) and/or productive efficiency. (2) Decentralization incentivizes the accountability of public representatives and government officials (Faguet, 2014). The absence and/or dearth of check and balance on public representatives (on fiscal and political matters) encourage misuse of authority and pave ways for corruption and nepotism.

Decentralization creates institutional arrangements for the relationship between citizens and the public servants (Manor, 1999)[5]. Such arrangements like political decentralization where residents elect local representatives through an electoral process undermine the inducement for rent-seeking by these officials. Moreover, specifically, if a strong legal framework accompanies political decentralization, it promotes the legitimacy of public officials and enhances public participation in politics, thereby deepening the democratic nature of institutions (Blair, 2000; Crook et al., 1998). Thus, the drive for decentralization is motivated by the arguments of efficiency gains and accountability of public representatives. The efficiency gains primarily focus on better fiscal management, and the accountability argument encourages the political participation of local people. Both (fiscal and political) decentralization measures are important for successful policy reform to reduce regional inequalities.

2.2.2 Empirical Studies

The study of decentralization and its effects on inequalities could be seen through different lenses. Although not directly but decentralization and its impact on political, economic, and social fronts affect poor lives in one way or the other. It improves the local population's condition, ensures equal distribution of income and equal opportunities for growth for the residents, or worsens the condition by increasing disparities in income and concentration of resources to one or few regions. Such outcomes also depend on some necessary arrangements and country-specific conditions. Moreover, it is crucial to know that the success of the same set of decentralization reforms in one country or region(s) could cause a failure for another. This means each region/country would have a different level of decentralization that proves practically workable for them. The impact of decentralization on inequalities and poverty reduction is comprehensively listed with details of country case studies in (Jütting et al., 2004).

The research conduct by Von Braun and Grote (2002) makes a comprehensive and in-depth study on decentralization and its impacts on poverty and inequality. They conclude that decentralization reduces disparities but under certain conditions. These conditions should be dealt with within the framework of political, fiscal, and administrative decentralization simultaneously because they are all strongly interacting in their impacts on inequalities. They also suggest considering different country-specific conditions while studying the decentralization and disparities. Country-specific conditions like geography, population density, natural resource endowments, political set-up, institutional arrangements, and capacities are conducive to understanding the link between decentralization and poverty reduction and maintaining inequalities.

Furthermore, Lessmann (2006) studies the case of 17 OECD countries for the 1980-2001 period considering both cross-section and panel data analysis finds that fiscal decentralization

[5]Figure 2.2 explains the institutional efforts in a decentralized system for fiscal resources distribution to sub-national governments.

(separately and) along with certain national characteristics affects inequality in regions. His analysis based on Ordinary Least Square (OLS) and fixed effects estimates depict that fiscal decentralization significantly reduces regional inequalities. He (Lessmann, 2009) further conducted a study of 23 OECD countries for 1982-2000 and finds similar results as earlier. These results are confirmed by Ezcurra and Pascual (2008) who study expenditure decentralization with a sample of 12 states in the European Union (EU).

Similarly, Rodríguez-Pose and Ezcurra (2010) suggest that the impact of decentralization depends on the level of economic development of a country. They use data for 26 high and low-income countries and find that the decentralization (both in political and expenditure) effectively mitigates regional disparities in countries with high income and works the opposite considerably in countries with low and medium income. The level of economic development in impacting regional disparities is further studied by Lessmann (2012). The study suggests that per capita GDP has a crucial conditioning role interacting with fiscal decentralization in reducing disparities among regions. The study considers 56 countries from 1980 through 2009.

For Kyriacou et al. (2015) the quality of government performance plays a mediating role between fiscal decentralization and regional inequalities rather than the economic development level of the country. They identify government quality through an index based on the dimensions of corruption, law and order, and bureaucratic quality from ICRG database. Their analysis uses a panel of 24 OECD countries for 1984-2006. Their results suggest that decentralization effectively reduces disparities in countries with high quality of government setting but conversely enhances disparities in countries with low quality of governance.

In addition to the above, Gil et al. (2004) study 15 OECD countries. The analysis probes the impact of fiscal and political decentralization on regional productivity inequalities. The results find decentralization reducing regional inequalities in labor productivity. They further argue that for equalizing regional productivity, the composition of government (left or center-left parties) plays a vital role in creating conditions for the success of decentralization.

Along with the cross-country studies, there are several country-level empirical studies on decentralization and its impact on regional inequalities. The following paragraphs list a few country case studies.

Kim et al. (2003) study the case of South Korea and find an unclear effect of decentralization reforms and regional disparities as the results fluctuate before and after the industrial restructuring and spatial reorganization in Korea during the 1990s. They find a positive correlation between regional incomes and spatial distribution for some services (education, employment, transportation, and water supply). On the contrary, the GDP per capita and the process of urbanization are found to be negatively correlated with regional disparities. The regional development policies would, according to the authors, require three years for adjustment to identify their effects on regional income inequalities.

Furthermore, Kanbur and Zhang (2005) studied the case of China for the period 1952-2000. Their investigation suggests that decentralization increased overall regional inequalities. The

increase in regional disparities is very prominent in the post reforms period. They find that decentralization exacerbate inequalities among rural-urban areas. They also find decentralization contributing to a rapid increase in inland-coastal inequalities during periods of the 1980s and 1990s[6].

Similarly, Bonet (2006) studied the case of Colombia and finds that decentralization reforms proved to encourage inequalities in Colombian regions. The results posit that the possible reasons for such outcomes are limited local resource redistribution, lack of national transfers, and institutional capacities of sub-national governments. The fiscal constraints proved a major hurdle in impacting inequalities.

In addition to the above Akai et al. (2009) study the case of the United States and find that decentralization harms regional inequalities in lower-income counties (not largely though). It decreases inequalities where the counties have low income. On the other hand, the increasing effect of decentralization on inequalities is more obvious in high-income counties. Their study is based on fiscal decentralization as a commitment device in reducing regional inequalities.

Looking at the theoretical background and empirical studies in the previous paragraphs, it is obvious that the link between decentralization and its impact(s) on disparities is mixed at length. The wide range of different results is certainly due to several factors. Country-specific differences, institutional capacity, samples of countries in the region, different measures of decentralization, and different econometric estimation methods could explain the potential causes of various outcomes. However, previous studies have largely ignored the countries in Asia in making a comparative study on decentralization and regional disparities. We take the opportunity to add to the growing literature by focusing only on Asian countries and study 19 economies for this purpose.

Before plunging into details of the data and econometric estimations section, it is imperative to briefly understand some characteristics of the decentralization reforms in Asia. The following section sheds light on the decentralization in Asian countries.

2.3 Decentralization in Asia: A short note

Decentralization reforms play a conspicuous role in Asia. The local governments have expanded significantly in most Asian nations since the 1990s. However, these subnational governments are confronted with many challenges, from the effects of financial and economic crises around the globe to urbanization, demographic, environmental, and climate change. These challenges increase the difficulties of the sub-national governments for the effective public services delivery. It further exacerbates growing income inequalities within and among regions. Following is a brief description of some of the Asian countries, their decentralization policies, and general practices[7].

[6]For a detailed discussion on the history of China's fiscal centralization, decentralization, and reforms see Shen et al. (2012).

[7]This section is based on information largely derived from (Cities and Governments, 2010).

Decentralization reforms have been evolving for a long time now, but the process has not been linear. In the Asian context, several countries have taken steps towards revitalizing the decentralization reforms. For example, Pakistan introduced decentralization reforms in 2001, which faced a setback in 2009 when local government elections were postponed, and the non-political administrators replaced the elected mayors. However, in 2010, several ministries that were previously under the central government's domain were devolved to provinces, and some form of local governments was revived in later years. Most of the expenditures on public services are undertaken by the provincial governments. The district governments, in theory, are responsible for elementary and secondary education, primary health care, and the environment; in practice, the provincial governments carry all these out. The sub-national government spending is around 33 percent of the total government spending, with a larger share carried out through provinces. The revenues raised by district governments are very low. They remained as low as 8 percent of the local budget in 2008-09, which suggests these were less than one percent of the total public revenues (Bahl et al., 2009). A large share of local government revenues is received through intergovernmental transfers.

The Indian decentralization reforms in 1993 were a step to promote local self-rule further and empower sub-state level governments to deliver to the rural population. The sub-national governments contribute to about two-thirds of consolidated government spending. The state and local governments contribute a little more than 30 percent of this spending. These expenditures are concentrated on urban local bodies and are dedicated to core functions like water supply, streetlights, sanitation, and roads. The revenues from own source for the sub-national governments comprise around 33 percent of total consolidated public revenues in the country. The vertical fiscal imbalance is very high. The intergovernmental transfers make nearly 90 percent of the revenues for sub-national governments. The transfers are often received from the state governments. However, the central government also makes transfers, but it is done through the state governments almost all the time.

Furthermore, Bangladesh's decentralization program began in 1997 to give powers to divisions and districts to participate in decision-making. However, the sub-national spending is lower than those in India and Pakistan and account for 15 percent or less. The own sub-national revenues are limited to two percent of the total consolidated public revenues. Around 90 percent of the local government revenues are received through intergovernmental transfers.

Moreover, the Sri Lankan decentralization reforms (establishment of Provincial Councils) were taken in 1988 to mitigate the conflicts between the Tamil minority of the North and the Singhalese majority of the rest of the island. The sub-national governments lack raising an adequate level of revenues and are heavily dependent on upper tiers for transfers. The fiscal capacity of sub-national governments is very low. Provincial current expenditures were around 13 percent of the total current expenditures during 2008-12. Around 73 percent of the expenditures of sub-national governments are financed through transfers (Cooray and Abeyratne, 2017).

Furthermore, in the Eastern Asian countries, China has taken certain steps to emphasize from financial improvements to quality public services delivery by sub-national governments as a part of the government's attempt to address equity and build a harmonious society. Before

the early 1980s, the fiscal system was highly centralized (Ichimura and Bahl, 2008). The sub-national governments spending are extremely decentralized and account for about 70 percent of the total public spending[8]. The Chinese local governments are different from the rest of the world because they also devote a sizeable share of their respective budgets to different insurance schemes. These functions are usually carried out by central governments (Bahl and Martinez-Vazquez, 2006). Moreover, the revenues are somewhat centralized in the country. The sub-national (provinces, prefectures, and townships) tax revenues are around 40 percent with annual variations (Shen and Zou, 2015). The inter-governmental transfers, which are very complex and often non-transparent (Bahl and Martinez-Vazquez, 2006), account for 60 percent.

In Japan, decentralization reforms were greatly promoted in the 1990s[9]. In recent times the government proceeds to actualize the 2003 'Trinity Reforms' to supply more noteworthy sub-national financial independence. Expenditures in sub-national governments comprise around 60 percent of the total public expenditures. The sub-national governments collected approximately 40 percent of the total national taxes in 2007. About 40 percent of the local revenues come through inter-governmental transfers.

In South Korea, the law on local government revival resulted in the composition of the local government assemblies in 1991. The decisions to carry out deeper decentralization reforms beyond local government elections were further undertaken in the late 1990s and early 2000s[10]. The expenditures of the local governments account for about 45 percent of the total public expenditures. The revenues are centralized in the country. Sub-national governments contribute around 35 percent of the total national revenues. Own revenues are about 60 percent of the total local revenues. The local governments receive about 40 percent of their total revenues through transfers.

In addition to the above, among South-East Asian countries, in Indonesia, the decentralization laws from the "Big Bang" reforms of 1999–2001 were the beginning of the new sub-national governments. The expenditures of sub-national governments account for approximately 35 percent of the total public spending. The revenues are highly centralized in the country. The sub-nationals contribute about 8 percent in the total national tax revenues. About 90 percent of the local revenues are contributed through inter-governmental transfers.

The reforms in the Philippines were taken in 1987 with the Local government Act of 1991 defining the roles and rights of sub-national governments. About 25 percent of the total national spending is contributed by sub-national governments. The amount of own-source revenues are about 10 percent of the total consolidated public revenues. With some variations among regions, approximately 70 percent of the revenues for sub-nationals are received through transfers.

In Thailand, the 1997 constitution requires the promotion of decentralization as a basic policy of the government, and this was followed by basic legislation in 1999 in the form of the Decentralization Plan and Procedures Act. The sub-national expenditures amounted to around 26 percent in 2011. The contribution sub-national to total consolidated revenues remained about

[8] It is 80 percent according to Wingender (2018).
[9] see Ikawa (2008) for a detailed discussion on Japanese local governments.
[10] see (Bae, 2016) for details.

15 percent in 2010. Approximately 85 percent of the local budget is supported through transfers.

Furthermore, Vietnam has seen steady and considerable progress, but challenges remain for monetary independence and political decentralization at the lower levels. In 2008 about 45 percent of total public expenditures were undertaken by sub-national governments. The own-resource revenues at the sub-national level have increased from 35 percent to about 44 percent by 2011. Half of the lower levels of government revenues are received through transfers.

The central Asian countries that were a part of the former Soviet Union until 1991 shared a unified system of local government system. After 1991 these countries grappled with the difficulties due to overlapping functions and shared competencies. However, local self-government in the states of the Eurasian region has attained different levels of institutional development. In the Central Asian states of Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan, the local self-governments function on the lowest levels and in villages. Nevertheless, these countries have been involved in making reforms to increase the role of local self-government.

In the Western Asian countries, decentralization appears in the constitutions of the Islamic Republic of Iran and Turkey. Since 2004, Turkey has undertaken decentralization reforms to increase resources and regional authority to sub-national governments to reorganize the division of responsibilities between the central government and these local authorities. However, the government's reforms in 2012 that aimed at achieving economies of scale in municipal services provision through municipal amalgamation have increased the dependency of local governments on intergovernmental transfers (Yılmaz and Güner, 2017). The central government has high revenue responsibilities and influences local budget decisions.

Furthermore, in Iran, the law on the State Islamic Councils was passed by Islamic Consultative Assembly (Majlis) in 1982. However, the final amendment to the law was made by the fifth Majlis in 1996 and the elections for these councils were held in 1998. Revenues are highly centralized in the country. For transfers to the sub-national governments, there is no binding law in force. The development transfers are made from oil revenues. Most of the decisions are taken by the parliament for any allocation of transfers to regional governments.

A brief account of the decentralization policies in some Asian countries presented above shows that the reforms in most of these countries were undertaken in the 1980s and 1990s. The sub-national governments exercise some kind of fiscal powers, but they are largely dependent on transfers from upper tiers. Moreover, the lower capacity for raising revenues increases budget constraints for them. This further affects service delivery and affecting population welfare. These challenges fuel regional inequalities in these countries.

2.4 Empirical Analysis

2.4.1 Regional Inequalities in Asia

The most challenging task in empirical research on regional disparities is often the availability of reliable data. The economic and social accounts of the countries are necessary factors for

comparative studies in this regard. Precisely, the data on regions based on homogeneous economic and territorial levels is crucial for accurate analysis. The data on regional economic and social characteristics is not often available on a single platform with accuracy and reliability. Data for developed countries may be found easily as they keep a strong check on the statistics; it is in developing countries that the researchers struggle to get the data for. For this study, we have collected data from different sources that include national statistical offices or the central banks' statistics of relevant countries, World Bank Development Indicators (WDI), OECD database, and IMF database. The details of variables and their potential data sources are listed in Table 2A.2 in the appendix.

The regional inequalities are measured through different indicators by different scholars. However, the most commonly used measure is regional GDP per capita (Shankar and Shah, 2003; Rodríguez-Pose and Gill, 2004; Lessmann, 2009, 2012). Furthermore, the challenges of regions' size and unevenly distributed population are other issues worth considering. To tackle this challenge, we consider the classifications of the territories for large regions (TL2) on the pattern of OECD classifications for some countries. We consider state/provincial level data for the countries not classified under the OECD or for which any classification is not available. The number of regions considered for regional GDP remains static throughout the analysis period therefore, there shall not be any issues related to changes in the number of provinces/states/administrative divisions. Following the common measures used in the contemporary literature (Shankar and Shah, 2003; Lessmann, 2009), we calculate disparity measures using a simple coefficient of variation (CV) and Population Weighted Coefficient of Variation (PW-CV) that are calculated based on regional GDP per capita. The CV can be used for comparisons of regional disparities in countries across time. The PW-CV measure is used for adjusted population size. This measure is used in literature as a measure that is independent of the scale, size of the population, and the number of territorial regions taken into consideration. This satisfies the Pigou-Dalton principle [(Pigou, 1912; Dalton, 1920)], which states that the transfer of resources from richer regions to poor regions reduces inequalities among them. The formulas for the calculation of both inequality measures are as following:

$$CV = \frac{1}{\bar{y}}[\frac{1}{n}\sum_{i=1}^{n}(\bar{y}-y_i)^2]^{1/2}, \tag{2.1}$$

$$PW\text{-}CV = \frac{1}{\bar{y}}[\sum_{i=1}^{n}p_i(\bar{y}-y_i)^2]^{1/2}. \tag{2.2}$$

Where $\bar{y}$ is the measure of the average GDP per capita of a country. y_i is the GDP per capita of region$_i$. The share of the population of the region in the total population of the country is denoted by p_i. n is the number of sub-national regions. Our dataset consists of 19 Asia countries for the period of 1990-2015. The frequency of the data varies by country. It is almost completely balanced for some countries and with large gaps for others. We provide the mean calculations of the inequality measurements for the available data in Table 2.1 below:

These measures range from 0 (perfect equality that means equal per capita regional GDP for different regions) to 1 (perfect inequality that means only one region has all the GDP). By looking at the table, we can observe that according to our inequality measures (CV) it is very high in most of the Asian countries with Indonesia (0.92), Mongolia (0.92), Iran (0.78). The

Table 2.1: Regional Inequalities in Asia

Country	Coeff. of Variation	PW-Coeff. Variation	Gini index.
Bangladesh	0.32	0.23	0.32
China	0.60	0.45	0.40
Georgia	0.43	0.72	0.38
India	0.51	0.41	0.34
Indonesia	0.92	0.76	0.34
Iran	0.78	0.58	0.42
Japan	0.22	0.48	0.33
Kazakhstan	0.57	0.45	0.31
Korea, Rep.	0.25	0.25	0.32
Kyrgyz Republic	0.51	0.52	0.31
Malaysia	0.44	0.55	0.45
Mongolia	0.92	1.06	0.33
Pakistan	0.24	0.19	0.31
Philippines	0.73	0.71	0.46
Sri Lanka	0.41	0.55	0.37
Thailand	1.08	1.31	0.41
Turkey	0.48	0.82	0.41
Uzbekistan	0.32	0.32	0.37
Vietnam	0.69	0.85	0.36
Average	0.55	0.59	0.37

Notes: Gini index data is taken from the World Development Indicators (WDI), the World Bank.

low inequalities are observed in countries like Japan (0.22), Pakistan (0.24), and Korea (0.25). The overall un-weighted average of (CV) entire set of countries is (0.55). This implies that the regional inequalities vary largely in Asia. Among all these countries, Thailand is an outlier where the inequality measure (CV) is 1.08, which is very high. The country has witnessed large inequalities since the 1960s. The richest provinces have always earned over six times the average income of the poorest 50% provinces (Jenmana and Gethin, 2019)[11]. Hence, our calculation is representative of Thailand's consistent inequalities. The correlation between CV and PW-CV is high (0.84). The correlation of Gini index to PW-CV is higher (0.39) than CV (0.23).

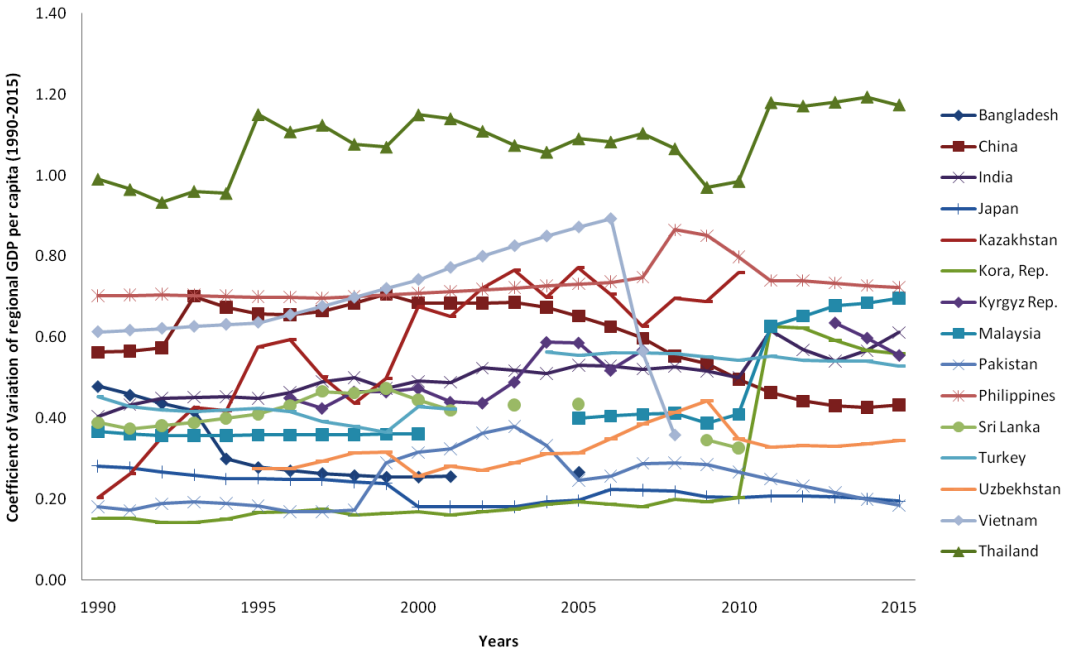
The trend of inequalities within-country is equally important for any empirical analysis. The graph below (Figure 2.3) shows within-country disparities for some of the countries in the list. We can observe many countries having inequalities above 40%.

2.4.2 Data and methodology

This section provides information on data and empirical techniques used in our analysis. The choice of variables in measuring the link between decentralization and regional inequalities is an important factor for this analysis. The following paragraphs briefly explain certain variables and their possible link to inequality measures.

As explained in the previous section, regional disparities are calculated from the regional GDP per capita (mean income). The regional GDP per capita is defined in terms of international purchasing power parity (PPP)$. The data is collected from different sources and converted PPP values from the local currency.

[11]See also (Jenmana et al., 2018) for a discussion on inequalities in Thailand.



Notes: The figure shows yearly regional inequalities in countries, measured as Coefficient of Variation (CV) of regional GDP per capita.

Figure 2.3: Trends in regional inequalities in Asia (CV)

For the decentralization[12] measure we use data from the International Monetary Fund (IMF) Government Financial Statistics (GFS) database. This applies to countries where data is available from the IMF's database. For other countries, we calculate the same from national budget documents. The measures are Expenditure and Revenue decentralization that relates to sub-national governments' (SNGs')[13] share of expenditure and/or revenue to total government expenditures (revenues). These measures are commonly used in the literature for decentralization measures. Our main variables of interest for the analysis will be expenditure and revenue decentralization indicators. However, we also use tax decentralization and vertical fiscal imbalance indicators for individual analysis only. The results for the two are discussed only in the appendix. The vertical fiscal imbalance (VFIB) is defined as the difference between own spending and own revenue at a given level of government. This considers the mismatch between revenue and expenditure (de)centralization[14]. These transfers ensure that the revenue and expenditures of each level of government are approximately equal[15]. The tax decentralization indicator measures the tax revenues of SNGs as a share in total tax revenues of the general government.

For the Political decentralization indicators, we take several indicators related to constitutional structure, government tiers, autonomy, and residual authority in law-making, and elections at the lower levels. We take advantage of the data set from Fan et al. (2009). A dummy

[12] See (Schneider, 2003)for conceptual understanding on the definitions of different decentralization measures.

[13] Sub national governments include state/province and local governments.

[14] For calculation and definitions of fiscal decentralization indicators, see 'The IMF Fiscal Decentralization Dataset' notes.

[15] A rich discussion on intergovernmental transfers and regional inequalities can be found in Bird and Smart (2002). An equally nice reading for decentralization and the transfers from higher levels of government to lower levels is presented in Bahl and Johannes (1994).

variable that denotes countries with a federal constitution[16] and the number of sub-national government tiers that reflect government division into many levels are included. The degree of sub-national autonomy is an important factor in decentralization studies as it provides shelter to lower-level governments to make decisions based on their needs. The dataset uses several dummy indicators for lower tiers' authority and legislative capacity on matters not specified by law to one level of government. Furthermore, the autonomy of sub-national governments could also be measured through the elections of local representatives at the local constituency level. Political participation is crucial for a decentralized system of government as it ensures the accountability of the elected members to local people. For this, we take two variables that take value 1 if the elections are held at the lower level (at the second tier and the lowest tier) and 0 otherwise[17].

It is important to note that the fiscal and political decentralization measures used in our study may fail to capture the degree and magnitude of decentralization fairly. The data on the fiscal measure comes from the IMF database, for which the researchers have noted some limitations [see (Ebel and Yilmaz, 2002; Stegarescu, 2005; Sepulveda and Martinez-Vazquez, 2011)]. The expenditures (revenues) share of sub-national governments does not provide information on what components are included in each category. Similarly, the tax autonomy enjoyed by the local governments is not included in the details. The transfers being made to local governments do not indicate the types (conditional or unconditional). Furthermore, the measures of political decentralization, although more closely defined, may have similar caveats. Overall, it implies that these widely available measures for decentralization on fiscal and political indicators have their limitations. Owing to these caveats and shortcomings, our results hinge on the strengths and weaknesses of these measures[18].

The fiscal and political decentralization measures are of primary interest in this study. However, several other factors that directly or indirectly affect regional inequalities are necessary to control for. Following are a few important variables included in the analysis.

We include GDP per capita and its squared values in the regression to control for regional development and check for Kuznets' hypothesis (Kuznets, 1955). Richer countries have a higher advantage in promoting regional development and thereby reducing within-country disparities among regions. The empirical studies on spatial inequality have considered the level of development as an important factor in explaining regional disparities (Petrakos et al., 2003). This line of justification could be traced back to Williamson (1965) seminal work that explains that spatial inequalities tend to increase with an increase in the process of economic development of the country. After reaching a particular stage, it starts to decrease with the level of development improving. Accordingly, spatial inequalities would tend to have an inverted U-Shaped relationship.

[16]The criteria to be counted as a federal country is that she has at least two levels of government. For comparative federal systems see (Watts, 2008). This information is equally checked in CIA factbook for each country.

[17]We also include the sum of autonomy and electoral indicators following (Lessmann, 2012) to capture the intensity of the presence of such sub-national autonomy.

[18]The other database on fiscal decentralization indicators that is recognized by the IMF is the OECD database. However, it includes mostly advanced economies, a few emerging markets, and no low-income countries (IMF 2020). The shortcomings in the OECD database are like those mentioned for the IMF-GFS database.

Furthermore, we include the number of administrative units/regions[19] that were used for calculating regional inequality measures[20]. This variable controls for possible heterogeneity issues since all countries' territorial size are largely different and cannot be compared to one another in any possible unified manner.

The population and the urbanization of a country are other important factors in the development studies. The income gap between urban and rural areas is of prime importance. To cater for widening and narrowing the gap in rural-urban areas and the agglomeration effect, we include the share of the urban population in our analysis. As a matter of fact, the urban regions benefit more from the development process as more economic activity takes place in urban centers, this variable controls for the effect. Furthermore, we also make a Geographical Concentration Index (GCI) variable to control for a further agglomeration effect.[21] It captures the concentration of the country's population in each of its regions concerning the surface area of regions.

Moreover, another important control variable is the trade openness of a country. It is the share of trade as a percentage of GDP. This variable indicates that regions respond to international competition and make efforts in reaching foreign markets. Moreover, the impact of trade openness on regional disparities is suggested by (Giannetti, 2002; Rodríguez-Pose and Gill, 2006; Fujita et al., 1999). Trade liberalization reduces spatial disparities across regions (Krugman and Elizondo, 1996). It is expected that more economically active regions respond to international market competitions in producing exportable goods and services.

Besides other variables, ethnic divisions are equally considered as an important factor in creating inequalities and fuelling civil conflicts. Many civil wars are related to identity i.e., they are fought either between or among different ethnic or religious groups (Buhaug and Gates, 2002). Ethnic rebellion groups at large mobilize for a common cause and deter peace. The degree of violence is larger in ethnically diverse countries (Esteban et al., 2012). The ethnic composition may be functioning along two dimensions: ethnic fragmentation and ethnic polarization. Ethnic fragmentation is defined as the probability that two individuals drawn at random come from different groups. This implies that the higher the number of groups, the higher the level of fragmentation will be. Furthermore, polarization is defined as dominance i.e., it occurs if the largest ethnic group constitutes 45-90% of the population. We include the ethnic fractionalization index that corresponds to the probability that two randomly drawn individuals within a country are not from the same ethnic group (Drazanova, 2019).

In addition to the above, natural resource abundance is one of the explanatory variables in the studies on inequalities and internal conflicts (Collier and Hoeffler, 2004; Ross, 2006; Ross et al., 2012). Resource-rich countries are faced with issues like land expropriation, low job opportunities for local residence, migration of local labor, and inequality in regions. This induces socio-economic differences in society which breeds anger and frustration in people. Moreover, natural resource abundance may equally increase corruption and create governance issues (Ades and Di Tella, 1999). The people in charge of managing the natural resources get

[19] State and provinces that are considered as sub-national tiers of government.

[20] This indicator is not included in the regressions when analyzing data with Gini index as an outcome variable.

[21] This index indicates the idea that an evenly (not concentrated) distribution of a country's population over the territory is achieved when regional population share and surface area coincide.

richer by using a channel of corruption and misuse of the resources, increasing inequalities among people. The data for natural resource rent comes from WDI.

Further, we include some other important variables in the analysis. The unemployment ratios affect regional inequalities (Lessmann, 2009). An active labor force indicates a better economic condition and better welfare. We include the unemployment rate as a percentage of the total labor force. We equally use the log of the total area of a country measured in km^2. This controls the country's size because larger countries tend to have larger land for economic purposes and a larger human resource endowment. As a further aside, we include the democratic quality[22] variable in our analysis to see how it affects income inequalities. Although it is logical to assume that more developed democracies have better redistribution policies that favor lower-income inequalities, yet the empirical studies are inconclusive on the link (see Timmons (2010) and Acemoglu et al. (2015)).

2.4.3 Estimation techniques and results

We carry out our empirical analysis with the panel estimation method[23] in two steps. We test the models with decentralization indicators individually and in a combined scenario. The individual analysis addresses the scope of the relationship on how these indicators affect inequalities. The estimations involving fiscal and political indicators in a single model are motivated by the fact that decentralization reforms on one dimension, without the other, are expected to render failure or at least be limited in their scope and effectiveness. The use of combined analysis allows us to test the effect of fiscal decentralization when controlling for political decentralization and vice versa[24].

As a further aside, we cling to the use of two approaches with panel analysis. We use annual data at first and 5-year averages on the second step. However, we only report the panel analysis results in the paper for annual data[25]. The first step of individual analysis and its functional form is presented in appendix 2B with a discussion on the results. Here we begin our analysis with the estimation where both the indicators are considered in one regression. The equation for this estimation takes the following form:

$$Inequality_{i,t} = \alpha_i + \sum_{j=1}^{k} \beta_j X_{j,i,t} + \gamma FDECENT_{i,t} + \theta PDECENT_{i,t} + \mu_t + \varepsilon_{i,t} \tag{2.3}$$

Where *Inequality* is the measure of regional inequalities (CV, PW-CV, or Gini index) in country i in year t. α_i and μ_t are country and time fixed effects. $X_{j,i,t}$ is a list of k control variables that have an effect on inequality. The *FDECENT* and *PDECENT* are alternate fiscal and political decentralization indicators. $\varepsilon_{i,t}$ represents the usual error term that capture any information

[22] The democracy index in the Polity IV project ranges from 0 (poor score) to 10 (highest score).

[23] The individual effects are estimated with FGLS as it is asymptotically more efficient than pooled ordinary least square (POLS) when the series exhibits heteroskedasticity (Wooldridge, 2010). All models control for panel-specific heteroskedasticity.

[24] Potential econometric issues often arise with non-stationary data, problems with heteroskedasticity, serial correlation, and endogeneity. We test for stationarity (Table 2A.4 in Appendix 2A.) of our data and find it not a problem in our case as the ADF (Fisher Chi-square) test was zero or equal to zero rejecting the null hypothesis for the presence of unit root process.

[25] All analysis with 5-year averages is available upon request. This neutralizes the effects of cyclical fluctuations. It also solves the issues arising from missing values in variables (Easterly, 1999; Higgins and Williamson, 2002). This should also deal with the reverse causality issue [see (Furceri and Zdzienicka, 2012)].

missed by the model. β, γ, and θ are estimation parameters for coefficients.

Considering several possible combinations of the two indicators from our models, we test expenditure and revenue decentralization measures with a few political decentralization indicators. The estimation of baseline results is based on Panel analysis with Random effect (RE) and the Feasible Generalized Least Squares (FGLS) methods.

2.5 Baseline Results

The results with random effect model are presented in Table 2.2 and 2.3 for expenditure and revenue decentralization, respectively. We can observe in Table 2.2 that the indicator of expenditure decentralization is positive for all the models. It is statistically significant for two models. This suggests that when controlling for different types of political decentralization indicators and a range of other economic, social, and geographic controls, fiscal measures fail to reduce inequalities. The positive coefficients suggest that they tend to increase inequalities among regions. The fiscal management capacity of sub-national governments is low in developing countries. The mismanagement of available finances results in undermining the expected outcomes of decentralization reforms.

Furthermore, the political indicators produce mixed outcomes in association with the inequality measure. The coefficients are negative and statistically significant for sub-national autonomy measures, implying that autonomy on a regional level to make laws supports regional development and reduces inequalities. In contrast, the indicators for elections on the lower level of government are positive and significantly associated with the outcome variable. The local representative elected at the lower tiers uses their discretion for using local finances to benefit a particular set of individuals. This elite capture in the local politics widens regional economic divisions. Consequently, people's welfare in terms of providing local public goods and services remains at stake. The rent-seeking behavior of the local elites may counteract the sub-national development.

Furthermore, estimating equation (3) with revenue decentralization indicator, we present the results in Table 2.3. Looking at the results, we observe that the revenue decentralization indicator is positive for half the number of the models and negative for the other half. However, the indicator does not observe any level of significance. These mixed results indicate that the revenues at the sub-national level remain sub-optimal. The effects may be contingent upon the political decentralization indicators.

Moreover, the political decentralization results are in line with the results reported in Table 2.2. The autonomy indicators are negative, and the electoral indicators are positive. All these indicators are statistically significant at 1% level. This equally indicates that political decentralization strongly affects inequalities (positive and negative), irrespective of different fiscal indicators.

As an aside from the analysis with random effect models, we estimate equation (3) with the FGLS model to control for possible cross-section and panel-specific correlations. The method also controls for panel-specific heteroskedasticity. The results are robust to our analysis from

Table 2.2: Effects of expenditure decentralization on regional inequality (Random effect model)

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	Coefficient of Variation (CV) of regional GDP per capita (1990-2015)					
Expenditure Decentralization	0.207***	0.031	0.096*	0.073	0.051	0.016
	(0.061)	(0.062)	(0.055)	(0.061)	(0.076)	(0.072)
Autonomy	-0.456***					
	(0.072)					
Residual authority		-0.561***				
		(0.080)				
Autonomy/Resid. authority			-0.329***			
			(0.064)			
Bottom tier elections				0.237***		
				(0.072)		
Second tier elections					0.162**	
					(0.075)	
Bottom/second elections						0.121***
						(0.044)
Trade openness	0.141***	0.066*	0.108***	0.162**	0.108*	0.136**
	(0.042)	(0.035)	(0.034)	(0.067)	(0.064)	(0.065)
Natural resource rents	0.083***	0.066***	0.077***	0.087***	0.057***	0.069***
	(0.020)	(0.017)	(0.017)	(0.028)	(0.021)	(0.023)
GDPPC	0.859**	0.214	0.464	0.732***	1.431***	1.209***
	(0.334)	(0.307)	(0.302)	(0.259)	(0.424)	(0.284)
$GDPPC^2$	-0.051**	-0.012	-0.026	-0.049***	-0.088***	-0.076***
	(0.022)	(0.019)	(0.020)	(0.016)	(0.027)	(0.018)
Ethnicity	-0.027	0.070**	0.031	-0.084***	-0.051*	-0.073***
	(0.029)	(0.033)	(0.029)	(0.029)	(0.026)	(0.023)
Surface area	-0.031	0.003	-0.012	0.002	0.006	0.012
	(0.023)	(0.018)	(0.018)	(0.020)	(0.026)	(0.023)
Urbanization Rate	0.081	0.088*	0.080	0.191***	0.084	0.135**
	(0.094)	(0.053)	(0.067)	(0.062)	(0.080)	(0.061)
Unemployment rate	0.024	-0.097***	-0.053**	0.007	0.025	0.012
	(0.027)	(0.030)	(0.026)	(0.027)	(0.031)	(0.029)
Concentration Index	0.005	0.024	0.023	0.001	-0.021	-0.011
	(0.031)	(0.037)	(0.037)	(0.037)	(0.043)	(0.040)
Territorial Units	0.007***	0.004***	0.005***	0.004**	0.007***	0.005***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Democratic quality	0.017*	0.020***	0.018***	0.008	0.020**	0.014**
	(0.009)	(0.005)	(0.006)	(0.006)	(0.009)	(0.007)
Constant	-3.791***	-0.954	-2.080*	-3.910***	-6.327***	-5.709***
	(1.148)	(1.068)	(1.069)	(0.872)	(1.561)	(0.979)
R^2 within	0.104	0.151	0.142	0.146	0.104	0.125
R^2 between	0.903	0.972	0.943	0.851	0.840	0.855
R^2 overall	0.803	0.846	0.835	0.809	0.792	0.803
χ^2	5.219	0.482	1.407	15.225	26.114	24.947
P-value	0.022	0.488	0.235	0.000	0.000	0.000
Observations	195	195	195	195	195	195

Notes: Robust standard errors are reported in parentheses using Huber/White/sandwich estimator. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. Trade openness, Natural resource rents, GDP per capita, ethnicity, surface area in km^2, urbanization rate, unemployment rate are in the natural log.

previous models as this includes any estimation issues arising from the heteroskedasticity and serial correlation in panels. These results posit similar evidence of the relationship between decentralization measures and regional inequalities. A brief explanation of these results is discussed in the following paragraphs.

Table 2.3: Effects of revenue decentralization on regional inequality (Random effect model)

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Coefficient of Variation (CV) of regional GDP per capita (1990-2015)					
Revenue Decentralization	0.187	-0.100	0.039	0.017	-0.221	-0.129
	(0.230)	(0.187)	(0.161)	(0.218)	(0.297)	(0.239)
Autonomy	-0.500***					
	(0.109)					
Residual authority		-0.438***				
		(0.034)				
Autonomy/Resid. authority			-0.344***			
			(0.037)			
Bottom tier elections				0.271***		
				(0.097)		
Second tier elections					0.236***	
					(0.086)	
Bottom/second elections						0.144***
						(0.049)
Trade openness	0.085	0.103	0.058	0.177*	0.154*	0.163*
	(0.057)	(0.086)	(0.051)	(0.095)	(0.088)	(0.093)
Natural resource rents	0.075***	0.047*	0.078***	0.068	0.027	0.050
	(0.024)	(0.024)	(0.015)	(0.045)	(0.031)	(0.036)
GDPPC	1.551***	0.477	0.905***	0.617*	1.518***	1.094***
	(0.452)	(0.333)	(0.224)	(0.364)	(0.346)	(0.301)
$GDPPC^2$	-0.095***	-0.030	-0.055***	-0.042*	-0.092***	-0.069***
	(0.029)	(0.021)	(0.015)	(0.023)	(0.022)	(0.020)
Ethnicity	-0.038	0.179*	0.086	-0.196	-0.166	-0.213
	(0.148)	(0.095)	(0.062)	(0.146)	(0.137)	(0.130)
Surface area	-0.073	0.027	-0.035	0.026	0.072	0.056
	(0.057)	(0.049)	(0.034)	(0.055)	(0.067)	(0.057)
Urbanization Rate	0.006**	0.001	0.003*	0.005*	0.001	0.003
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Unemployment rate	-0.015*	-0.015***	-0.021***	-0.002	0.001	0.000
	(0.008)	(0.006)	(0.004)	(0.007)	(0.007)	(0.007)
Concentration Index	0.002	0.012	0.004	0.010	-0.007	-0.000
	(0.049)	(0.033)	(0.032)	(0.045)	(0.046)	(0.045)
Territorial Units	0.007***	0.005***	0.005***	0.004**	0.005**	0.004**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Democratic quality	0.007	0.019***	0.016***	0.009	0.018**	0.015*
	(0.009)	(0.007)	(0.005)	(0.008)	(0.009)	(0.009)
Constant	-5.370***	-2.261***	-3.076***	-3.104**	-7.281***	-5.374***
	(1.288)	(0.795)	(0.640)	(1.305)	(1.473)	(0.946)
R^2 within	0.113	0.127	0.139	0.134	0.089	0.114
R^2 between	0.868	0.934	0.977	0.777	0.836	0.827
R^2 overall	0.794	0.844	0.855	0.796	0.796	0.802
χ^2	4.876	0.076	4.446	1.834	10.731	3.173
P-value	0.027	0.783	0.035	0.176	0.001	0.075
Observations	196	196	196	196	196	196

Notes: Robust standard errors are reported in parentheses using Huber/White/sandwich estimator. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. Trade openness, Natural resource rents, GDP per capita, surface area in km^2 are in the natural log.

The results in Table 2.4 show that the expenditure decentralization indicator is positively associated with inequality measures when controlling for any of the political decentralization indicators (except one). It is statistically significant at 1% level in the models that include subnational autonomy indicators. It is positive in two among three models with the electoral indicators; it fails to any level of statistical significance. Furthermore, the political decentralization indicators are in line with the results from the previous models. This rather implicates evi-

dence on the robustness of the previous results. The autonomy indicators are found to reduce inequalities, whereas the electoral indicators work in the opposite direction.

Table 2.4: Effects of expenditure decentralization on regional inequality (FGLS model)

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Coefficient of Variation (CV) of regional GDP per capita (1990-2015)					
Expenditure Decentralization	0.193***	0.075**	0.110***	0.040	0.030	-0.041
	(0.034)	(0.033)	(0.033)	(0.036)	(0.055)	(0.048)
Autonomy	-0.500***					
	(0.054)					
Residual authority		-0.528***				
		(0.037)				
Autonomy/Resid. authority			-0.331***			
			(0.034)			
Bottom tier elections				0.302***		
				(0.034)		
Second tier elections					0.154***	
					(0.038)	
Bottom/second elections						0.147***
						(0.022)
Trade openness	0.148***	0.050**	0.099***	0.176***	0.116***	0.141***
	(0.022)	(0.020)	(0.021)	(0.023)	(0.023)	(0.022)
Natural resource rents	0.075***	0.064***	0.069***	0.101***	0.054***	0.071***
	(0.009)	(0.008)	(0.008)	(0.010)	(0.010)	(0.009)
GDPPC	1.164***	0.396***	0.747***	0.518***	1.654***	1.284***
	(0.128)	(0.135)	(0.132)	(0.138)	(0.183)	(0.124)
$GDPPC^2$	-0.070***	-0.022***	-0.043***	-0.036***	-0.101***	-0.081***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.012)	(0.008)
Ethnicity	-0.044***	0.070***	0.023*	-0.073***	-0.054***	-0.066***
	(0.012)	(0.012)	(0.012)	(0.015)	(0.012)	(0.012)
Surface area	-0.042***	-0.005	-0.019*	0.006	-0.007	0.018
	(0.011)	(0.010)	(0.010)	(0.011)	(0.014)	(0.014)
Urbanization Rate	0.115***	0.050	0.074**	0.187***	0.121***	0.142***
	(0.041)	(0.034)	(0.035)	(0.041)	(0.039)	(0.037)
Unemployment rate	0.005	-0.109***	-0.076***	-0.005	0.008	-0.001
	(0.012)	(0.015)	(0.014)	(0.011)	(0.012)	(0.011)
Concentration Index	0.015	0.023	0.016	0.058**	0.030	0.050*
	(0.023)	(0.025)	(0.023)	(0.024)	(0.026)	(0.026)
Territorial Units	0.006***	0.003***	0.004***	0.003***	0.006***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic quality	0.012***	0.016***	0.013***	0.004	0.015***	0.012***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-4.967***	-1.444***	-3.073***	-3.154***	-7.171***	-6.123***
	(0.563)	(0.511)	(0.540)	(0.563)	(0.819)	(0.563)
χ^2	13.897	0.064	5.544	5.614	32.823	15.853
P-value	0.000	0.801	0.019	0.018	0.000	0.000
Observations	195	195	195	195	195	195

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. Trade openness, Natural resource rents, GDP per capita, ethnicity, surface area in km^2, urbanization rate, unemployment rate are in the natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

Furthermore, analyzing revenue decentralization with the FGLS model, we report the results in Table 2.5. We can observe that the revenue decentralization indicators follow the patterns observed in Table 2.3. The positive association in models one, three, and four indicates an effect that increases regional inequalities. However, unlike previous results, we observe now that model one is statistically significant at the 5% level. Furthermore, among the models that are

negatively associated with the inequality measure, we can observe model five to be statistically significant at the 10% level. This indicates that when controlling for the second-tier election indicator on the political decentralization front, the revenue decentralization is conducive to lowering inequalities. The high revenue share of the sub-national governments encourages them to finance projects that target pro-poor social and economic services.

Table 2.5: Effects of revenue decentralization on regional inequality (FGLS model)

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Coefficient of Variation (CV) of regional GDP per capita (1990-2015)					
Revenue Decentralization	0.219**	-0.024	0.077	0.073	-0.204*	-0.095
	(0.106)	(0.084)	(0.085)	(0.100)	(0.112)	(0.104)
Autonomy	-0.489***					
	(0.058)					
Residual authority		-0.454***				
		(0.024)				
Autonomy/Resid. authority			-0.345***			
			(0.022)			
Bottom tier elections				0.325***		
				(0.036)		
Second tier elections					0.220***	
					(0.030)	
Bottom/second elections						0.144***
						(0.018)
Trade openness	0.064**	0.001	0.042**	0.120***	0.150***	0.134***
	(0.029)	(0.026)	(0.022)	(0.030)	(0.029)	(0.030)
Natural resource rents	0.066***	0.061***	0.068***	0.099***	0.031***	0.062***
	(0.012)	(0.009)	(0.008)	(0.015)	(0.011)	(0.012)
GDPPC	1.519***	0.838***	0.999***	0.515***	1.665***	1.186***
	(0.139)	(0.125)	(0.094)	(0.139)	(0.148)	(0.132)
$GDPPC^2$	-0.093***	-0.054***	-0.061***	-0.037***	-0.100***	-0.073***
	(0.009)	(0.008)	(0.006)	(0.008)	(0.009)	(0.008)
Ethnicity	-0.096	0.101	0.080	-0.245***	-0.105	-0.178**
	(0.079)	(0.066)	(0.059)	(0.089)	(0.076)	(0.080)
Surface area	-0.089***	-0.021	-0.043***	-0.012	0.057**	0.034
	(0.022)	(0.017)	(0.014)	(0.020)	(0.023)	(0.021)
Urbanization Rate	0.263***	0.162***	0.169***	0.276***	0.021	0.118**
	(0.053)	(0.040)	(0.035)	(0.051)	(0.048)	(0.046)
Unemployment rate	-0.014***	-0.020***	-0.021***	-0.004	-0.005	-0.004
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Concentration Index	-0.029	0.003	0.001	0.025	0.020	0.027
	(0.024)	(0.023)	(0.019)	(0.025)	(0.026)	(0.026)
Territorial Units	0.006***	0.005***	0.005***	0.004***	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic quality	0.005*	0.017***	0.014***	0.005	0.013***	0.011***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Constant	-5.557***	-3.071***	-3.726***	-2.727***	-7.793***	-5.726***
	(0.493)	(0.447)	(0.407)	(0.545)	(0.633)	(0.504)
χ^2	21.135	2.123	11.417	3.477	21.949	8.134
P-value	0.000	0.145	0.001	0.062	0.000	0.004
Observations	196	196	196	196	196	196

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. Trade openness, Natural resource rents, GDP per capita, surface area in km^2, urbanization rate are in the natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

Turning to the political decentralization indicators, we observe that the autonomy indicators are negative and statistically significant at the 1% level for all relevant models. Moreover,

the electoral indicators are positive and statistically significant at the 1% level in their relevant models. This implies that the sub-national autonomy encourages growth and opportunities for the poor population when controlling for the revenue decentralization indicator. The power to make decisions for the local population induces sub-national governments to serve the masses better. In comparison, the electoral process for local representatives encourages rent-seeking by the local political elite. This undermines growth and economic opportunities for the population.

The use of two-panel data methods in this paper is an exercise to ensure the results do not suffer from an estimation technique bias. The results from FGLS model are rather more robust than random effect models. The changes could be observed in the standard errors of the interest variables. The FGLS model provides smaller standard errors for the fiscal and political decentralization indicators. In addition to the controls included in each panel, the analysis included time and country fixed effects for all the panels. Given the nature of time-invariant indicators for political decentralization, the coefficients and standard errors remained static for variables of interest in all the models. The variation between the panels for countries remained unitary. Therefore, we resorted to the use of the time-fixed effect to observe variations over time. Moreover, all the models presented above also include income group fixed effects as a robustness check. The results do not observe deviations from the baseline outcomes.

Some important patterns of the remaining explanatory variables can be observed from the above analysis. It is worth looking at some of them. We can observe GDP per capita, which is in line with the Kuznets (1955) theorem. We can observe a positive association of GDP per capita and a negative association of its squared term with the inequality measure. This shows that the level of development increases inequalities at the beginning, and after reaching a certain level, it decreases them, tracing out a Kuznets curve.

The trade openness variable is positive and statistically significant for almost all the panel analysis models. This shows that more trade openness may be biased towards some regions being more economically active than others for producing goods and services for international exports. This may reduce government priorities for spending more in regions that contribute less towards the promotion of goods for international markets and may thereby increase regional income disparities.

Moreover, the natural resource variable is positive and significant in all the models. This indicates that the countries with large reserves of natural resources and heavy dependence on natural resource rents often face economic problems like the Dutch disease. Many researchers explore the link between natural resource abundance and quality of the political system (Ross, 1999; Jensen and Wantchekon, 2004; Collier and Hoeffler, 2005; Hodler, 2006). Our results show that the natural resource rents are positively associated with the inequality measures when political and fiscal decentralization reforms are undertaken in the countries.

Furthermore, the *Ethnicity* variable shows a negative association with a large number of models. However, it is negative for all the models with electoral indicators. The negative coefficients show that the ethnically diverse regions induced inequalities to reduce when decentralization reforms were introduced. This may be because more ethnically diverse countries use decentralization as a tool to reduce tensions among sub-national (regions) and the central government.

Decentralization is assumed to improve inter-ethnic relations in multi-ethnic countries by allowing more autonomy to regional ethnic groups over their affairs (Lyon, 2015).

All the specifications presented in the models above are also analyzed with alternate inequality measures: population-weighted coefficients of variation (PW-CV) and the Gini index from the World Bank. Although it would have been more interesting to include an analysis with regional per capita income (consumption) to make a plausible comparison of the results with those obtained with CV and PW-CV, the data on regional per capita income is scarce to make such comparison. Moreover, the regional GDP per capita is frequently used as a proxy to compare one region's productive capacity, income, and economic development level to others. The Gini index is what Deaton (2013) calls: 'the average difference in income between all pairs of people divided by the average income'. The CV is an analysis to compare within-country regional inequality. The use of Gini is a comparison of the distribution of income across populations. The aim of estimating the relationship with Gini index is to see if the baseline results from CV of regional GDP per capita as an inequality measure are robust to using a different inequality indicator. All the results with alternate inequality indicators are presented in appendix 2B. The results with PW-CV observe change on fiscal indicators but largely validate our results with the political decentralization indicators. Moreover, the results with Gini index are in large support of the baseline results. The alternate inequality measures are estimated using FGLS method only.

2.5.1 Robustness

The results from panel analysis are a first step in understanding the relationship between decentralization and inequality. We control many econometric issues through a range of varied estimation techniques; the results may suffer from reverse causality and endogeneity issues. In the models presented in this study, it is assumed that the level of decentralization within the country affects spatial inequalities. However, looking at this issue from the other end, regional inequalities could call for more decentralization. The persistence of inequalities between regions may attract political movements for more financial and political autonomy. Furthermore, poorer regions benefit less from major decentralization reforms due to inefficiency and re-distributive shortcomings. This calls for a centralized budget to make equal re-distributive budgeting. Thus, expecting decentralization measures to be endogenous the literature calls for an instrumental variable approach to solve the issue.

Although to cater for endogeneity and reverse causality issues, we take long period averages with certain specifications to see the relationship of decentralization and inequality measures, the methods may yet not fully solve the issue. The association between decentralization and regional inequalities is of lower importance in studying between-country variations. In contrast, panel analysis is more focused on within-country variations. Keeping in mind the within-country variation as a major focus of our study we make use of the IV estimation technique using (random effect) two-stage least squares (G2SLS) method. This also enables us to check the validity of our results from the previous analysis with alternate panel analysis. The only difference at this stage is that we could use an instrumental variable approach to individual indicators one at a time instead of using both the indicators in one estimation equation and instrument both the sets with their relevant exogenous instruments. The possible solution could be to keep an indicator as an endogenous and instrument the other to control for one indicator

while instrumenting the other.

It is often very difficult to find an instrument that exogenously determines the measures of decentralization (both fiscal and political indicators). The standard instruments in the literature include country size (Arikan, 2004), geographic fragmentation index (Canavire-Bacarreza et al., 2020), population size, and trade openness (Sepulveda and Martinez-Vazquez, 2011), lagged values for fiscal indicators (Bartolini et al., 2016), and democracy (Lessmann, 2012).

Along with the lagged values (Bartolini et al., 2016), as an instrument for fiscal decentralization indicators, we also resort to using certain institutional channels that we believe are necessary for successful policy implementation, such as decentralization reforms. Owing to this we use an index of democracy as defined by the Polity2 index (Marshall et al., 2018) (the number of years a country has experienced democracy). This indicates the trust of people in the institution of democracy and participation in decision-making.

Furthermore, we use democratic accountability, which implicates if the public representatives do not perform optimally, they will be at risk of voted out. Similarly, we include indicators of stronger sub-national government measures; municipal and state-level elections[26] (municipal and state/provincial governments locally elected)[27]. We further include the index of corruption in the political system as an instrument. The idea is to cater to economic leakages and corrupt means in the political affairs that affect the political economy of a country.

Institutional quality plays an important role in making decentralization reforms work. All policy reforms aiming at fighting the menace of inequalities are designed in stronger institutional frameworks. Our instruments are valid in that they help financial and political accountability on a sub-national level to ensure the success of decentralization reforms. The degree of decentralization, both financial and political decentralization, is determined through these instruments. The results of the G2SLS estimations are presented in Table 2.6[28].

Looking at the results from G2SLS we find that fiscal decentralization indicators are positive and statistically significant at 1% level. The FD indicator is instrumented by financial and institutional instruments. The corruption index for expenditure and democratic accountability for the revenue indicator are used as an explanatory instrument for the endogenous variables. The lagged values can be used as an instrument as they are less likely to be influenced by any shocks in contemporary times. Moreover, institutional development plays an important role in long-run developmental policies to persist. Unlike previous research, we make use of the instruments that include financial and institutional quality indicators together. The results suggest that when instrumenting by these indicators, fiscal decentralization is associated with increasing regional inequalities. This validates our baseline results from panel analysis.

[26]The indicator takes the value of 0 if neither the local executive nor the legislative were locally elected; 1 if the executive at either municipal or state/province appointed, the legislature at either municipal or state/provincial government elected; 2 if locally elected either municipal or state/provincial governments or both elected locally at municipal or state/provincial government and neither at the other one; 3 if both locally elected at either municipal and state/provincial government and only legislature elected at the other; and 4 if all locally elected.

[27]The data can be accessed from Inter-American Development Bank— https://mydata.iadb.org/Reform-Modernization-of-the-State/Database-of-Political-Institutions-2017/938i-s2bw.

[28]We test the instrumental variable estimation with Coefficient of Variation (CV) models only.

Table 2.6: Effects of decentralization on income inequality (IV-G2SLS Models)

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable(s)	CV		CV		CV		CV	
Exp. Decentralization	0.217***							
	(0.056)							
Rev. Decentralization			0.855***					
			(0.194)					
Auto/Resid. authority					-0.186*			
					(0.095)			
Bottom/second elections							0.299***	
							(0.025)	
Trade openness	0.101*	-0.051	-0.005	0.008	0.002***	0.004***	-0.000	0.001
	(0.053)	(0.041)	(0.068)	(0.019)	(0.001)	(0.001)	(0.001)	(0.001)
Natural resource rents	0.079***	0.012	0.111***	-0.013	0.049***	0.094**	0.118***	-0.079***
	(0.019)	(0.013)	(0.023)	(0.008)	(0.015)	(0.037)	(0.017)	(0.028)
GDPPC	1.079***	0.303	1.387***	0.007	0.287*	-0.577**	1.133***	-0.648*
	(0.336)	(0.196)	(0.344)	(0.094)	(0.165)	(0.235)	(0.243)	(0.342)
$GDPPC^2$	-0.066***	-0.018	-0.087***	-0.001	-0.020*	0.052***	-0.072***	0.005
	(0.021)	(0.012)	(0.021)	(0.006)	(0.011)	(0.013)	(0.014)	(0.020)
Ethnicity	-0.118	-0.060	0.021	-0.043	0.157*	0.439***	-0.537***	0.768***
	(0.094)	(0.052)	(0.110)	(0.027)	(0.085)	(0.145)	(0.099)	(0.137)
Urbanization Rate	0.158*	0.021	0.357***	-0.019	0.055	-0.274***	-0.010	0.848***
	(0.083)	(0.037)	(0.096)	(0.034)	(0.053)	(0.100)	(0.066)	(0.238)
Democratic quality	0.015***	-0.001	0.024***	-0.005**	0.022***	-0.006	0.025***	-0.081***
	(0.005)	(0.004)	(0.006)	(0.002)	(0.003)	(0.008)	(0.004)	(0.010)
Exp. $Dec._{t-1}$		1.015***						
		(0.057)						
Rev. $Dec._{t-1}$				0.817***				
				(0.083)				
Corruption		0.004				0.013		
		(0.009)				(0.028)		
DEMACC				0.005				0.001
				(0.007)				(0.020)
Democ. years						0.275***		
						(0.059)		
State/province elec.								1.065***
								(0.054)
Constant	-4.078***	-0.774	-3.863***	-0.197	-1.411**	2.265***	-5.443***	5.670***
	(1.168)	(0.565)	(1.185)	(0.370)	(0.611)	(0.784)	(0.950)	(1.446)
Observations	168	168	166	166	296	296	231	231
Countries	14		13		15		13	
R^2 within	0.105		0.129		0.092		0.037	
R^2 between	0.935		0.920		0.944		0.941	
R^2 overall	0.819		0.825		0.789		0.793	
Sargan-Hansen	2.639		1.435		1.289		1.089	
P-value	0.104		0.231		0.256		0.297	
R^2		0.93		0.96		0.59		0.91
Adj. R^2		0.90		0.95		0.53		0.89
F-Statistics		210.863		48.888		10.811		273.485
P-value		0.000		0.000		0.000		0.000

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. The GDP per capita and surface area is in natural log. All regression include Trade openness (in (ln) for models 5 to 8), Natural resource rents, Ethnic fractionalization, Surface area, Urbanization rate, Unemployment rate (in (ln) for models 5 to 8), Concentration Index, Territorial Units, and Democratic Quality as controls. The FD indicators are instrumented by their first lag along with institutional instrument of corruption index and democratic accountability. The PD indicator for autonomy/residual authority is instrumented by years of democracy since 1800 and corruption index, and the electoral indicator is instrumented with state/municipal elections, and democratic accountability. The even numbered models are the first stage regression outcomes for each odd number model. The choice of random effect model is directed by the Hausman specification test.

Furthermore, the autonomy indicator is instrumented by the years of democracy since 1800 that indicates the persistence of democratic institutions in the countries and an indicator of the corruption in the political system. The idea is that along with the democratic institutions, it is necessary to notice corruption indices that help understand the quality of the government system. Hence, these instruments are necessary predictors for the autonomy of sub-national governments. The results suggest that the autonomy indicator is negative and statistically significant in association with regional inequalities. The authority of local politicians on making laws that match local needs is more relevant to reducing regional inequalities.

Moreover, the electoral decentralization indicator is positive and statistically significant to inequalities. The indicator is instrumented by the institutional setup of the index of elected representatives on state/province level and democratic accountability. The accountability indicator intends to influence the electoral process from the fact that the political representatives will be accountable to the public for their decisions and use of public funds. Furthermore, the indicator of state and provincial representatives being elected denotes the importance of local representatives to deliver services. The results show that electoral decentralization is positively associated with inequalities in regions i.e., they tend to increase regional inequalities.

These results are in support of our baseline results found in panel analysis. Our instruments are valuable as they explain the decentralization measures well. The Sargan-Hansen over-identification test tests the validity of our instruments in each model. The results of the test are reported along with the instrumental variable results in the bottom panel of Table 2.6. As a further aside from the instrumental variable approach for robustness checks, we include income group dummies to control income heterogeneities among the sample countries. We find our results from baseline are robust to the use of instrumental estimation techniques with varied estimation specifications.

2.6 Summary and Conclusion

In contemporary times many countries around the world are making policies to tackle the issues related to inequalities. The active efforts to distribute income and decentralize expenditure and revenue sources are a major focus in these policies. However, the quest continues to seek an answer on how these policies can be implemented and bring desirable outcomes. Whether these policies are complementary to increasing disparities or work in the opposite direction to it?

This paper explores the link between decentralization and regional disparities in 19 Asian countries through different econometric approaches. Asia's growth and development in the past five decades have witnessed a remarkable change, but it has failed for several countries to reduce inequalities among people and regions (Nayyar, 2019). We use a rich dataset for the countries that have not been a part of previous studies, at least most of the countries in our sample. The relationship between decentralization and regional inequalities is complex and often works in opposite directions. Therefore, it is difficult to make anticipations on what possible net effect decentralization (political, fiscal, and administrative) may have on regional inequalities.

From a theoretical perspective, it is asserted that decentralization may increase regional inequality. This could be induced by the weak redistribution capacity of the central government because of decentralization (Prud'Homme, 1995). In contrast, the efficiency-enhancing effects that arise due to decentralization may decrease regional disparities and promote regional growth (Qian and Weingast, 1997). Moreover, developed countries are more likely to benefit from efficiency-enhancing effects. On the contrary, developing countries often face issues like corruption, coordination among jurisdictions, excessive regulations, which undermine potential efficiency gains (Tanzi, 1995). Furthermore, (Lessmann, 2012) suggests decentralization decreases territorial inequalities. However, his ultimate results are contingent on the level of economic development.

Our analysis takes political and financial decentralization indicators (individually and in a mixed setup) into account for Asian countries. We find that fiscal decentralization indicators are positively related, if at all, to inequality measures. This implies that most of the sub-national governments lack the capacity for better fiscal management and face hard revenue collection constraints. Although fiscal resource availability may not be an issue in some countries, institutional channels like bureaucratic misconduct, corruption, funds embezzlement, and the capacity of sub-national governments undermine growth and convergence. This results in increasing disparities as local authorities fail to deliver to the public demands and impact regional economic growth. These results are in line with the empirical literature that finds increasing effects of fiscal decentralization on regional inequalities (Shankar and Shah, 2003; Canaleta et al., 2004; Akai et al., 2009; Ezcurra and Pascual, 2008; Lessmann, 2009; Rodríguez-Pose and Ezcurra, 2010).

Furthermore, we find that political decentralization measures show mixed results. The indicators of autonomy in law-making and exercising residual authority on local levels is conducive to reducing inequalities. This potentially indicates that stronger political accountability in jurisdictions may force public representatives to deliver to the public's demands. In the same vein, the possibility of control on bureaucracy under local laws may undermine their incentives to misconduct in public funds management.

The policies undertaken on a regional and national level have an impact on economic performance and growth. Although several anecdotal studies provide evidence that the policies of the governments influence local economic performance, no systematic studies have been conclusive in this regard. As a policy measure to reduce income inequalities, political decentralization is yet a growing field for academic researchers as the theory is at odds with this relationship. Our results comply with available literature that political decentralization reduces regional inequalities (Lessmann, 2012; Rodríguez-Pose and Ezcurra, 2010).

Our empirical analyses have a greater implication in understanding decentralization trajectories in Asian countries from a policy perspective. The countries with large area and population in the region adopt decentralization for one reason or another, regional convergence and reduction in inequalities is at the heart of these policy measures. As a further aside, we see how policy mix from both the dimension of decentralization is related to inequalities simultaneously. The policymakers desiring to reduce inequalities should not consider decentralization in separate dimensions and ensure the process is pursued simultaneously in multiple dimensions to achieve economic and political goals.

Keeping in view the historical convergence/divergence race and larger part of the world population living in Asia with a very diverse social setup, the paper imperatively suggests further extensive research on a larger scale. The results presented in our analysis provide insight into decentralization and its effects on regional disparities. We find regional development policies have failed in benefiting from decentralized fiscal autonomy. On the other hand, they have partially benefited from political autonomy. These results are insightful and show that the rapid economic growth in Asia has fueled regional (rural-urban income gap and geographical inequalities within countries) disparities to rise.

Bibliography

Acemoglu, D., Johnson, S., and Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. *Handbook of economic growth*, 1:385–472.

Acemoglu, D., Naidu, S., Restrepo, P., and Robinson, J. A. (2015). Democracy, redistribution, and inequality. In *Handbook of income distribution*, volume 2, pages 1885–1966. Elsevier.

Ades, A. and Di Tella, R. (1999). Rents, competition, and corruption. *American Economic Review*, 89(4):982–993.

Ahmad, E. and Tanzi, V. (2002). *Managing fiscal decentralization*. Routledge.

Akai, N., Hosio, M., et al. (2009). Fiscal decentralization, commitment and regional inequality: Evidence from state-level cross-sectional data for the united states. *Journal of Income Distribution*, 18(1):113–129.

Annan, K. A. (2002). Overview of decentralisation worldwide: A stepping stone to improved governance and human development. *UNDP Publications*.

Arikan, G. G. (2004). Fiscal decentralization: A remedy for corruption? *International Tax and Public Finance*, 11(2):175–195.

Bae, Y. (2016). Ideas, interests and practical authority in reform politics: decentralization reform in south korea in the 2000s. *Asian Journal of Political Science*, 24(1):63–86.

Bahl, R., Cyan, M., et al. (2009). Local government taxation in Pakistan. Technical report, International Center for Public Policy, Andrew Young School of Policy Studies, Georgia State Uiversity.

Bahl, R. and Johannes, L. (1994). Fiscal decentralization and intergovernmental transfers in less developed countries. *Publius: The Journal of Federalism*, 24(1):1–20.

Bahl, R. and Martinez-Vazquez, J. (2006). *Fiscal federalism and economic reform in China*. Cambridge University Press.

Bank, W. (2008). *Decentralization in Client Countries: An Evaluation of the World Bank Support: 1990-2007*. The World Bank.

Bardhan, P. (2002). Decentralization of governance and development. *Journal of Economic Perspectives*, 16(4):185–205.

Bartolini, D., Stossberg, S., and Blöchliger, H. (2016). Fiscal decentralisation and regional disparities. *OECD Economics Department Working Papers, No. 1330, OECD Publishing, Paris, https://doi.org/10.1787/5jlpq7v3j237-en*.

Berg, A. G. and Ostry, J. D. (2017). Inequality and unsustainable growth: Two sides of the same coin? *IMF Economic Review*, 65(4):792–815.

Bird, R. M. and Smart, M. (2002). Intergovernmental fiscal transfers: International lessons for developing countries. *World Development*, 30(6):899–912.

Blair, H. (2000). Participation and accountability at the periphery: Democratic local governance in six countries. *World development*, 28(1):21–39.

Bonet, J. (2006). Fiscal decentralization and regional income disparities: Evidence from the Colombian experience. *The Annals of Regional Science*, 40(3):661–676.

Buhaug, H. and Gates, S. (2002). The geography of civil war. *Journal of Peace Research*, 39(4):417–433.

Canaleta, C. G., Pascual Arzoz, P., and Rapun Garate, M. (2004). Regional economic disparities and decentralisation. *Urban Studies*, 41(1):71–94.

Canavire-Bacarreza, G., Martinez-Vazquez, J., and Yedgenov, B. (2020). Identifying and disentangling the impact of fiscal decentralization on economic growth. *World Development*, 127:104742.

Cities, U. and Governments, L. (2010). Local government finance: The challenges of the 21st century. *Second Global Report on Decentralization and Local Democracy*.

Collier, P. and Hoeffler, A. (2004). Greed and grievance in civil war. *Oxford Economic Papers*, 56(4):563–595.

Collier, P. and Hoeffler, A. (2005). Resource rents, governance, and conflict. *Journal of Conflict Resolution*, 49(4):625–633.

Cooray, N. S. and Abeyratne, S. (2017). *Decentralization and development of Sri Lanka within a unitary state*. Springer. https://doi.org/10.1007/978-981-10-4259-1.

Crook, R. C., Crook, R. C., Manor, J., et al. (1998). *Democracy and decentralisation in South Asia and West Africa: Participation, accountability and performance*. Cambridge University Press.

Dabla-Norris, M. E., Kochhar, M. K., Suphaphiphat, M. N., Ricka, M. F., and Tsounta, E. (2015). *Causes and consequences of income inequality: A global perspective*. International Monetary Fund.

Dalton, H. (1920). The measurement of the inequality of incomes. *The Economic Journal*, 30(119):348–361.

Deaton, A. (2013). *The great escape: Health, wealth, and the origins of inequality*. Princeton University Press.

Dollar, D. and Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth*, 7(3):195–225.

Drazanova, L. (2019). Historical Index of Ethnic Fractionalization (HIEF) dataset. *Harvard Dataverse. Available at https://doi.org/10.7910/DVN/4JQRCL*, 2.

Easterly, W. (1999). Life during growth. *Journal of Economic Growth*, 4(3):239–276.

Ebel, R. D. and Yilmaz, S. (2002). *On the measurement and impact of fiscal decentralization*. The World Bank.

ECOSOC, U. (2019). Special Edition: Progress towards the Sustainable Development Goals Report of the Secretary-General. *Advanced unedited version. New York (US): United Nations*.

Esteban, J., Mayoral, L., and Ray, D. (2012). Ethnicity and conflict: An empirical study. *American Economic Review*, 102(4):1310–42.

Ezcurra, R. and Pascual, P. (2008). Fiscal decentralization and regional disparities: Evidence from several European Union countries. *Environment and Planning A: Economy and Space.*, 40(5):1185–1201.

Faguet, J.-P. (2002). *Decentralizing the provision of public services in Bolivia: Institutions, political competition and the effectiveness of local government*. PhD thesis, The London School of Economics and Political Science (LSE).

Faguet, J.-P. (2014). Decentralization and governance. *World Development*, 53:2–13.

Fan, C. S., Lin, C., and Treisman, D. (2009). Political decentralization and corruption: Evidence from around the world. *Journal of Public Economics*, 93(1-2):14–34. Dataset available at: https://www.danieltreisman.org/articles.

Ferraz, C. and Finan, F. (2011). Electoral accountability and corruption: Evidence from the audits of local governments. *American Economic Review*, 101(4):1274–1311.

Fisman, R. and Gatti, R. (2002). Decentralization and corruption: Evidence across countries. *Journal of Public Economics*, 83(3):325–345.

Fujita, M., Krugman, P. R., and Venables, A. (1999). *The spatial economy: Cities, regions, and international trade*. MIT press.

Furceri, D. and Zdzienicka, A. (2012). Financial integration and fiscal policy. *Open Economies Review*, 23(5):805–822.

Gadenne, L. and Singhal, M. (2014). Decentralization in developing economies. *Annual Review of Economics*, 6(1):581–604.

Gbohoui, W., Lam, W. R., and Lledo, V. D. (2019). *The great divide: Regional inequality and fiscal policy*. International Monetary Fund.

Gennaioli, N., La Porta, R., Silanes, D., Florencio, L., and Shleifer, A. (2014). Growth in regions. *Journal of Economic Growth*, 19(3):259–309.

Giannetti, M. (2002). The effects of integration on regional disparities: Convergence, divergence or both? *European Economic Review*, 46(3):539–567.

Gil, C., Pascual, P., and Rapún, M. (2004). Regional economic disparities and decentralization. *Urban Studies*, 41(1):71–94.

Gustafsson, B. and Johansson, M. (1999). In search of smoking guns: What makes income inequality vary over time in different countries? *American Sociological Review*, pages 585–605.

Hayek, F. A. (1945). The use of knowledge in society. *The American Economic Review*, 35(4):519–530.

Higgins, M. and Williamson, J. G. (2002). Explaining inequality the world round. *Japanese Journal of Southeast Asian Studies*, 40(3):268–302.

Hodler, R. (2006). The curse of natural resources in fractionalized countries. *European Economic Review*, 50(6):1367–1386.

Ichimura, S. and Bahl, R. (2008). *Decentralization policies in Asian development*. World Scientific.

Ikawa, H. (2008). 15 years of decentralization reform in japan. *Council of Local Authorities for International Relations (CLAIR). Up-to-date-Documents on Local Autonomy in Japan*, (4).

Jenmana, T. et al. (2018). Democratisation and the emergence of class conflicts: Income inequality in thailand, 2001-2016. Technical report, World Inequality Lab.

Jenmana, T. and Gethin, A. (2019). Extreme inequality, democratisation and class struggles in thailand. *World Inequality Lab WID. World Issue Brief 2019-1*.

Jensen, N. and Wantchekon, L. (2004). Resource wealth and political regimes in africa. *Comparative Political Studies*, 37(7):816–841.

Jütting, J. P., Kauffmann, C., McDonnell, I., Osterrieder, H., Pinaud, N., and Wegner, L. (2004). Decentralization and poverty in developing countries: Exploring the impact. *OECD Development Centre Working paper No.236*.

Kanbur, R. and Venables, A. J. (2005). *Spatial inequality and development*. OUP Oxford.

Kanbur, R. and Zhang, X. (2005). Fifty years of regional inequality in china: A journey through central planning, reform, and openness. *Review of Development Economics*, 9(1):87–106.

Kim, E., Hong, S. W., and Ha, S. J. (2003). Impacts of national development and decentralization policies on regional income disparity in korea. *The Annals of Regional Science*, 37(1):79–91.

Krugman, P. and Elizondo, R. L. (1996). Trade policy and the third world metropolis. *Journal of Development Economics*, 49(1):137–150.

Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, 45(1):1–28.

Kyriacou, A. P., Muinelo-Gallo, L., and Roca-Sagalés, O. (2015). Fiscal decentralization and regional disparities: The importance of good governance. *Papers in Regional Science*, 94(1):89–107.

Lessmann, C. (2006). Fiscal decentralization and regional disparity: A panel data approach for OECD countries. Technical report, IFO working paper no.25.

Lessmann, C. (2009). Fiscal decentralization and regional disparity: Evidence from cross-section and panel data. *Environment and Planning A: Economy and Space.*, 41(10):2455–2473.

Lessmann, C. (2012). Regional inequality and decentralization: An empirical analysis. *Environment and Planning A: Economy and Space*, 44(6):1363–1388.

Litvack, J. and Seddon, J. (1999). Decentralization briefing notes, world bank institute. *Washington. D.C. Available at: http://www1.worldbank.org/publicsector/LearningProgram/Decentralization/BriefingNotes.pdf*.

Lundberg, M. and Squire, L. (2003). The simultaneous evolution of growth and inequality. *The Economic Journal*, 113(487):326–344.

Lyon, A. (2015). *Decentralisation and the Management of Ethnic Conflict: Lessons from the Republic of Macedonia*. Routledge.

Manor, J. (1999). *The Political Economy of Democratic Decentralization*. The World Bank.

Marshall, M. G., Gurr, T. R., and Jaggers, K. (2018). Political regime characteristics and transitions, 1800-2017. *Center for Systemic Peace. Data available at: http://www.systemicpeace.org/inscrdata.html*.

Martinez-Vazquez, J. and Vaillancourt, F. (2011). *An overview of the main obstacles to decentralization. In 'Decentralization in Developing Countries: Global perspectives on the Obstacles to Fiscal Decentralization'.* Edward Elgar Publishing, Cheltenham, UK.

McKinnon, R. I. (1997). Market-preserving fiscal federalism in the american monetary union. *Macroeconomic dimensions of public finance: Essays in honour of Vito Tanzi*, 5:73.

Musgrave, R. (1959). The theory of public finance. *New York: McGraw-Hill*.

Nayyar, D. (2019). *Resurgent Asia: Diversity in Development*. Oxford University Press.

Oates, W. E. (1972). Fiscal federalism. *New York: Harcourt Brace Jovanovich.*

Oates, W. E. (2008). On the evolution of fiscal federalism: Theory and institutions. *National Tax Journal*, 61(2):313–334.

Ostry, M. J. D., Berg, M. A., and Tsangarides, M. C. G. (2014). *Redistribution, inequality, and growth*. International Monetary Fund.

Padovano, F. (2007). *The politics and economics of regional transfers: Decentralization, interregional redistribution and income convergence*. Edward Elgar Publishing.

Petrakos, G., Rodríguez-Pose, A., and Rovolis, A. (2003). Growth, integration and regional inequality in europe. *43rd Congress of the European Regional Science Association: "Peripheries, Centres, and Spatial Development in the New Europe",27th - 30th August 2003, Jyväskylä, Finland, European Regional Science Association (ERSA), Louvain-la-Neuve*.

Pigou, A. C. (1912). *Wealth and welfare*. Macmillan and Company, limited.

Prud'Homme, R. (1995). The dangers of decentralization. *The World Bank Research Observer*, 10(2):201–220.

Qian, Y. and Weingast, B. R. (1997). Federalism as a commitment to reserving market incentives. *Journal of Economic Perspectives*, 11(4):83–92.

Rodríguez-Pose, A. and Ezcurra, R. (2010). Does decentralization matter for regional disparities? A cross-country analysis. *Journal of Economic Geography*, 10(5):619–644.

Rodríguez-Pose, A. and Gill, N. (2004). Is there a global link between regional disparities and devolution? *Environment and planning A: Economy and Space.*, 36(12):2097–2117.

Rodríguez-Pose, A. and Gill, N. (2006). How does trade affect regional disparities? *World Development*, 34(7):1201–1222.

Ross, M. (2006). A closer look at oil, diamonds, and civil war. *Annual Review of Political Science*, 9:265–300.

Ross, M. L. (1999). The political economy of the resource curse. *World Politics*, 51(2):297–322.

Ross, M. L., Lujala, P., and Rustad, S. A. (2012). Horizontal inequality, decentralizing the distribution of natural resource revenues, and peace. *High-value Natural Resources and Post-conflict Peacebuilding*, pages 251–59.

Rubinfeld, D. L. (1987). The economics of the local public sector. In *Handbook of public economics*, volume 2, pages 571–645. Elsevier.

Schneider, A. (2003). Decentralization: Conceptualization and measurement. *Studies in Comparative International Development*, 38(3):32–56.

Sepulveda, C. F. and Martinez-Vazquez, J. (2011). The consequences of fiscal decentralization on poverty and income equality. *Environment and Planning C: Government and Policy*, 29(2):321–343.

Shah, A. and Thompson, T. (2004). Implementing decentralized local governance: A treacherous road with potholes. *Detours and Road Closures*.

Shankar, R. and Shah, A. (2003). Bridging the economic divide within countries: A scorecard on the performance of regional policies in reducing regional income disparities. *World Development*, 31(8):1421–1441.

Shen, C., Jin, J., and Zou, H.-f. (2012). Fiscal decentralization in china: History, impact, challenges and next steps. *Annals of Economics & Finance*, 13(1).

Shen, C. and Zou, H.-f. (2015). Fiscal decentralization and public services provision in china. *Annals of Economics and Finance*, 16(1):53–78.

Stegarescu, D. (2005). Public sector decentralisation: Measurement concepts and recent international trends. *Fiscal Studies*, 26(3):301–333.

Tanzi, V. (1995). *Fiscal federalism and decentralization: A review of some efficiency and macroeconomic aspects*. World Bank Washington D.C.

Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of Political Economy*, 64(5):416–424.

Timmons, J. F. (2010). Does democracy reduce economic inequality? *British Journal of Political Science*, 40(4):741–757.

Treisman, D. (2002). Decentralization and the quality of government. *unpublished paper, Department of Political Science, UCLA*.

Van de Werfhorst, H. G. and Salverda, W. (2012). Consequences of economic inequality: Introduction to a special issue. *Research in Social Stratification and Mobility*, 30(4):377–387.

Von Braun, J. and Grote, U. (2002). Does decentralization serve the poor? In *Managing fiscal decentralization*, pages 84–112. Routledge.

Wallis, J. J. and Oates, W. E. (1988). Decentralization in the public sector: An empirical study of state and local government. In *Fiscal federalism: Quantitative studies*, pages 5–32. University of Chicago Press.

Watts, R. L. (2008). *Comparing federal systems*. McGill-Queen's University Press.

Weingast, B. R. (1995). The economic role of political institutions: Market-preserving federalism and economic development. *Journal of Law, Economics, & Organization*, pages 1–31.

Weingast, B. R. (2014). Second generation fiscal federalism: Political aspects of decentralization and economic development. *World Development*, 53:14–25.

Williamson, J. G. (1965). Regional inequality and the process of national development: a description of the patterns. *Economic development and cultural change*, 13(4, Part 2):1–84.

Wingender, P. (2018). Intergovernmental fiscal reform in china. *IMF Working Paper*, 2018(088).

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Yılmaz, S. and Güner, A. (2017). Impact of recent changes on local government discretion and accountability in turkey. *Marmara Journal of Economics.*

Appendix 2A

Table 2A.1: Regional data by country, period, and sources

Country Name	Period	Data Source
Bangladesh	1990-2005	Gennaioli et al. (2014)
		Bangladesh Bureau of Statistics.
China	1990-2015	National Bureau of Statistics of China.
Georgia	2010-2015	National Statistics Office of Georgia.
India	1990-2015	Gennaioli et al. (2014)
		Ministry of Statistics and program Implementation, India.
Indonesia	1990-2015	Gennaioli et al. (2014)
		Badan Pusat Statistik.
Iran, Islamic Rep.	2000-2010	Gennaioli et al. (2014)
		Statistical Center of Iran.
Japan	1990-2015	Gennaioli et al. (2014)
		Statistics Bureau of Japan.
Kazakhstan	1990-2010	Gennaioli et al. (2014)
Korea, Rep.	1990-2015	Gennaioli et al. (2014)
		Korean Statistical Information Service
Kyrgyz Rep.	1996-2015	Gennaioli et al. (2014)
		National Statistical Committee of the Kyrgyz Republic
Malaysia	1990-2015	Gennaioli et al. (2014)
		Bank Negar Malaysia Official Portal of Finance Ministry
		Department of Statistics Malaysia, Official Portal
Mongolia	1990-2015	Gennaioli et al. (2014)
		Mongolia Statistical Information Service
Pakistan	1990-2015	Pakistan Bureau of Statistics
		State Bank of Pakistan
Philippines	1990-2015	Gennaioli et al. (2014)
		Philippines Statistics Authority
Sri Lanka	1990-2010	Gennaioli et al. (2014)
Thailand	1990-2015	Gennaioli et al. (2014)
		National Statistical Office
Turkey	1990-2015	Gennaioli et al. (2014)
		Turkish Statistical Institute
Uzbekistan	1995-2015	Gennaioli et al. (2014)
		The state committee of the republic of Uzbekistan on statistics
Vietnam	1990-2015	Gennaioli et al. (2014)
		General Statistics Office of Vietnam

Note: Data for many countries has gaps between years.

Table 2A.2: Data, Definition, and sources

Variable	Definition	Source(s)
Coefficient of Variation	It is calculated using regional GDP per capita	Regional statistics and Gennaioli et al. (2014)
Weighted Coefficient of Variation	It is calculated using regional GDP per capita and regional population share	Regional statistics and Gennaioli et al. (2014)
Gini Index	Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WDI, World Bank.
Expenditure Decentralization	The expenditure decentralization measures the share of sub national governments' (state/provinces and local) expenditures in total government expenditures.	IMF GFS, Regional budget documents
Revenue Decentralization	The revenue decentralization measures the share of sub national governments' (state/provinces and local) revenues in total government revenues.	IMF GFS, Regional budget documents
Tax Decentralization	The tax decentralization measure the share of sub national governments' (state/provinces and local) tax revenues in total government tax revenues. It is a deeper understanding of revenue autonomy of sub national governments.	IMF GFS, Regional budget documents
Vertical Fiscal Imbalance	The difference between own spending and own revenues at a given level of government.	IMF GFS, Regional budget documents
Federal System Dummy	A dummy variable for countries with a federal constitution system of government.	Fan et al. (2009), OECD country profiles
Sub-national tiers	The number of government administrative tiers.	Fan et al. (2009), OECD country profiles
Autonomy	A dummy variable that denotes that local governments have autonomy on a given question in constitution. The decision making on that specific question is reserved by the constitution.	Fan et al. (2009)
Residual authority	The sub national governments' residual authority to legislate on issues that are not assigned to any specific level of government by the constitution.	Fan et al. (2009)
Autonomy and/or residual authority	SNGs autonomy and/or residual authority (sum)	Fan et al. (2009), Lessmann (2012)
Elections at bottom tier	A dummy variable to show if the elections are conducted at the bottom tier of government (electoral decentralization measure)	Fan et al. (2009)
Elections on second tier	A dummy variable to show if the elections are conducted at the second tier of government (electoral decentralization measure)	Fan et al. (2009)
Elections on bottom and/or second tier	The elections at second and/or bottom tier of government.	Fan et al. (2009), Lessmann (2012)
GDP per capita	GDP per capita (log) in 2011 PPP constant $	WDI, World Bank
Surface Area	Log of total surface area in square kilometers.	WDI, World Bank
Urbanization Rate	Share of Urban population as a percentage of total population.	WDI, World Bank
Unemployment Rate	Share of unemployed population in total labor force of country	WDI, World Bank
Trade Openness	Total trade as a share of country's GDP	WDI, World Bank
Territorial Units	Number of territorial Units used for calculating regional GDP per capita and regional inequality measures.	Various sources
Concentration Index	This denotes that an evenly distribution of country's population over territory is achieved when regional share of population and surface area coincide.	Various sources
Natural Resource rent	Total natural resources rents (% of GDP) . Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	WDI, World Bank
Ethnicity	The ethnic fractionalization index correspond to the probability that two randomly drawn individuals within a country are not from the same ethnic group. The applications of HIEF pertain to the pattern of ethnic diversity across countries and over time.	Drazanova (2019)
DEMOCRACY	Democracy index as reported by Polity IV project.	Marshall et al. (2018)
DEMOC18	Number of years of democracy since 1800 as provided by democracy index reported by Polity IV project.	Marshall et al. (2018)
DEMACC	Democratic accountability measure as reported by ICRG database.	ICRG (2017)
CORRUPTION	This indicates corruption within the political system as reported by ICRG database.	ICRG (2017)
STATPRELE	An indicator if all local executives and legislative are elected locally at state and municipal level.	IADB (2017)

Note: Data for Concentration inex and Territorial units comes from the sources mentioned against CV and PW-CV with other regional statistical sources.

Table 2A.3: Summary statistics

Variables	Mean	Std.Dev.	Min.	Max.	Obs.
CV	.55	.28	.14	1.88	391
WCV	.59	.34	.12	1.97	391
Gini index	36.71	5.3	26.8	49.1	198
Expenditure Decentralization	.4	.32	.02	1.82	281
Revenue Decentralization	.23	.2	.02	.95	271
Tax Decentralization	.25	.17	0	.66	215
Vertical Fiscal Imbalance	.4	.33	-.76	.97	249
Federal system of government	.16	.37	0	1	489
Tiers of government	4.08	.69	3	5	494
Autonomy	.16	.37	0	1	494
Residual authority	.11	.31	0	1	494
Autonomy/Residual authority	.26	.55	0	2	494
Bottom tier elections	.32	.47	0	1	494
Second tier elections	.16	.37	0	1	494
Bottom/second tier elections	.47	.68	0	2	494
GDP per capita (log)	7.92	1.15	6.02	10.76	494
Urbanization rate	47.99	18.71	18.2	91.38	494
Unemployment rate	5.57	3.78	.21	20.71	494
Territorial Units	23.89	18.33	4	72	494
Trade Openness	72.23	42.04	15.51	220.41	485
Natural resource rent % of GDP	6.21	8.37	.01	42.26	492
Ethnic Fractionalization	.42	.26	0	.83	430
Geographic Concentration Index	.23	.27	.08	2.19	391
Institutionalized Democracy	4.34	3.71	0	10	494
Years of democracy since 1800	.66	.47	0	1	494
Democratic Accountability (DEMACC)	3.7	1.53	0	6	407
State/province elections (STATPREL)	.94	.76	0	2	359
Corruption within the political system	2.6	.92	.08	5	407

Note: The Table gives summary statistics for the data variables used in the analysis.

Table 2A.4: Stationary Test

Variables	Inverse Normal Z Statistics	P-values	Inverse Chi-square p-statistics	P-values
Expenditure Decentralization	-4.2636	0.000	75.9927	0.000
Revenue Decentralization	-4.2198	0.000	66.7914	0.000
Tax Decentralization	-3.0631	0.001	47.1802	0.006
Vertical Fiscal Imbalance	-5.1171	0.000	77.4282	0.000
GDP p.c	-6.3086	0.006	115.9298	0.000
Area km^2	-3.9054	0.000	73.3853	0.000
Trade openness	-5.1779	0.000	90.4727	0.000
Natural resource rent	-7.2130	0.000	123.1228	0.000
Urbanization rate	-3.3316	0.000	75.0487	0.000
Unemployment rate	-9.4677	0.000	168.6271	0.000
Concentration Index	-6.1892	0.000	98.4013	0.000
Corruption Index	-7.5131	0.000	119.2675	0.000
Democracy Index	-5.6184	0.000	97.5862	0.000
Years of Democracy since 1800	-7.9041	0.000	162.3401	0.000
Democratic Accountability	-8.2143	0.000	130.8557	0.000

Note: Fisher $\chi 2$ unit-root test. Number of lags (2).

Appendix 2B.

This appendix provides additional information (supplementary to result section) on estimation techniques and results used in this paper. The results section in the text starts the analysis with a combined effect of political and fiscal decentralization indicators. The analysis with individual effects is a necessary step to have an overview of how the variables are related in their individual state with the inequality measures. The estimation equation for the individual effects is specified as follows:

$$Inequality_{i,t} = \alpha_i + \sum_{j=1}^{k} \beta_j X_{j,i,t} + \gamma DECENT_{i,t} + \mu_t + \varepsilon_{i,t} \quad \text{(2B. 1)}$$

Where *Inequality* is the measure of regional inequalities (CV, PW-CV or Gini index) in country i in year t. α_i and μ_t are country and time fixed effects. $X_{j,i,t}$ is a list of k control variables that have an effect on inequality. The *DECENT* are alternate fiscal and political decentralization indicators. $\varepsilon_{i,t}$ represents the usual error term that capture any information missed by the model. β and γ are estimation parameters for coefficients.

The results for analysis with equation (2B.1) are presented with FGLS estimation method. The results are presented in Table 2B.1 to 2B.3. Looking at the results in Table 2B.1 (column 1 to 4), we observe that the fiscal decentralization measures are positive and significantly associated with CV. However, the indicator for tax decentralization is negative and significant. The positive coefficients portray that the fiscal capacity at the local level is weak and appreciates regional inequalities. The negative coefficient on tax decentralization suggests that the tax autonomy on the local level improves the targeted services delivery to local needs. This consequently reduces economic and social inequalities among regions.

Turning to the first set of political decentralization measures (columns 5 to 9) for autonomy indicators, we find most of them are negative and significant (except sub-national government tiers). This indicates that political autonomy in legislation at local levels is conducive to decreasing regional disparities. Moreover, the second set of political indicators that includes electoral decentralization measures (columns 10 to 12) are positively associated with inequality measure with statistical significance on second-tier elections at the 1% level. This shows that having elections at lower levels of government is positively associated with inequalities. The local elite capture [see (Bardhan, 2002)] seems to play its role where voters are bribed or influenced to vote for a local elite who then favors a set of the population for funding and awarding projects. This increases inequalities within and among regions. These findings are in support of the combined results reported in the paper.

Using an alternative inequality measure (PW-CV) we report the results in Table 2B.2. Looking at the outcomes, we can observe the measures of fiscal decentralization (columns 1 to 4) are positive and statistically significant at 1% level with expenditure and Vertical fiscal imbalance indicators. The revenue and the tax indicators are negative. However, the tax indicator is statistically significant among the two. With a change in revenue indicator, the results follow the outcomes from the previous table, rendering support for the robustness of our results with alternative inequality measures.

Furthermore, the political decentralization indicators follow the previous results and show a stronger significance in the new setup. The autonomy indicators are largely negative and significant, and the electoral indicators are positive and significant for all the models. This shows that political decentralization is mixed in its effects on impacting regional disparities. What could be causing such a mixture of outcomes could lie in the fundamental policy designs and implementation through these channels.

Moving further, we estimate the individual effects with Gini index. The index is different in its scope of measuring inequalities. The coefficient of variation (CV and PW-CV) is based on regional GDP per capita that is used as a (proxy) comparison tool for economic development among regions. The Gini coefficient is a measure of the distribution of income used for income (wealth) inequalities in a population. The results are reported in Table 2B.3.

Table 2B.1: Effects of decentralization on regional inequality (Individual effects-CV)

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	Coefficient of Variation (CV) of regional GDP per capita (1990-2015)											
Expenditure Decentralization	0.234***											
	(0.040)											
Revenue Decentralization		0.313***										
		(0.097)										
Tax Decentralization			-0.282**									
			(0.127)									
Vertical Fiscal Imbalance				0.104**								
				(0.042)								
Federal system of government					-0.475***							
					(0.021)							
Tiers of government						0.033*						
						(0.019)						
Autonomy							-0.287***					
							(0.029)					
Residual authority								-0.475***				
								(0.021)				
Autonomy/Residual authority									-0.273***			
									(0.016)			
Bottom tier elections										0.237***		
										(0.031)		
Second tier elections											0.248***	
											(0.023)	
Bottom/second elections												0.164***
												(0.014)
Trade openness	0.002***	0.002***	0.003***	0.002***	0.002***	0.002***	0.002***	0.002***	0.003***	0.002***	0.001***	0.002***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Natural resource rents	0.012***	0.009***	0.005***	0.010***	0.004***	0.007***	0.009***	0.004***	0.008***	0.009***	0.007***	0.008***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPPC	1.404***	1.421***	0.100	1.366***	0.203**	0.438***	0.573***	0.203**	0.364***	0.514***	1.048***	0.797***
	(0.150)	(0.165)	(0.382)	(0.178)	(0.086)	(0.114)	(0.085)	(0.086)	(0.083)	(0.096)	(0.102)	(0.095)
$GDPPC^2$	-0.090***	-0.091***	-0.009	-0.091***	-0.013**	-0.028***	-0.038***	-0.013**	-0.025***	-0.040***	-0.067***	-0.056***
	(0.009)	(0.011)	(0.022)	(0.011)	(0.005)	(0.007)	(0.005)	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)
Ethnicity	-0.087*	0.107	0.317***	-0.124*	0.429***	0.165***	0.145***	0.429***	0.299***	-0.046	0.047	-0.082*
	(0.046)	(0.077)	(0.064)	(0.075)	(0.034)	(0.046)	(0.042)	(0.034)	(0.034)	(0.051)	(0.046)	(0.048)
Surface area	-0.028***	-0.052***	0.061***	-0.017	0.062***	0.039***	0.029***	0.062***	0.041***	0.063***	0.067***	0.074***
	(0.010)	(0.019)	(0.015)	(0.013)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.009)	(0.008)	(0.009)
Urbanization Rate	0.004***	0.006***	0.001	0.007***	-0.002***	-0.002**	-0.000	-0.002***	-0.000	0.004***	-0.001	0.002**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.005	-0.011***	-0.010***	-0.014***	-0.015***	-0.001	-0.005**	-0.015***	-0.009***	-0.003	0.003	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Concentration Index	-0.011	-0.019	0.019	-0.011	0.054***	0.050**	0.062***	0.054***	0.070***	0.051**	0.036	0.041
	(0.024)	(0.022)	(0.032)	(0.025)	(0.020)	(0.021)	(0.020)	(0.020)	(0.020)	(0.025)	(0.028)	(0.029)
Territorial Units	0.008***	0.008***	0.005***	0.007***	0.005***	0.008***	0.008***	0.005***	0.006***	0.006***	0.007***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Democratic quality	0.008***	0.003	0.015***	-0.003	0.019***	0.013***	0.012***	0.019***	0.013***	0.011***	0.027***	0.020***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Constant	-5.005***	-4.724***	-0.875	-4.771***	-1.376***	-2.179***	-2.363***	-1.376***	-1.733***	-2.424***	-4.843***	-3.778***
	(0.497)	(0.528)	(1.524)	(0.723)	(0.327)	(0.400)	(0.325)	(0.327)	(0.323)	(0.348)	(0.404)	(0.353)
χ^2	23.505	26.853	0.000	13.485	0.019	2.923	0.386	0.019	1.656	1.305	16.497	2.960
P-value	0.000	0.000	0.995	0.000	0.889	0.087	0.534	0.889	0.198	0.253	0.000	0.085
Observations	195	196	147	184	337	337	337	337	337	337	337	337

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2. are in natural log. All models allow for independent auto-correlation and control for panel-specific heteroscedasticity.

The results with Gini index show that a larger number of models are positively associated with income inequalities. However, the statistical significance can be observed for a few models only. The results partially follow the outcomes reported in the previous tables. The changes with some of the models are plausibly due to the inequality measure. Thus, our results from individual analysis globally indicate that the fiscal indicators positively affect regional inequalities. Moreover, the political indicators portray a mixed picture: negative effect with autonomy and positive effect with the electoral indicators.

In addition to the individual effects, we present the results corresponding to the outcomes presented in the text. The results with alternative inequality measures (PW-CV and Gini index) are reported in Table 2B.4 and 2B.5 for expenditure decentralization and Table 2B.6 and 2B.7 for revenue decentralization. The models are estimated using FGLS method. The equation form of the estimations is equation (3) in the text.

Table 2B.2: Effects of decentralization on income inequality (Individual effects- PW-CV) FGLS

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	Population-Weighted Coefficient of Variation (PW-CV) of regional GDP per capita (1990-2015)											
Expenditure Decentralization	0.145***											
	(0.043)											
Revenue Decentralization		-0.015										
		(0.097)										
Tax Decentralization			-0.771***									
			(0.126)									
Vertical Fiscal Imbalance				0.109***								
				(0.039)								
Federal system of government					-0.328***							
					(0.028)							
Tiers of government						-0.106***						
						(0.019)						
Autonomy							-0.207***					
							(0.034)					
Residual authority								-0.328***				
								(0.028)				
Autonomy/Residual authority									-0.195***			
									(0.018)			
Bottom tier elections										0.232***		
										(0.029)		
Second tier elections											0.264***	
											(0.023)	
Bottom/second elections												0.155***
												(0.013)
Trade openness	0.002***	0.001***	0.005***	0.002***	0.003***	0.002***	0.003***	0.003***	0.003***	0.003***	0.002***	0.003***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Natural resource rents	0.003*	0.002	0.002	0.004**	-0.001	-0.000	0.004***	-0.001	0.001	0.004***	0.002*	0.004***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPPC	1.326***	1.535***	-1.545***	1.345***	0.257**	0.969***	0.497***	0.257**	0.362***	0.515***	1.137***	0.871***
	(0.170)	(0.172)	(0.377)	(0.204)	(0.106)	(0.117)	(0.108)	(0.106)	(0.106)	(0.103)	(0.109)	(0.102)
$GDPPC^2$	-0.093***	-0.107***	0.080***	-0.092***	-0.017***	-0.062***	-0.034***	-0.017***	-0.027***	-0.040***	-0.073***	-0.060***
	(0.011)	(0.011)	(0.022)	(0.012)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)
Ethnicity	0.005	-0.068	0.193***	-0.058	0.496***	0.212***	0.275***	0.496***	0.389***	0.053	0.085*	0.013
	(0.061)	(0.079)	(0.058)	(0.072)	(0.037)	(0.041)	(0.038)	(0.037)	(0.035)	(0.046)	(0.043)	(0.043)
Surface area	-0.117***	-0.122***	0.007	-0.097***	-0.020**	-0.015*	-0.041***	-0.020**	-0.040***	-0.013	-0.015*	-0.011
	(0.012)	(0.020)	(0.016)	(0.016)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.009)	(0.009)	(0.009)
Urbanization Rate	0.012***	0.012***	0.002	0.010***	-0.001	-0.001	0.001	-0.001	0.001	0.005***	0.000	0.003***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment rate	0.005	0.000	0.004	-0.002	-0.003	0.003	0.007***	-0.003	0.002	0.005**	0.012***	0.009***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Concentration Index	0.224***	0.210***	0.201***	0.196***	0.315***	0.286***	0.337***	0.315***	0.346***	0.298***	0.260***	0.272***
	(0.029)	(0.027)	(0.035)	(0.030)	(0.027)	(0.027)	(0.029)	(0.027)	(0.027)	(0.030)	(0.032)	(0.033)
Territorial Units	0.015***	0.014***	0.010***	0.012***	0.011***	0.013***	0.013***	0.011***	0.012***	0.010***	0.012***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic quality	-0.003	-0.005*	-0.007*	-0.008*	0.015***	0.017***	0.008**	0.015***	0.007**	0.007**	0.021***	0.015***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-3.465***	-3.992***	7.107***	-3.724***	-0.773*	-3.072***	-1.434***	-0.773*	-0.884**	-1.756***	-4.283***	-3.198***
	(0.546)	(0.534)	(1.533)	(0.792)	(0.395)	(0.389)	(0.395)	(0.395)	(0.398)	(0.382)	(0.413)	(0.374)
χ^2	31.174	19.406	19.119	18.733	11.882	29.022	10.429	11.882	14.161	19.837	59.051	27.403
P-value	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Observations	195	196	147	184	337	337	337	337	337	337	337	337

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2. are in natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

Looking at the results in Table 2B.4 we can observe that the coefficients on expenditure decentralization variable positive with two and negative with four models. However, the statistical significance can be observed on two: one for positive and one for negative models. Two patterns stand out from these outcomes. The fiscal indicators increase regional inequalities when controlled for autonomy in legislation making and negatively associates with the inequality when controlled for the election at the bottom and second tiers. These results for the expenditure indicators slightly change from what we find in the text. The inequality measure, when corrected for population weights, affects the relationship a little differently. However, the results for all the political decentralization indicators largely follow the outcomes in the baseline results.

Furthermore, the analysis with the Gini index presented in Table 2B.5 renders support to our findings in the baseline results. The expenditure indicator is positive and significant for many models. The autonomy and the electoral indicators follow the signs and significance levels from baseline results. Hence the outcomes are robust to the use of different measures for

Table 2B.3: Effects of decentralization on income inequality (Individual effects- Gini index) FGLS

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	Gini index (1990-2015)											
Expenditure Decentralization	0.015											
	(0.014)											
Revenue Decentralization		-0.020										
		(0.039)										
Tax Decentralization			0.001									
			(0.048)									
Vertical Fiscal Imbalance				-0.067***								
				(0.018)								
Federal system of government					-0.014							
					(0.011)							
Tiers of government						0.005						
						(0.007)						
Autonomy							0.061***					
							(0.014)					
Residual authority								-0.014				
								(0.011)				
Autonomy/Residual authority									0.012			
									(0.008)			
Bottom tier elections										0.013		
										(0.008)		
Second tier elections											0.058***	
											(0.008)	
Bottom/second elections												0.024***
												(0.006)
Trade openness	-0.000	0.000	-0.002***	0.000	0.000*	0.000**	0.000*	0.000*	0.000**	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Natural resource rents	-0.001	-0.000	-0.000	-0.004***	-0.002***	-0.002***	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
GDPPC	0.406***	0.407***	0.398**	0.447***	0.421***	0.398***	0.371***	0.421***	0.389***	0.395***	0.535***	0.415***
	(0.065)	(0.072)	(0.185)	(0.073)	(0.059)	(0.061)	(0.056)	(0.059)	(0.059)	(0.057)	(0.050)	(0.050)
$GDPPC^2$	-0.023***	-0.022***	-0.025**	-0.025***	-0.025***	-0.024***	-0.022***	-0.025***	-0.023***	-0.024***	-0.032***	-0.025***
	(0.004)	(0.005)	(0.011)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Ethnicity	0.022	0.063*	-0.109**	0.098***	0.005	-0.004	-0.040**	0.005	-0.026	-0.008	0.005	0.003
	(0.021)	(0.034)	(0.044)	(0.035)	(0.021)	(0.018)	(0.017)	(0.021)	(0.020)	(0.017)	(0.018)	(0.018)
Surface area	-0.019**	-0.024***	-0.019***	-0.007	-0.021***	-0.019***	-0.000	-0.021***	-0.011*	-0.018***	-0.014**	-0.016***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.005)	(0.005)	(0.005)
Urbanization Rate	-0.000	-0.001	-0.001	0.000	0.001***	0.001**	0.000	0.001***	0.001	0.001**	0.001***	0.001***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.002	-0.002	-0.005***	0.000	-0.004***	-0.003***	-0.001	-0.004***	-0.002*	-0.002***	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Concentration Index	0.137*	0.264***	-0.158*	0.171**	0.168***	0.147***	0.004	0.168***	0.094*	0.164***	0.134***	0.180***
	(0.070)	(0.098)	(0.089)	(0.083)	(0.047)	(0.042)	(0.049)	(0.047)	(0.052)	(0.045)	(0.042)	(0.044)
Democratic quality	-0.004***	-0.004***	-0.003**	-0.001	-0.003***	-0.004***	-0.002**	-0.003***	-0.003***	-0.003***	-0.002**	-0.003***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-1.099***	-1.102***	0.000	-1.477***	-1.105***	-1.065***	-1.126***	-1.105***	-1.094***	-1.039***	-1.673***	-1.151***
	(0.215)	(0.247)	(.)	(0.269)	(0.202)	(0.214)	(0.191)	(0.202)	(0.202)	(0.202)	(0.177)	(0.172)
χ^2	32.029	28.965	0.158	27.431	46.026	43.755	23.528	46.026	26.317	49.912	82.551	60.261
P-value	0.000	0.000	0.691	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	83	83	65	83	132	132	132	132	132	132	132	132

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2. are in natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

regional inequalities.

As a further aside from the above, the results for revenue decentralization with PW-CV are presented in Table 2B.6. The relationship is negative and statistically significant in all models. The baseline results were negative with a few models, whereas the new set-up is stronger in intensity with all the models for negative effects. This suggests that revenue decentralization is conducive to reducing (weighted) regional inequalities when controlling for political indicators. The revenue autonomy for the sub-national governments plays an important role in

Table 2B.4: Effects of Expenditure decentralization on income inequality (PW-CV) FGLS

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: PW-Coefficient of Variation (PW-CV) of regional GDP per capita (1990-2015)						
Expenditure Decentralization	0.118***	-0.019	0.033	-0.050	-0.086	-0.121**
	(0.036)	(0.040)	(0.038)	(0.044)	(0.061)	(0.054)
Autonomy	-0.318***					
	(0.055)					
Residual authority		-0.386***				
		(0.047)				
Autonomy/Resid. authority			-0.206***			
			(0.025)			
Bottom tier elections				0.225***		
				(0.035)		
Second tier elections					0.184***	
					(0.041)	
Bottom/second elections						0.130***
						(0.021)
Trade openness	0.181***	0.128***	0.162***	0.227***	0.160***	0.204***
	(0.028)	(0.028)	(0.027)	(0.028)	(0.028)	(0.028)
Natural resource rents	0.011	-0.010	0.006	0.013	-0.013	-0.004
	(0.011)	(0.011)	(0.011)	(0.010)	(0.012)	(0.011)
GDPPC	0.245	-0.213	-0.018	0.193	0.990***	0.693***
	(0.195)	(0.206)	(0.194)	(0.193)	(0.254)	(0.203)
$GDPPC^2$	-0.021*	0.006	-0.005	-0.023*	-0.068***	-0.052***
	(0.012)	(0.013)	(0.012)	(0.012)	(0.016)	(0.013)
Ethnicity	0.076***	0.148***	0.115***	0.013	0.050***	0.026
	(0.016)	(0.018)	(0.016)	(0.020)	(0.017)	(0.019)
Surface area	-0.081***	-0.062***	-0.070***	-0.060***	-0.046***	-0.041***
	(0.013)	(0.013)	(0.013)	(0.012)	(0.015)	(0.013)
Urbanization Rate	0.200***	0.213***	0.204***	0.330***	0.193***	0.258***
	(0.057)	(0.055)	(0.055)	(0.058)	(0.054)	(0.054)
Unemployment rate	0.085***	-0.011	0.031*	0.041***	0.064***	0.041***
	(0.014)	(0.019)	(0.016)	(0.014)	(0.014)	(0.015)
Concentration Index	0.287***	0.293***	0.296***	0.289***	0.285***	0.286***
	(0.031)	(0.032)	(0.031)	(0.030)	(0.034)	(0.032)
Territorial Units	0.014***	0.011***	0.012***	0.010***	0.013***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic quality	0.008***	0.003	0.007**	-0.009**	0.008***	-0.003
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Constant	-0.857	1.292*	0.288	-1.182	-4.056***	-3.168***
	(0.722)	(0.751)	(0.699)	(0.736)	(1.018)	(0.801)
χ^2	8.138	0.005	4.337	12.928	32.378	21.330
P-value	0.004	0.946	0.037	0.000	0.000	0.000
Observations	195	195	195	195	195	195

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2 are in natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

the collection and redistribution of resources. An efficient and effective revenue collection can finance many programs for social and economic welfare.

However, looking at the political decentralization indicators, we can observe no deviations in the relationship. The results validate the outcomes from baseline models. This also suggests that no matter what indicator of fiscal decentralization we control, political decentralization has had mixed effects on regional inequalities in Asia.

Furthermore, analyzing revenue decentralization relationship to income inequalities, we report the results for Gini index in Table 2B.7. We can observe that the FD indicator is positive in the three models. However, it is statistically significant only in one. The negative and statistically significant model suggests that when we control for second-tier elections on the political decentralization, the revenue decentralization is conducive for reducing income inequalities.

Table 2B.5: Effects of Expenditure decentralization on regional inequality (FGLS model GINI)

Models	(1)	(2)	(3)	(4)
Dependent Variable		Gini Index (1990-2015)		
Expenditure Decentralization	0.032***	0.042***	-0.041***	0.002
	(0.010)	(0.008)	(0.010)	(0.008)
Autonomy/Residual authority	-0.093***			
	(0.019)			
Bottom tier elections		0.077***		
		(0.009)		
Second tier elections			0.091***	
			(0.008)	
Bottom/second elections				0.048***
				(0.004)
Trade openness	-0.033***	-0.010	-0.017**	-0.018**
	(0.010)	(0.008)	(0.008)	(0.007)
Natural resource rents	-0.007*	0.009**	-0.019***	-0.003
	(0.004)	(0.004)	(0.004)	(0.003)
GDPPC	0.339***	0.262***	0.715***	0.490***
	(0.060)	(0.055)	(0.059)	(0.051)
$GDPPC^2$	-0.020***	-0.016***	-0.043***	-0.030***
	(0.004)	(0.003)	(0.004)	(0.003)
Ethnicity	0.019***	-0.001	-0.003	-0.003
	(0.006)	(0.005)	(0.005)	(0.004)
Surface area	-0.017***	-0.034***	0.004	-0.018***
	(0.006)	(0.006)	(0.005)	(0.004)
Urbanization Rate	0.009	0.031*	-0.026	0.011
	(0.021)	(0.019)	(0.018)	(0.017)
Unemployment rate	-0.016***	-0.000	0.000	-0.000
	(0.005)	(0.004)	(0.003)	(0.003)
Concentration Index	0.113**	0.286***	0.059	0.190***
	(0.056)	(0.051)	(0.043)	(0.041)
Democratic quality	-0.002**	-0.004***	-0.002***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.668**	-0.377*	-2.402***	-1.361***
	(0.279)	(0.228)	(0.245)	(0.206)
χ^2	33.648	125.586	146.969	161.068
P-value	0.000	0.000	0.000	0.000
Observations	83	83	83	83

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2 are in natural log. All models allow for independent autocorrelation and control for panel-specific heteroscedasticity.

Moreover, the political decentralization indicators follow the baseline results showing the robustness of our baseline findings.

This appendix provides an additional resource to support our findings from the paper. Individual analysis and further robustness checks with each alternate measure of regional income inequalities show that our main findings are globally robust. The fiscal indicators have positively associated with increasing regional disparities, whereas the political indicators have had a mixed impact. The takeaway message from these results is that the Asian countries in this

Table 2B.6: Effects of Revenue decentralization on income inequality (FGLS model PW-CV)

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: PW-Coefficient of Variation (PW-CV) of regional GDP per capita (1990-2015)						
Revenue Decentralization	-0.292***	-0.390***	-0.371***	-0.366***	-0.727***	-0.605***
	(0.105)	(0.093)	(0.091)	(0.096)	(0.116)	(0.104)
Autonomy	-0.382***					
	(0.051)					
Residual authority		-0.319***				
		(0.026)				
Autonomy/Resid. authority			-0.281***			
			(0.026)			
Bottom tier elections				0.302***		
				(0.028)		
Second tier elections					0.244***	
					(0.027)	
Bottom/second elections						0.160***
						(0.015)
Trade openness	0.187***	0.173***	0.161***	0.197***	0.256***	0.221***
	(0.029)	(0.032)	(0.030)	(0.031)	(0.030)	(0.029)
Natural resource rents	-0.012	-0.022*	-0.005	0.021*	-0.058***	-0.018
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
GDPPC	1.086***	0.450***	0.647***	0.490***	1.359***	1.013***
	(0.157)	(0.148)	(0.137)	(0.157)	(0.148)	(0.141)
$GDPPC^2$	-0.075***	-0.038***	-0.048***	-0.044***	-0.091***	-0.073***
	(0.010)	(0.009)	(0.008)	(0.010)	(0.009)	(0.009)
Ethnicity	-0.140*	0.073	0.016	-0.395***	-0.234***	-0.362***
	(0.074)	(0.071)	(0.066)	(0.085)	(0.078)	(0.082)
Surface area	-0.070***	-0.020	-0.041**	-0.030	0.084***	0.043**
	(0.023)	(0.020)	(0.019)	(0.019)	(0.024)	(0.020)
Urbanization Rate	0.335***	0.232***	0.248***	0.425***	0.120**	0.252***
	(0.056)	(0.045)	(0.043)	(0.054)	(0.051)	(0.048)
Unemployment rate	-0.000	-0.003	-0.007**	0.004	0.010***	0.007***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Concentration Index	0.216***	0.250***	0.245***	0.247***	0.264***	0.257***
	(0.030)	(0.025)	(0.025)	(0.025)	(0.026)	(0.025)
Territorial Units	0.011***	0.010***	0.010***	0.009***	0.010***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic quality	-0.011***	-0.002	-0.002	-0.010***	-0.001	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-4.329***	-2.021***	-2.604***	-2.588***	-7.026***	-5.268***
	(0.573)	(0.540)	(0.519)	(0.584)	(0.618)	(0.536)
χ^2	6.332	0.585	2.542	2.206	10.720	2.932
P-value	0.012	0.444	0.111	0.138	0.001	0.087
Observations	196	196	196	196	196	196

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2 are in natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

study have decentralized different power and authority on both fronts (fiscal and political). The outcomes have not been fascinating in reducing regional disparities within and among countries. This also indicates that policy reforms on one dimension without considering the other prove fatal and may thereby induce inequalities to increase. Furthermore, the findings equally implicate that decentralization reforms need to be designed to support each other. The positive effects of one dimension and the negative effects of the other bring forth several critical questions. The designing of policies with opposite or contrasting goals counteract the overall expected positive effects. Hence, any reforms to decentralization need a comprehensive design for interlinking goals so that the execution of authority on both fronts works hand in hand to reduce regional inequalities and increase public welfare.

Table 2B.7: Effects of Revenue decentralization on income inequality (FGLS model GINI)

Models	(1)	(2)	(3)	(4)
Dependent Variable		Gini index (1990-2015)		
Revenue Decentralization	0.025	0.075**	-0.071***	0.005
	(0.031)	(0.031)	(0.025)	(0.023)
Autonomy/Residual authority	-0.098***			
	(0.017)			
Bottom tier elections		0.080***		
		(0.009)		
Second tier elections			0.091***	
			(0.008)	
Bottom/second elections				0.051***
				(0.004)
Trade openness	-0.059***	-0.022*	0.011	-0.007
	(0.017)	(0.013)	(0.012)	(0.012)
Natural resource rents	-0.007*	0.010**	-0.019***	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)
GDPPC	0.519***	0.309***	0.604***	0.449***
	(0.056)	(0.061)	(0.056)	(0.053)
$GDPPC^2$	-0.031***	-0.019***	-0.035***	-0.027***
	(0.004)	(0.004)	(0.003)	(0.003)
Ethnicity	0.011	0.003	0.047*	0.035
	(0.030)	(0.028)	(0.025)	(0.026)
Surface area	-0.024***	-0.039***	0.008	-0.020***
	(0.008)	(0.007)	(0.006)	(0.006)
Urbanization Rate	0.001	0.028	-0.056***	-0.006
	(0.020)	(0.020)	(0.016)	(0.016)
Unemployment rate	-0.004***	-0.001	0.001*	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Concentration Index	-0.015	0.213***	0.183***	0.248***
	(0.085)	(0.071)	(0.062)	(0.064)
Democratic quality	-0.003***	-0.004***	-0.001**	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-1.100***	-0.427**	-2.117***	-1.219***
	(0.223)	(0.213)	(0.197)	(0.168)
χ^2	6.967	53.189	100.331	95.737
P-value	0.008	0.000	0.000	0.000
Observations	83	83	83	83

Notes: Robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. All regressions include time dummies. GDP per capita and surface area in km^2 are in natural log. All models allow for independent autocorrelation and control for panel-specific heteroskedasticity.

Chapter 3

State Capacity and Colonialism: Public Services Delivery in Colonial Punjab

3.1 Introduction

There is a renewed interest among scholars in the question of the colonial origins of a state as a provider of public goods and increasing welfare. The colonial institutional development and its effects on economic performance have been of great interest in this regard. La Porta et al. (1998) argues that countries that were under the British colonies had a strong legal system through which they performed better economically. In another article (La Porta et al., 1999) the authors address the questions on how history affects government performance (quality of government in the provision of services and other quality indicators). Furthermore, Acemoglu et al. (2001) studied the development of institutions in European colonies (taking settler mortality rates as an indicator for preferences of European countries investing in the development of the colonial states) and its effects on economic performance. Hence, state capacity (both financial and political power to implement laws and provide public goods) in colonial history is an important insight in understanding the development patterns of the colonial countries. Though the studies by scholars have linked colonial history and institutional development to see their effects in contemporary times, I aim to see how state policies in making institutional arrangements (composition of land tax system and collections) in colonial times had affected the then public goods provision in colonial Punjab. Moreover, the support for the gains from agriculture expansion also came through the decisions to invest in transport infrastructure. I take this development into account as well.

The late nineteenth and early twentieth century saw a huge transition of power and politics in the sub-continent of India. The power shift from Mughals[1] to British in 19^{th} century and the partition of British India into independent countries[2] in 20^{th} century changed everything for people, from education, health, water and sanitation, transport, and other public services to economic and financial development with the construction of railway lines and expansion of agriculture. Among all the happenings, Punjab[3] was one of the most affected parts of the British Raj to face the challenges of such changes. Owing to its strategic frontier location, rich agricultural land with plenty of river waters, and a large population, Punjab became the focus of the British crown for strengthening its power and economy[4]. The trial and error (more often less successful) experiences in other parts of the colony, like Bengal, encouraged the British to adopt a policy that could best fit the land of Punjab and enhance the human and financial strength of the crown. The establishment of canal colonies, bringing a large wasteland of the province under cultivation, and Punjab becoming the 'breadbasket' of the Raj, led British to make more efforts to develop the province. A large network of railways and roads network was set up to link the production of wheat and cotton in Punjab to the coasts in Bengal and Sindh for exporting the product to the world markets. But did all such developments change the availability of local public services? Particularly, did people have more health and education facilities because of such expansion in agriculture and construction of railway infrastructure? Did the policy of the colonial period strengthen the capacity of district local boards in dealing

[1] Mughal dynasty (Muslim dynasty of Turkic-Mongol origin) ruled most of northern India from the early 16^{th} to the mid-19^{th} century. The last Mughal, Bahādur Shah II (reigned 1837–57), was exiled to Yangon, Myanmar (Rangoon, Burma) by the British after his involvement with the Indian Mutiny of 1857–58 (https://www.britannica.com/topic/Mughal-dynasty).

[2] Present day Bangladesh (separated from Pakistan in 1971), Myanmar(Burma), India, and Pakistan were under British colonial power till 1947.

[3] Punjab was a North-Western province during the British colonial period. It was divided into two Punjabs between India and Pakistan in 1947.

[4] Particularly because Punjab was loyal to the British during the 1857 mutiny.

with low literacy and high mortality rates? This paper seeks answers to these questions by using a unique dataset on districts in colonial Punjab from 1881 to 1931[5].

In this article, I first document the importance of state capacity (through land taxation) and its relation to public services in colonial Punjab. State capacity is an important factor for not only economic but also human capital development and in determining the availability of public services[6]. There is a vast literature in economics that has studied the origins of the state as a rent-seeking organization (Besley and Persson, 2009; Gennaioli and Voth, 2015). Furthermore, the role of institutions in putting a limit on the rights of rulers and expanding the scope of power of the state in securing property rights as a fundamental public good is well presented in the literature (see Acemoglu et al. (2005)). Keeping in mind state capacity as an effective institutional agent (land tax in our case), I primarily focus on how important the differences in education (literacy rates) and health (mortality rates) outcomes between the districts of the province are. Even though the historical (colonial) state capacity and its relation to services delivery are of great importance in understanding historical development, the research in the area is scarce[7].

Secondly, I include another important factor contributing to influence large health and education outcomes in the colonial era, 'the railway infrastructure development'. Though the primary focus of the study is on State Capacity, railways have worked as an agent of change. The railroad network revolutionized British India in many ways. The movements of military troops across the regions, improving trade of goods and services, and facilitating the movement of people, are a few to name. This network grew from 9,893 route miles to 37,266 between 1881 to 1921 (Bogart and Chaudhary, 2016). The expansion of this network reduced transportation costs and price variations across regions and resulted in high agriculture incomes (Donaldson, 2018; Hurd II, 1975). The availability of a developed transportation network motivated farmers to produce more and benefit from exporting/trading the extra produce to other parts of the country with less time and without the fear of agricultural produce rotting. The railways and their link to economic development have been studied by several scholars, but such studies have often ignored their effects on other human development sectors of the economy. A small number of scholars find an adverse effect of the expansion of transportation infrastructure. Tang (2017) finds an increase in mortality rates among regions that were integrated as a result of an expansion in railroad transport in Japan. Moreover, Atack et al. (2012) find a positive effect of railways on school attendance in late nineteenth-century America. For this purpose, I follow Donaldson (2018) to mark the presence of a railway line in the district, which tracks the evolution of district economies before, and after the railway network's expansion. This indicates the exposure of a district to newly developed transport infrastructure.

Why should we expect state capacity (land tax revenues) in Punjab to be related to public service provision? The answer lies in the history that the provincial governments did not have financial independence up to 1870[8]. The first phase of decentralization reforms was adopted

[5] I use data for census years for this analysis.

[6] see Besley and Persson (2010) for impacts of investing in state capacity and its effects on economic development.

[7] Banerjee and Iyer (2005), and Lee (2019) discuss the importance of land tenure system and land tax system in colonial India and its relation to economic development in India after the partition. I focus on the colonial era for investigating such impacts.

[8] See Chand (1930) for a detailed discussion on provincial finances and expenditure and revenue disparities among them.

in 1871. However, beginning in 1882[9] through the local self-government reforms, the public spending from the provincial share of land revenues were more observable (see Chaudhary (2010)). As a result of these reforms, the provinces received a share of their land revenues which otherwise were accrued to the central government earlier. The type of settlement in the provinces counted for such differentials in the available share of the revenues because the provinces with permanent settlement systems received a fixed amount of tax revenues. The provinces with a temporary settlement system received, on the other hand, more revenues as agriculture expanded. This allowed for more resources for public services. Since the province of Punjab was largely based on a temporary or individual-based settlement system, the availability of revenues for public spending was a function of increases in the land revenues. Such practices could be expected within provinces for district land revenues and expenditures on public services too. Land revenues strongly influenced the amount of money that districts had available to spend on rural primary education because additional taxes on these revenues were the major source of funding for district boards Chaudhary and Garg (2015). Hence, land revenues were an important factor in understanding expenditures on public services[10]. We complement our results using district land revenues as a measure of state capacity and their effects on public services.

This paper, to my understanding, contributes to three different strains in the literature. 1) It explores the colonial state's capacity in extracting resources as an indicator of institutional development in the British colonial era, particularly focusing on the regional development of Punjab. 2) It contributes to the literature on the historical origins of development contributing to human capital development. 3) It contributes to the limited literature on the development and colonial state of health in Punjab, which is missing from the literature at large.

This paper is a part of a growing literature on colonial state policies and their economic and human development effects. The only difference is that it focuses on the development pattern of the colonial state in its colonial time. This paper sheds light on the importance of state capacity in colonial Punjab and its effects on promoting public service provision. The state's authority in generating an adequate level of revenues to deliver to public demands is crucial. The British faced such challenges in colonial India, where different regions (provinces and the princely states) had different land tenure systems at the same time. The land ownership with the landlord and non-landlord areas differed with the rates of land revenues to the state. Punjab was largely under a village or an individual-based land revenue system. One could expect the differences among districts would not be related to any policy differentials but because of variations in land revenues. Although the province of Punjab had a large agriculture investment (indicated by the establishment of canal colonies), and a newly developed railway infrastructure, the development indicators were less satisfactory for health and education services to the people. The literacy rates were low, and mortality rates remained very high. However, the improvements in the indicators could be seen at the beginning of the 20^{th} century. Although Punjab became the large food supplying ground and contributed largely to man supply for military use, the resource generated through land revenues remained insufficient to meet the demands of a growing population. Besides that, when diseases and famines

[9]The resolution on Local Self-Government 1882 by Viceroy Lord Ripon.

[10]For a detailed study on reforms on local self-government, services expenditures, and development of Punjab in comparison to rest of British India, see Tinker (1954). For local self-government and its development in colonial Punjab, see (Nath, 1929).

hit different districts, it became even more difficult for the districts to maintain a good living.

The remainder of the paper is structured as follows: Section 3.2 briefly explores the conceptual understanding of State Capacity and its importance for service delivery. Section 3.3 explores the state capacity in colonial India with focus on Punjab province. Section 3.4 describes the historical background of education and health conditions during the colonial time. Section 3.5 describes the data and variables: Section 3.6 presents estimation techniques. The main empirical results are presented in Section 3.7. Section 3.8 concludes the paper by discussing main findings and potential mechanisms that might explain differences in the state capacity and public service provisions in Punjab.

3.2 State Capacity: short conceptual framework

A large and growing literature in economics, sociology, political science, and finance has stressed the role of high state capacity for the economic development of a country (Johnson, 1982; Amsden, 1992) while, low state capacity is often seen to breed a civil war, challenge state stability on political and economic fronts, and cause persistent poverty (see Migdal (1988); Acemoglu et al. (2011); Herbst (2014)). Thus, it is of prime importance for a country to have a stable state capacity to grow and maintain a sufficient level of available resources to meet its peoples' demands.

An important and defining characteristic of any political system is the state capacity (Migdal, 1988). There are four fundamental state capacities through which any political system in contemporary times can survive and function: i) Extractive capacity which indicates the capacity to mobilize financial resources from people to perceive national interests, ii) Steering capacity that guides the nation towards achieving socio-economic development, iii) Legitimation capacity that ensures the general acceptance in creating consensus among nations, and iv) Coercive capacity that empowers a political system to dominate through use of power and threat[11].

The conceptual distinctions hold among the four capacities. They are all interrelated for a common goal. The state's ability to produce and deliver as the subjects' demand or the rulers' promise to do so will not create an issue with legitimation capacity. The legitimation is dependent on the state's performance. Furthermore, the legitimacy of a political system makes it stronger to use coercive capacity. The state can effectively direct socio-economic activities and manage the extraction of resources for a smooth running of the system. All these state capacities work simultaneously in ensuring the success of the political system in delivering to the people. However, the decline of all at the same time is a rare event. However, changes in one element influence the other in functioning. For example, without legitimacy, the state must invest more in extracting resources and face higher costs in maintaining law and order. There may be a certain threshold of state capacity below which the political system would not perform and would be in great danger of failure.

Looking through the conceptual framework and possible channels through which state capacity can define a successful (failed) political system, as explained above, it is often difficult

[11] see Tilly and Ardant (1975) for further details and conceptual clarification on several dimensions of state capacity.

to come up with one common or an acceptable definition of the concept. More often, the definitions, sub-definitions, high, low, strong, and weak state capacity are graveling. To a general understanding of the concept, one can identify a definition that could encapsulate the core of the idea; state capacity is *the ability of a state to control and influence the behavior of its citizens to comply with the state laws*. Such influence on the behavior of the people is not readily achieved. States should build institutions that know about and have control of common masses at a genuinely low (state, province, county) level to obtain this level of force (see Migdal (1988)). Such control through institutions is referred to as 'infrastructural power' by Lange (2009).

Importance of State Capacity

The absence of state capacity, what Besley and Persson (2009) call, to raise revenues and support markets is a critical factor in explaining the persistence of weak states. Furthermore, two dimensions of political decision making–cohesiveness and stability–impact state development (Besley et al., 2013). Once state capacity is achieved, it can be used to obtain a long list of objectives that a state set. More importantly, the state's monopoly of coercion and ability to extract resources, i.e, imposing taxes is an essential indicator in this regard. These two objectives are viewed as significant by a wide range of governments and are the central elements of the present-day modern states (Tilly et al., 1992). Nevertheless, states can likewise use their capacity to ensure the availability of extensively advantageous public goods like building roads, schools, and wells, or force collaboration with other national projects (Scott, 1999). In qualitative-historical literature, the state's incapacity to minimize violence and provide public goods is one of the most important constraints on economic development in underdeveloped countries (Fukuyama, 2014; Migdal, 1988).

There are several factors, besides main fiscal, and political indicators, that explain differences in state capacity. For example, geographic features of the state such as mountains and rugged terrains, poorly populated clusters, and large deserts make it difficult for the government machinery to penetrate (see Herbst (2014)). Moreover, the wealth of states to make large investments in state institutions and technologies for social control may be expensive to deal with (Fearon and Laitin, 2003). Furthermore, the elite class would be more unwilling to support the state interventions that are seen as extracting resources from them and may therefore seek to retard their development (Suryanarayan, 2017). The state is taken as a competitor to the authority of elites on a local level. They counteract the state's representativeness to serve their ends, creating a set of intermediaries between the state and society (Migdal, 1988; Geddes, 1994). Also, the social projects of large scale and foreign wars or revolutionary moments may create a large fiscal need for states to invest in capacity building (Besley and Persson, 2009). In contrast, in the resource-rich states where such political imperatives do not exist, investment in state capacity building is seen as expensive and unnecessary (Humphreys, 2005).

No matter what, state capacity has a strong positive correlation to state development on fiscal and economic fronts. To minimize economic waste, strong states play an important role in avoiding civil conflicts and providing opportunities for people through creating incentives to invest. Furthermore, high state capacity ensures market supporting institutions like courts and patents. It also makes efforts in providing plenty of market-enhancing goods like schools, roads, hospitals, infrastructure development[12]. On the contrary to this, weak states face private

[12] see Besley and Persson (2010) for details.

individuals that use coercion to appropriate rents to themselves. The markets fail to operate efficiently, and uncertainties arise in guaranteeing the enforcement of contracts in the state. An excellent contemporary example of such weak states can be observed in many parts of Asia and Africa.

Looking at the arguments above, we can plausibly infer that the state's capacity in enforcing laws and generating resources to support the supply of goods and services for the well-being of its masses is of fundamental importance in political-economic literature. Such evidence of state capacity can be traced in the Indian and Pakistani context in recent literature. (Duflo and Hanna, 2005) finds that a lower rate of teacher absenteeism is positively associated with higher test scores in rural India. Asher and Novosad (2020) explore how the rural road infrastructure facilitates rural population to look for work beyond their respective villages. The authors find a positive association between newly constructed road infrastructure and more opportunities for employment in rural India.

Furthermore, Acemoglu et al. (2020) explore the relationship between state capacity in providing services and trust-building in state functionaries. This investigation suggests that reduced delays in state courts for dispute resolution in rural Pakistan is positively associated with the likelihood of using the state institution (contingent upon truthful information of the courts in managing cases rapidly) than non-state institutions–*Panchayats*[13].

3.3 State Capacity in colonial India

In the early colonial period in the subcontinent, the state functionaries on the local level were very limited by any modern definition of state functions. The district collector was the only person who performed two major functions for the state: the superintending tax regime and serving as a judge in the district. The complexity of the district collector's job can be understood by the number of various tasks he would be obliged to perform. With a small number of clerical staff responsible for maintaining records of lands, their taxation rates, and payment status, the district collector had to deal with many duties. His obligations as a judge to resolve disputes related to land ownership, taxation, seizing and selling the land of non-compliers, and remitting taxes in the districts of his responsibility that faced natural disasters, and bad weather conditions throughout the year, were too complex.

When these responsibilities were attached to land record maintenance, the responsibilities of the district collectors were highly affected by the land tenure system in practice in the province. The principal methods of revenue collection in British India were defined under such a system. Following is a brief account of different types of land tenure systems that existed during colonial time and their requirements on how the jobs were performed by district administration.

Ryotwari[14]– This tenure system would require the collector to have a long list of basic information on every piece of land, i.e. the size of the land, its productive capacity in each season,

[13] *Panchayats*- are non-state forums typically ad hoc local councils of village elders that are usually given the authority to resolve disputes on behalf of residents of the community. Such forums have existed for a long time in the subcontinent. For further details on historical existence and working as an informal justice system in India and Pakistan, see Chaudhary (1999); Shinwari (2015).

[14] Also written as *Raiyatwari*.

and its ownership throughout the district under his jurisdiction. The intensity of this system required more personnel on a local level. These local officials were called *village accountants*[15]. They were responsible for recording all the information related to land ownership, crop production in every field, mortgages, and any changes in ownership. The district collector would often visit every village, check the records, and physically inspect the fields mentioned therein. He would also listen to the villagers' opinions in this regard to make double checks on the village accountants' work. This was an individual-cultivator-based system where the taxes were collected directly from the cultivator.

Zamindari[16]– Unlike the ryotwari system, the tax responsibilities were given to one or a few zamindars (landlords). They would be responsible for tax payments by individual cultivators. The government did not maintain village accountants in such areas. However, in areas with temporary settlements government maintained a tax rate and renewed such rates after detailed surveys every few decades. Such surveys provided information on the production capacity and rights of the tenants. This also meant to maintain the relation of cultivators with the government. In permanently settled areas, the tax rates were fixed by the government. This did not require the government to maintain many administrative staff to record information. However, the government conducted cadastral[17] surveys in these areas. Such surveys merely recorded village boundaries rather than individual fields (Dodwell, 1932). Moreover, the village accountants existed in such areas but they worked for the zamindars and not for the state.

Mahalwari– This village-based system of land revenues was a mixture of *ryotwari* and *zamindari* system. A village headman collected the land revenues for the whole village. The village was called as one unit *Mahal* and treated as one unit for the payment of land tax. The revenue system would be revised by the state periodically in the Mahalwari areas. If the village was owned by a body of villagers that jointly owned the village, this would look like an individual-based system. If the village body was largely based on a single person or a family, it would be very much like a landlord (zamindari) system. The common tenure system in Punjab was largely village-based, where the revenues were determined on fairly ad hoc grounds (Banerjee and Iyer, 2005).

The British took advantage of an extensive network of village officials in several other ways than just book land records. In several areas, these officials maintained a record of births and deaths, reported epidemics, had constantly watched unclaimed properties, and helped in conducting census and surveys for the government.

The above-given details provide us with an insight that the state capacity in British India could be measured through the extent of the state's presence (Acemoglu et al. (2015); Soifer (2008)) on a local level (village officials) and the revenue collection through land tax (land rev-

[15]Local people called them with different other names as well like *Patwaris, Kulkarnis, Talatis, or Karnams*. These officials were responsible for a small group of land in villages they resided.

[16]Also known as *Malguzari*.

[17]The cadastral survey, writes Banerjee and Iyer (2008), refers to a detailed survey of the land, noting geographical features as well as ownership boundaries. This is usually carried out to assess ownership as well as to provide a basis for taxation. Such a survey was never carried out in many Permanent Settlement areas since the British, assured of a fixed revenue from the landlords, did not need such detailed information.

enues). The village officials worked as government agents and reported to district collectors for land revenues and any other assignments.

3.4 Historical Background

3.4.1 Literacy in colonial Punjab

The modern education system was established in the subcontinent during British Indian rule. Since the first arrival at the beginning of 17^{th} century and later, controlling large parts of the subcontinent, the East India Company (the company hereinafter) and its officials were disinclined to introduce western learning in the country. The charter act of 1813 was the first time the Company accepted responsibilities for the education of Indians. Under the charter, the government dedicated one hundred thousand rupees annually to Indian education and required developing educational facilities to train Indians for the public services (Mukerji, 1951). This was the beginning of the state system of education in the subcontinent (Nurullah and Naik, 1943). The Company realized that the Indigenous education system in practice throughout India had little worth and did not fulfill the demands for modern western knowledge. It was thought to be obsolete and of little significance due to the absence of any scientific or modern curriculum. Moreover, it was far from being adopted as a general education system because it was fragmented based on religion, caste, social status, and regional differences. The children studied a different set of knowledge based on their association to a particular religion or a sub-caste within the religious group. Hence, the British introduced a new education system to allow equal education opportunities for the public.

Nevertheless, were such efforts meant to change the education system and benefit the people of colonial India? History is at odds over such debates. The idea carried out under the charter act of 1813 policy was based on the 'filtration': the colonial government would educate the elites, who would then instruct the masses. The Wood's Despatch of 1854 came with frustration over the slow pace of change and the idea of filtration[18]. The despatch announced that the government would be responsible for educating people from primary school to university level. This also instructed to change indigenous schools into Western style. The process of such changes would be carried out through subsidies to these indigenous institutions. The missionary schools were initially the main receivers of government subsidies. However, the Hunter Commission of 1882 clarified and further insisted on creating a national education system based on private Indian enterprise supported through government subsidies.

Beginning the annexation of Punjab in 1803, and when the British took over the larger part of the province in 1849, there existed Indigenous[19] institutions. There were broadly two types of schools in this system: A religious elite system that supported pupils from privileged classes to gain knowledge, continue higher education, and a local elementary schooling system where the children (particularly male) were taught some languages and literature. This system was biased towards elite classes that could afford a scholar for their children to be taught at home.

[18]This paragraph is based on the information from Mukerji (1951) and Langohr (2005). About 40 years after the charter act of 1813, there were fewer than 40,000 students in government schools in all British-controlled territories. Less than 1% of government revenues were being spent on education by this time (Mukerji, 1951).

[19]The term 'indigenous' when used with education, is generally recognized to refer to the first inhabitants of an area that was later colonized by another, more powerful, group of people who then forced their language and culture on the original inhabitants (Reyhner and Singh, 2014).

A small number of religious institutions were available for other people to send their children to learn. These institutions focused on teaching religious literature and languages[20]. There were very few missionary schools as well. There were private institutions that were aided by governments to modernize and promote western education[21]. These institutes were allowed to teach religion as a separate class along with a secular curriculum. This policy aimed to prepare the pupils of those private institutions for the matriculation exam which was combined for all the students either under instruction at a government school or at an aided school. Thus, literacy differed for different religions and within religious groups. For example, for Hindus, the high caste Brahmans were dominant in this case. Besides these separate institutes, there were some Muslim schools where teachers from the Hindu community served (Chaudhary and Rubin, 2011). There were a few other schools for commercial and/or trading communities.

In Punjab, the 1854 Despatch was the first to attempt to westernize the schooling system in the province. Owing to such changes, besides the Indigenous schooling system, there were government schools where pupils were taught modern western scientific curricula and native vernacular. The number of Government schools during 1856-57 stood at 456, and the Indigenous schools were 5024. Over time, the number of Government schools increased to 1210, and the number of Indigenous schools stood at 4662 as of 1878-79 (Leitner, 1882). The average primary enrolment rates for school-age pupils were 3.2% in 1891-92, which rose to 12.9% in 1941-42 in all the recognized institutes in Punjab. The gender-specific literacy rate was inclined towards the male. It changed from 8.6% in 1901 to 11.2% in 1931 against the female literacy that changed from 0.4% in 1901 to 1.8% in 1931 (Chaudhary, 2015).

3.4.2 Health in colonial Punjab

In the mid 19^{th} century, epidemics of cholera, malaria, smallpox, and the plague were more commonly known health crisis of the subcontinent. All of these were profusely present in Punjab as well. It was one of the most emerging health crises the British had to face as a ruler of the province. A large number of a population infected and a high number of deaths in Punjab ringed the bells of alarm for the state. The province saw very high mortality rates due to plaque and a comparatively high number of deaths due to malaria, smallpox, and cholera from its annexation in 1849 to the late 1920s. The lack of public health services and sanitary conditions further worsened such outbreaks to last longer[22]. Due to health conditions, the government would stay short of taxes from areas where farmers got sick and were unable to produce a sizeable agriculture output. Hence, this was a great concern for the state to invest in public health and make arrangements to stop the spread of diseases on a large scale.

Besides several health issues and many diseases in British India, malaria was one of the most infectious diseases. The mortality rates due to malaria were higher than other contemporary diseases. Malaria killed at least one million and affected a hundred million people every year.

[20]The schools were called *Maktab* or 'place of writing' (a Persian school either for Muhammadans or open to all sects), *Madrasa* or 'place of the lesson' where Arabic teachings of Law, language, and literature were taught. They sometimes taught the Persian language as well. *Patshala* where Sanskrit was a major language, and source of knowledge. The *Gurmuki* schools were meant for the Sikh population. *Mahajani* schools existed for the commercial or trading communities. For further details of these educational systems, see Leitner (1882).

[21]See Table 3A.15 in the appendix for the number of private and public primary schools in Punjab.

[22]See Tandon (2013) for details of epidemics and its consequences in Punjab.

Punjab was the most prominent province of British India for endemicity and recurrent epidemics of malaria[23]. In her book Zurbrigg (2018) writes:

"From the mid-19th century through the early 1920s, mortality levels across much of India were extremely high, with life expectancy in the low to mid-twenties. Recurring famine and epidemic crises were reflected in low, or sometimes negative, demographic growth. Among these 'epidemics of death,' malaria figured pre-eminently, typically as a surge in autumnal fever deaths following the monsoon rains."

This indicates a two-edged sword for the people of Punjab, where the agriculture produce was a gambling game based on seasonal rains. The scarcity of food due to drought and the shortage of rainfall and diseases resulting from large-scale monsoon rainfalls were perennial in the colonial era.

There were no systematic studies conducted for the diseases in Punjab until 1911. The malaria outbreak of 1908 was when the Indian government conducted an official inquiry and formally released the results in September 1911. This inquiry was due to the intensity of the 1908 outbreak that left 300,000 people dead and largely hit the economy of the province[24]. Thus, health conditions were one of the worst during the colonial era, and yet there were few measures that the Indian government put in place to control such large outbreaks. However, the overall situation changed after the 1920s, and the indicators like an increase in life expectancy and lower mortality rates were somewhat promising.

3.5 Data and variables

I construct a new district-level dataset for colonial Punjab spanning 1881 to 1931. The data extracts information from different official reports and documents from the colonial period. (1) The decennial census reports are used for data on population, area, literacy, and occupations. (2) The railway reports are used for data on the dates of railway lines opening in districts. (3) The figures for birth rates and death rates (infant mortality and deaths due to fever) come from Punjab medical departments' reports[25]. (4) The numbers for agriculture-related items (particularly land revenues) are extracted from the agriculture progress reports (various issues), and (5) the district gazetteers are used for district board finances and matching of the data for the above-related variables (where possible). The district gazetteers are a unique source of information on all aspects of the social, political, and economic conditions. The gazetteers used for each district are listed in Table 3A.13 in the appendix. Moreover, the analysis includes data on several geographic controls explained in the text below. The data for the first census in 1872 is largely inconsistent. Therefore, we begin the analysis from 1881. For a list of variables and their potential data sources, see Table 3A.12 in the appendix. The analysis is restricted to British Indian districts of Punjab because data on the Princely States is inaccurate for the early census reports. Following is a brief account of some key variables and their calculations in this paper.

[23] Punjab became the ground for malaria-related research activities for the British medical scientists.

[24] see S.R. Christopher, Malaria in the Punjab, scientific memoirs by officers and sanitary department of the government of India series no.46. This can be seen at https://digital.nls.uk/indiapapers/browse/archive/75058530

[25] The data is obtained from district gazetteers if it is missing in the medical reports.

Measuring State Capacity

The measurement of state capacity is complicated and controversial, especially when several uncertainties are associated with it from a theoretical point of view. This difficulty has limited the scope of what one can declare as a valid (complete) indicator of state capacity. However, researchers agree on some general indicators to be good measurements of state capacity, i.e., taxing ability (Besley and Persson, 2009), presence of state functionaries (Acemoglu et al., 2015). I follow Lee (2019) in choosing the variables for determining state capacity in districts of colonial Punjab. Lee (2019) approached state capacity from two dimensions which he calls the 'input approach' (measuring the spread of state institutions) and the 'output approach' (measuring the achievements of state institutions in extracting resources and controlling the behavior of the general public). This includes the *per-acre land taxation* calculated as the total land revenue divided by total cultivated acres of land in the district. The data were collected from the Indian Agriculture statistics (various editions corresponding to census years, i.e., 1881-1931) and the district gazetteers (for each district different gazetteer editions were used according to their availability).

Measuring Literacy

The education statistics were not collected systematically in British India until the late 19^{th} century. The Hunter Education Commission Report published in 1883 was the first of its kind that manifested the importance of collecting educational statistics. However, some data on literacy for villages and districts were reported in each census report. Although the definition and measurement of literacy had changed from one census to another, there was a more consistent literacy measurement method in later censuses. During the 1881 and 1891 census reports, the individuals were classified into literate, learning, and illiterate. During the 1901 census, 'the ability to read and write' was adopted as a measurement for literacy. From 1911 a consistent definition of literacy 'an individual who can read and write a letter'. To cater to such differences in the measurement and their possible effects on literacy differences within districts I use cross-section analysis by using data for each census year. I construct the literacy rate (in percentage) as total literate in the district divided by the district's total population. I follow a similar pattern for creating gender-specific literacy rates given their respective number of literates and total gender-specific population. The summary of district-wise literacy rates (total and gender-specific) can be seen in Table 3A.1 in the appendix[26]. The scatterplot of literacy rates and state capacity is given in Figure 3B.1 in the appendix.

Measuring Health indicators

As explained in the historical background section of this paper, health and sanitary conditions remained in a shabby state for a larger part of the colonial period. The official reports regularly maintained the records related to population and demographic changes. The birth and death rates were recorded in three different documents: the census reports, the medical department's reports, and the district gazetteers. Although these numbers may not represent the actual situation during the colonial era, they indicate the overall health conditions. As there

[26]The data for Attock, Lyallpur, and Mianwali was not available for the earlier census reports because these districts were branched out from other districts to form new districts after 1901. Moreover, I exclude the districts of North-West Frontier Province like Bannu, Dera Ismail Khan, Hazara, Kohat, Peshawar, that were recorded along with Punjab until 1901. Delhi is also excluded as it was included in the central province after 1911. See relevant district gazetteers for more details.

was a larger population living in rural areas, birth and death registration might have been under-reported/underestimated. Nevertheless, these figures are the best available data from the colonial time official documents. I use these data for quantitative analysis of health services delivery in Punjab during the period of our study. The infant mortality rates under one year and five years are other important variables I use for the analysis. Moreover, I use crude death rates and death rates related to fever, which caused the highest number of casualties than other diseases, as an indicator for the health sector. The relationship between infant and child mortality rates are graphed in Figure 3B.2 and 3B.3 in appendix B[27].

Railways

British India witnessed one of the most significant transport infrastructure developments in history when railway[28] lines started to be built[29]. The railways were the most important developments in the subcontinent from 1850 to independence. The major contributions of the railways were several, both for the British crown and the people of the subcontinent. For the British (on the political front), it helped in moving military and civil servants around the country, solidifying its control over the large territory of India. It also supported for transportation of goods and services quickly. For the people of the subcontinent, it helped in several ways. It promoted economic uplift of the regions that were separated by journeys of weeks. It facilitated trade and market integration because now goods and products from rural India could be brought to cities and ports in days if not in hours. Moreover, the transmission of news from one part of the Raj to another was faster now than before. This development reduced large price variations of the agriculture product, resulting in higher income for the trading districts (see Donaldson (2018)). Thus, a district with a railway line passing through would presumably be more economically active and thereby people comparatively well off. The rail-roads are used as a proxy for trade openness in (Burgess and Donaldson, 2010; Donaldson, 2018).

Furthermore, the railways in Punjab were important for the British because Punjab was the recruitment hub for the reconstruction of the British military, especially after the Indian revolt of 1857[30]. Moreover, the province's strategic location served as a defense plan of the British against any impending attack from the Russian empire. The British crown paid special attention to the development of Punjab. The inventions like the construction of canal colonies, the introduction of the use of fertilizers and seeds, railways, roads, and telegraph services transformed Punjab into a fertile and rapidly growing region of the subcontinent[31]. These infrastructural development projects brought more employment and pushed for rapid urbanization and migration in Punjab.

[27] Due to lack of data on other quantitative aspects like the investments from district board revenues on the public health sector, I fail to establish such a relationship. Since data could be retrieved from the available documents for a few districts, I am not able to make use of such analysis. Similarly, the number of hospital/dispensaries in each district depicted the infrastructure development for health sector outcomes. Moreover, the number of patients treated at each of these facilities shows the access to health facilities to the people of the districts in relevant years. Lack of data on these variables makes it difficult to use them. The data for these variables is available for initial years for a few districts but not for the later years.

[28] For a detailed history of railways in the subcontinent see Sanyal (1930).

[29] The first passenger train set off on 16 th April 1853 from Mumbai to Thane, 34 kilometers away.

[30] Punjab's importance was augmented due to many factors. The people of the province were loyal to the British crown during the Indian Revolt of 1857. The presence of a large population and a large land area with a great potential for agricultural products were a few endowments to name.

[31] See (Talbot, 2011) for further details.

For using railway data, I follow a similar line as in Donaldson (2018) and Fenske et al. (2017) to calculate the number of years of the opening of the railway lines in the districts. These studies use a GIS system where the authors code the opening of the line with the beginning and end of the segments. I include the total numbers of years a district was exposed to a railway line passing through it. Moreover, I also use a dummy for the presence of a railway line in the districts as used by the authors mentioned above. This is rather a more general indicator where the differences between a district with a railway line for 20 years and a district with a one year will be coded one. The data for the opening of the railway lines comes from the *History of Indian Railways Constructed and In Progress*[32].

Geographic patterns

The geography of colonial Punjab had unique regional variations. Ranging from the snow-covered Himalayas in Northeast to the deserts in Hisar, and several small rivers in districts, the province had an important landscape to grow rapidly but was constrained by the consequences of such geographic features as well. These variations made opportunities for market growth and large productions in some areas and hindered the progress of railways and market integration in others. These features were important for the growth of agriculture and faced the challenges of natural calamities and a wide range of diseases. To cater for geographic variations, I use several such variables for my analysis. The data on altitude, latitude and longitude, average annual rainfall, mean annual temperature, an indicator for the presence of river in the district, soil type, and total irrigated acres of land are included in geographic features. Furthermore, I also include population density and share of the population belonging to a particular religious group. For religious population shares, I calculate a Religious Diversity Index (RDI). Furthermore, for the literacy equations, the list of controls also includes the cohort-specific share of the population for the age group 10 to 15. By including this group, we assume at least a child has completed the primary education. This could be seen as a person who is enumerated as literate and who can read and write a letter.

3.6 Estimation technique

The estimation strategy involves two identification methods: cross-section and panel fixed-effect analysis. The first analysis uses the cross-sectional variations of health and education outcomes in districts in each census year from 1881 to 1931. The panel analysis considers district fixed effects that absorb any unobservable, time-invariant factors that could be correlated to the state capacity and sectoral outcomes.

I begin the analysis with the cross-section estimations. I carry out this in multiple steps. I begin by using a simple cross-sectional regression for education and health outcomes without including other control variables. I run a regression for each of the equations with State capacity alone and include rail years in the equation on the second step. In the third step, I include all control variables relevant to each of the outcome variables. This exercise is meant to see the general relation of the independent variable(s) to outcome variable(s). The equation form for both types of outcomes takes the following forms:

[32] I use the 1918, 1934, and 1945 versions of the document to make sure the data is correctly matched. Where such data cannot be traced, the observations are recorded as 0.

For education outcomes:

$$ln(Literacy_{dt}) = \beta StateCapacity_{dt} + \gamma RailYears_{dt} + \theta X_{dt} + \varepsilon_{dt} \tag{3.1}$$

For health outcomes:

$$ln(Infant_{dt}) = \beta StateCapacity_{dt} + \gamma RailYears_{dt} + \theta X_{dt} + \varepsilon_{dt} \tag{3.2}$$

Where *ln(Literacy)* is the natural log of literacy rate (taken in percentages for total and gender-specific literacy rates). The *ln(Infant)* is the natural log of infant mortality rates (under one and five years). State Capacity is the measure of land revenue per acre of land cultivated in each district. It captures the institutional strength and economic conditions of the districts during the year. This is an indicator of financial state capacity where the state was able to extract such rents from the agriculture producers (landlords, village-based cultivators, and/or individuals). Rail Years measures the number of years a district has had a railway line functioning for transportation of goods and services and passengers. This captures the effect of the development of transportation infrastructure on the economy and its effects on outcomes like literacy and mortality rates. This also indicates interregional trade openness. X is a vector of control variables that includes geographic attributes necessary for agriculture production and colonial land revenues and economic growth. These variables have been listed above under 'Geographic patterns'. The demographic controls like population density, cohort-specific age group population for 10 to 15 years and population belonging to major religious ethnicities (RDI) are also included in the vector of controls.

Moreover, the health equation further includes the female literacy rate in the regression. All variables include data for each district d in year t[33] in the sample. Note that I do not include district or time fixed effects in the regressions since the type of land settlement in Punjab was the same for all the districts over time, so variations in land revenues due to settlement type, are out of consideration in this regard. However, I adjust for standard errors for within district correlation. This controls for district-wise heterogeneity. The main variable and coefficient of interest in all the regressions are primarily State Capacity (β) and secondarily Rail years (γ). These variables provide two sets of information: how the financial state capacity and transportation development were linked to health and education outcomes. The ε is the usual indicator of error term that captures any missing information not explained by the rest of the model(s). θ is a parameter attached to control variables like that of β and γ.

Further, aside from equation (3.2), we also test for general mortality rates and mortalities due to fever. For this, we use the following equation where basic form of the equation (3.2) remains for a larger part but some of the control variables change in the analysis.

$$ln(Mortality_{dt}) = \beta StateCapacity_{dt} + \gamma RailYears_{dt} + \theta X_{dt} + \varepsilon_{dt} \tag{3.3}$$

Where *ln(Mortality)* refers to the natural log of crude death and deaths due to fever separately. The X vector includes all the geographic and demographic controls as in equation (3.2) but it drops the female literacy rate from the equation in the final analysis. Equation (3.3) provides an overview of the general health outcomes in colonial Punjab.

[33] $t \in \{1881, 1891, 1901, 1911, 1921, 1931\}$

3.7 Cross-section Analysis Results

Education Outcomes

State policies were successful in developing Punjab on an agricultural front by investing in the construction of the canal (establishing canal colonies) and laying a large network of railway lines, we could (*ceteris paribus*) expect to see a positive effect on literacy rate and other educational outcomes. I begin with a reduced form of the estimation of equation (3.1) as explained earlier.

Three different patterns stand out in this regard. The results presented in Table 3A.2 and 3A.3 in appendix 3A, it can be observed that the literacy rate is positively affected by state capacity. However, such an effect reduces over the years, meaning that agriculture expansion and infrastructure developments have had a positive but smaller effect on literacy after successive years. Furthermore, the rail years in Table 3A.3 have an insignificant effect on literacy rate (negative for two of the models). But the coefficients on this variable change to be positive and significant with all the models once all social and geographic controls are included in the regression. The changes from individual regressions to a full model show that social and geographic patterns play an important role alongside development. Therefore, one may be cautious in interpreting these individual effects when no other explanatory variables are included. It may often reside on unexpected outcomes. I report the reduced form regression results in the appendix and include only full model results in the main text.

The results of the full model on determining education outcomes are presented in Table 3.1. We can observe that coefficients on state capacity variable are positively associated with literacy rates in all models. This indicates that colonial state policies in establishing a good revenue system, systematic collection and distribution mechanism of land revenues enhanced overall literacy outcomes. However, this relationship is statistically significant for the initial models only and reduces (based on coefficients) in its effects with growing decades.

Furthermore, we can see that the rail years variable is positive and statistically significant in almost all models. This is rather a stronger indication that transportation infrastructure development improved overall well-being in the districts, thereby affecting literacy rates. The overall magnitude of the effects reduces from 0.026 in 1881 to 0.007 in 1931. This is likely to be expected because by 1911 out of sample districts 85% of them were already having a railway line. This percentage increased to 92% in 1921 and reached to 100% in 1931.

Though we see that the coefficients on State Capacity reduce over time, we would be interested in knowing the magnitude changes over time to have a little more idea of the real effects of increasing state capacity on literacy outcome. To do so, I calculate the standardized β coefficients. This is calculated by multiplying β coefficients of State capacity (primary explanatory variable) in Table 3.1 with its standard deviation and then divide the results by the standard deviation of the natural log of literacy rate (outcome variable). The standardized β coefficients range from 0.32 in 1881, reducing to 0.05 in 1911, and rising to 0.107 in 1931. To interpret this, we could say that in 1881, a one standard deviation increase in the State Capacity has translated into a 0.32 standard deviation increase in literacy rate. This progress followed an initial decrease and then a slight increase after 1911. The overall comparison of these can be inferred as the magnitude of the effect of state capacity on literacy rates decreased more than

Table 3.1: Literacy rate (total) and State Capacity

Dependent Variable log Literacy rate (%) Total						
Variables/years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.312**	0.213*	0.086	0.040	0.027	0.049
	(0.117)	(0.113)	(0.186)	(0.185)	(0.098)	(0.077)
Rail years	0.026***	0.012*	0.010*	0.013**	0.009*	0.007
	(0.007)	(0.007)	(0.006)	(0.006)	(0.004)	(0.004)
Latitude	0.038	0.037	0.108	0.046	0.063	0.053
	(0.060)	(0.092)	(0.072)	(0.079)	(0.066)	(0.083)
Altitude	0.001*	0.000	0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Rainfall	-0.561*	-0.823	-0.053	0.046	0.141	0.144
	(0.290)	(0.507)	(0.305)	(0.291)	(0.170)	(0.215)
Temperature	-0.065	-0.110	0.002	-0.074	0.050	-0.018
	(0.097)	(0.141)	(0.089)	(0.124)	(0.120)	(0.158)
Alluvial soil	-0.228	-0.234	-0.162	-0.161	-0.232	-0.147
	(0.140)	(0.164)	(0.218)	(0.192)	(0.153)	(0.187)
Red soil	-0.188	-0.209	-0.196	-0.449**	-0.336**	-0.381*
	(0.133)	(0.139)	(0.232)	(0.211)	(0.151)	(0.188)
Density	-0.002*	-0.003***	-0.003*	-0.003	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Irrigated acres	-0.066	-0.076	-0.067	-0.028	-0.065	-0.038
	(0.072)	(0.074)	(0.054)	(0.066)	(0.078)	(0.079)
RDI	-0.487	-1.313**	-1.116	-1.554	-1.159*	-1.316*
	(0.568)	(0.464)	(1.059)	(1.093)	(0.656)	(0.739)
Cohort population	-0.024	0.125	-0.222	-0.373	-0.363*	-0.357
	(0.156)	(0.228)	(0.215)	(0.314)	(0.198)	(0.263)
Constant	2.521	3.184	1.847	7.003	3.331	5.286
	(2.805)	(3.639)	(5.152)	(5.957)	(4.480)	(6.212)
Observations	25	25	26	28	28	28
R^2	0.88	0.84	0.74	0.74	0.79	0.69
Adj. R^2	0.75	0.68	0.51	0.53	0.62	0.44

Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall, mean annual temperature, red and alluvial soil dummy, and total cropped area irrigated. Demographic and social controls include population density, cohort population of age 5 to 10 (in the natural log), and religious diversity/fragmentation index (RDI).

50% in absolute values from 1881 to 1931. The beta coefficients for State Capacity and Rail years (secondary explanatory variable) are graphically illustrated in Figure 3.1. The downward polynomial[34] trends show the overall reduction in the effects of these variables with literacy rates over time. The scatter plots for Literacy rate and State Capacity are given in Figure 3B.2 in the appendix.

While looking at the overall literacy outcomes, we may see different patterns; it is rather important to look at the bifurcated literacy patterns for men and women in colonial Punjab. As explained in the paper earlier, there were fewer institutions for girls to acquire knowledge and literacy than boys. More often, the females were taught by men at home. Given this, one can expect a larger effect of State capacity for male literacy (holding the traditional practices to educate a male child and not the female child in the primitive society of the subcontinent). I follow the regression patterns as above for male and female literacy outcomes. The results of the reduced forms are presented in Table 3A.4 through 3A.7 for males and females, respectively.

[34]The linear trend is downward sloping too. The polynomial trends are taken for order three.

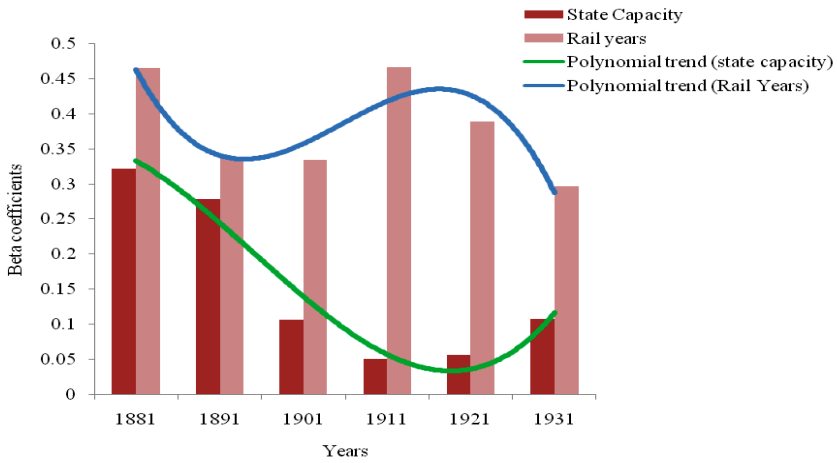


Figure 3.1: Beta Coefficients with Literacy Rate

In the first set of regressions, we can observe that there is a positive and significant association (for a larger number of models) between state capacity and the literacy rate for males (Table 3A.4). Furthermore, there is a positive association of state capacity to female literacy rate throughout all the models (Table 3A.6). However, it is significant for three out of six models. Looking at the coefficients, we can observe that the effect is stronger for female literacy rates than male literacy rates. This would mean that female literacy was affected more over time.

Moving further, when I include rail years in the regressions, both male (Table 3A.5) and female (Table 3A.7) literacy patterns are positively affected by state capacity. Nevertheless, the variable of interest is significant for a few models in both cases (more statistically significant models for males). The rail years is negative for many models with male literacy and positive for all the models with female literacy. This implies that keeping all other things constant, infrastructure development coupled with state capacity was more beneficial for female literacy rates than male.

Table 3.2: Gender specific literacy rate and State Capacity

Panel A	Dependent Variable log Literacy rate (%) Male					
Variables/years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.324**	0.236**	0.107	0.054	0.038	0.053
	(0.107)	(0.108)	(0.176)	(0.169)	(0.091)	(0.068)
Rail years	0.024***	0.010	0.009	0.011*	0.008*	0.006
	(0.007)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)
Panel B	Dependent Variable log Literacy rate (%) Female					
State Capacity	0.082	-0.084	-0.085	-0.054	0.093	0.061
	(0.461)	(0.342)	(0.314)	(0.308)	(0.173)	(0.149)
Rail years	0.065**	0.031**	0.026**	0.030**	0.022**	0.015**
	(0.027)	(0.012)	(0.009)	(0.011)	(0.010)	(0.007)
Observations	25	25	26	28	28	28
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall, mean annual temperature, red and alluvial soil dummy, and total cropped area irrigated. Demographic and social controls include population density, gender-specific cohort population of age 5 to 10 (in natural log), and religious diversity/fragmentation index (RDI).

Finally, including all other control variables, I present the results in Table 3.2. We can observe that the effects of state capacity indicator are positively associated for all models for male (*Panel A*) as compared to female (*Panel B*) literacy rates where two models surprisingly take an opposite sign. We can infer from the comparisons on State capacity coefficients that male literacy benefited largely from an increase in State Capacity. Furthermore, the rail years are positive and significant for several models for male literacy and in all models with female literacy. The relationship is stronger and larger for female literacy. Moreover, we observe that the magnitude of the effects (based on coefficients) reduces for both the cohorts over time with both the explanatory interest variables. This is somewhat in line with the patterns we saw in the case of total literacy rate. Hence, we could plausibly conclude that the state capacity and rail infrastructure played an important role in the promotion of literacy in the districts in colonial Punjab, but the effects were lower for the later years than they initially were. We can similarly infer that rail years were more effective for female literacy (opposite to our initial predictions) in comparison to males. The fact that male children often helped their parents in the field and trade-related activities, female literacy growth could be driven due to out-of-school male children.

Health Outcomes

Turning to health outcomes to see what changes could be observed as a result of development in colonial Punjab. We can expect improvements in health-related outcomes, i.e., reduction in infant mortality rates, more health infrastructure development, high life expectancy, etc. We are interested to know if such policies of expansion had reduced mortality rates among children (under the age of one and the age of five)[35].

The results of the reduced form of equation (3.2) are presented in appendix Table 3A.8 and 3A.9 for infant mortality rates with state capacity and with rail years respectively[36]. We can observe that in almost all the models (both tables), the results portray a positive association of state capacity to outcome variable (exception with model 1921). The models 1881 to 1921 are statistically significant in both tables. Furthermore, the rail years variable is positive and statistically significant for the initial years and becomes negative for the rest of the models (significant for 1911). Given these results, we could generally infer that the state capacity (all other things held constant) did not translate into reducing infant mortality rates. Moreover, we find that railway infrastructure somehow had reducing effects on infant mortalities, but such effects were too small and could only be observed after 1901. We further observe the coefficients reduce in magnitude as we progress through time. Two patterns are necessary to be ascertained in these results. First, the results are globally opposite to what general economic literature finds. Economic development, *ceteris paribus*, has a reducing impact on IMRs, i.e., it tends to reduce infant mortality rates as per capita GDP/income increases. However, this relationship does not hold all the time. Our results with no controls are somewhat opposite to the common norm in the literature. However, such results need caution while being interpreted because the individual results often mislead when other covariates are important factors in determining infant mortality rates. It is also important to note that though the coefficients are positive, they

[35]The indicators of life expectancy and infant mortality rates are important indicators for measuring the healthy state of a country. Since no data on life expectancy could be retrieved from colonial official reports, I calculate infant mortality rates under one and five years from the given number of deaths for age-specific cohorts reported in the Punjab sanitary and medical department reports.

[36]The tables do not include 1891 model as we were unable to retrieve data for this period for a larger number of districts.

reduce in magnitude over time meaning a reduction in mortality rates in successive years.

I include all other controls in the equation (3.2) and see if the relationship changes between state capacity and infant mortality. The results of this full specification are given in Table 3.3. The results show a fluctuating pattern in models, positive in the first two models (statistically significant for 1881), turning to negative in 1901, and positive for 1911 before turning negative for later models. The important point to note is that the positive models reduce in magnitude with progressive census years. The negative relationship shows an improvement in health conditions, and the positive relation shows a worsening effect. Although the relationship fluctuates from positive to negative and vice versa as we move forward in time, the comparative magnitudes decline from 0.12 percentage points in 1881 to -0.034 percentage points in 1931. This means that the overall impact of state capacity has remained very low but effective on a very small scale over time.

Looking at the rail years variable, we can observe that the initial models were positively associated with infant mortalities, but the effect became smaller and smaller for successive models. The negative association from 1911 onwards shows an improvement in overall health conditions in the districts as a result of railway infrastructure development. Nevertheless, these results were too small or extremely low to be noticed. To see how these coefficients are associated with overall infant mortality rates, we calculate β coefficients as we did in the models for education outcomes.

The graphic presentation of the β coefficients with state capacity and rail years is given in Figure 3.2(a). We can see the polynomial trend lines showing a decrease in the overall trend. The relationship drops from positive in 1881 to become negative from 1901 onwards. The declining trends and the values of β coefficients remaining negative after 1901 represents an improvement in health outcomes because of increasing state capacity and improved transportation infrastructure.

Following similar patterns used for infant mortality rates, I test child mortality rates to see if the effects are different for older children. The results are presented in Tables 3A.10 and 3A.11 for reduced form. However, I discuss the main results of the full specification model only that is given in Table 3.4 in the text.

The results in Table 3.4 show rather a stronger effect of the state capacity on child mortality in comparison to those seen in infant mortality rates. The relationship is negative for most of the models (except 1931) and statistically significant for some. This suggests that the development of agriculture and more revenues earned through land taxation translated into better health for children of this specific age group. This could have been possible because more revenues earned in districts meant more expenditures on health services and because children of older age were less at risk than infants. Moreover, the rail years equally show an improvement as the coefficients reduce in successive years and become negative for a large part of the later periods. Hence, we could comparatively say that an improvement in state capacity and transport infrastructure has had better results in improving health for children of the age above one and below five years. However, to see the magnitude of change, we calculate β coefficients and present them in Figure 3.2 (b). We can see the trend lines and observe how the patterns of such relationships evolve.

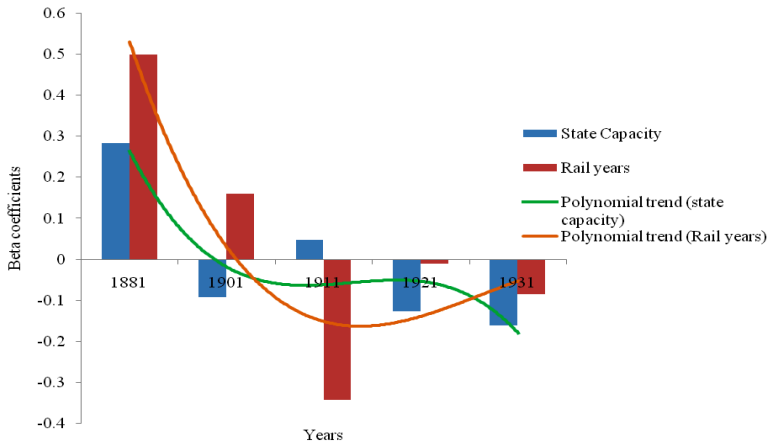
Table 3.3: Infant Mortality Rates and State Capacity

Dependent Variable log Infant Mortality Rates					
Variables/Years	(1881)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.120*	-0.024	0.013	-0.033	-0.034
	(0.062)	(0.059)	(0.033)	(0.053)	(0.046)
Rail years	0.012**	0.002	-0.003*	-0.000	-0.001
	(0.005)	(0.003)	(0.002)	(0.003)	(0.003)
Female literacy (log)	0.045	0.051	0.063*	-0.097	0.088
	(0.035)	(0.038)	(0.035)	(0.070)	(0.079)
Latitude	0.011	-0.022	-0.039	0.026	0.053
	(0.040)	(0.032)	(0.025)	(0.052)	(0.039)
Altitude	0.000	0.000	0.000	0.000	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall	0.095	0.127*	0.012	0.336***	-0.081
	(0.094)	(0.064)	(0.043)	(0.089)	(0.074)
Temperature	0.043	0.044	0.033	0.125**	0.076
	(0.037)	(0.038)	(0.031)	(0.054)	(0.064)
Alluvial soil	-0.006	0.007	0.031	-0.066	0.030
	(0.057)	(0.071)	(0.040)	(0.098)	(0.091)
Red soil	-0.066	-0.148	-0.074	0.072	-0.011
	(0.129)	(0.121)	(0.070)	(0.163)	(0.167)
Density	-0.001	0.000	0.002**	0.001	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Irrigated acres	-0.048	-0.004	0.008	-0.110***	0.039
	(0.035)	(0.025)	(0.014)	(0.033)	(0.025)
River	0.061	-0.049	0.008	0.123	-0.006
	(0.057)	(0.058)	(0.037)	(0.093)	(0.109)
RDI	-0.584	-0.466	0.659**	-0.391	-0.396
	(0.329)	(0.373)	(0.261)	(0.522)	(0.519)
Constant	4.644**	5.277***	5.014***	2.584	1.453
	(2.078)	(1.704)	(1.411)	(2.847)	(2.695)
Observations	25	27	28	28	28
R^2	0.87	0.72	0.87	0.73	0.52
Adj. R^2	0.72	0.43	0.75	0.48	0.08

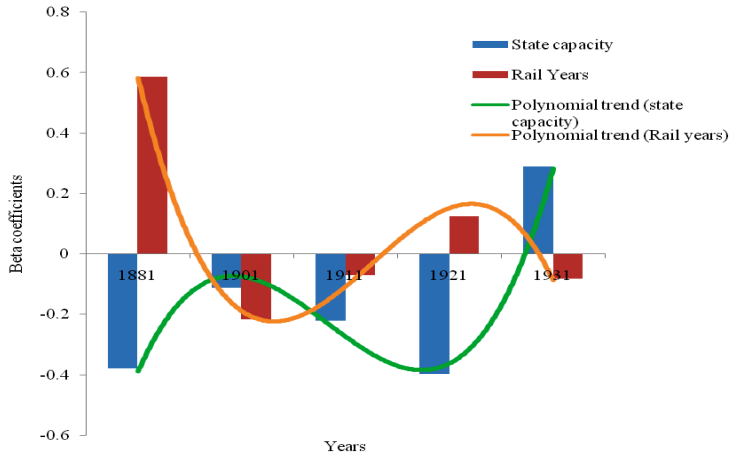
Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall in meters, mean annual temperature in degree Celsius, red, and alluvial soil dummy, dummy for a major river passing through the district, and total cropped area irrigated. Demographic and social controls include population density, female literacy rate (in natural log), and religious diversity/fragmentation index (RDI).

While looking for infant and child mortality rates as an indicator of overall health conditions in colonial Punjab, I further test to see if the overall mortality rates were impacted due to such developments in the province. In this regard, I estimate a specification that follows the general procedure of equation (3.2), but with the log of mortality rates (all-causes) and log of mortality rates (due to fever) as the dependent variable rather than using the log of infant and child mortality rates. The estimates results for equation (3.3) are given in Table 3.5 *Panel A* and *Panel B* for overall mortality and mortalities due to fever respectively.

The results in *Panel A* are analogous (at least with the signs on coefficients) to those reported in Table 3.3 for infant mortality rates. We can observe that the state capacity and mortality rates relationship is negative for many models. It is statistically significant for the 1921 and 1931 models. This predicts that the overall mortality rates reduced as a result of the state's financial capacity increase. Looking at the rail years, we can observe that the models are negative for 1901 onwards. This indicates that the rail exposure in districts contributed to lowering overall



(a) Infant Mortality



(b) Child Mortality

Figure 3.2: Beta Coefficients with Infant Mortality Rates

mortality rates in later years. However, this relationship is not significant for the rest of the models except the first model, where it is positive and significant. This shows that mortality rate reduction was driven by improved railroad infrastructure but to a very low and insignificant level.

The results in *Panel B* represent the relationship of mortality rates due to fever. We can observe that the results are negative for many models and statistically significant for three. This indicates a stronger effect of growing state capacity in reducing the mortality rates due to certain causes (due to fever in this analysis). However, the magnitude of the effect reduces over time from 1901 onwards. Furthermore, the rail years variable is small and insignificant throughout the models. Nevertheless, it is negative for 1921 and 1931 models, which predicts a reducing effect on mortalities due to fever.

To understand how the magnitude is changing throughout the models, I have calculated β coefficients for both the indicators of mortality rates and present the results in Figure 3.4. We can see that the results for crude mortality rates show a negative and downward trend from 1891 onwards, as shown in panel (a). The β coefficients for panel (b) show a stronger negative trend for state capacity, whereas it becomes negative in 1921 onwards for the rail years.

Table 3.4: Child Mortality Rates and State Capacity

Dependent Variable log Child Mortality Rates					
Variables/Years	(1881)	(1901)	(1911)	(1921)	(1931)
State Capacity	-0.247*	-0.073	-0.089	-0.168*	0.076
	(0.121)	(0.108)	(0.092)	(0.088)	(0.058)
Rail years	0.022**	-0.005	-0.001	0.003	-0.001
	(0.010)	(0.005)	(0.005)	(0.006)	(0.004)
Female literacy (log)	-0.030	0.055	-0.114	-0.218	0.127
	(0.084)	(0.124)	(0.092)	(0.155)	(0.104)
Latitude	0.073	-0.020	-0.119***	-0.103	0.089*
	(0.067)	(0.050)	(0.040)	(0.063)	(0.050)
Altitude	0.001*	-0.001**	-0.001**	-0.001**	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall	-0.236	0.271**	0.193**	0.306**	-0.181**
	(0.190)	(0.095)	(0.074)	(0.128)	(0.083)
Temperature	0.060	-0.033	-0.180**	-0.113	0.138*
	(0.079)	(0.067)	(0.081)	(0.089)	(0.078)
Alluvial soil	0.122	0.172**	0.123	0.175	-0.041
	(0.124)	(0.078)	(0.097)	(0.112)	(0.115)
Red soil	-0.186	0.586***	0.027	0.361	0.248
	(0.238)	(0.149)	(0.167)	(0.301)	(0.251)
Density	0.001	0.005***	0.003**	0.004**	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Irrigated acres	0.114	-0.007	0.006	-0.120**	-0.027
	(0.077)	(0.029)	(0.032)	(0.053)	(0.048)
River	-0.035	0.061	0.081	0.174	0.048
	(0.137)	(0.096)	(0.101)	(0.140)	(0.122)
RDI	-0.024	0.078	-0.313	0.298	-0.442
	(0.708)	(0.739)	(0.704)	(0.638)	(0.567)
Constant	-0.597	6.024**	12.468***	11.763***	-0.996
	(3.527)	(2.507)	(3.284)	(3.659)	(3.141)
Observations	25	27	28	28	28
R^2	0.74	0.83	0.66	0.69	0.62
Adj. R^2	0.43	0.66	0.35	0.41	0.27

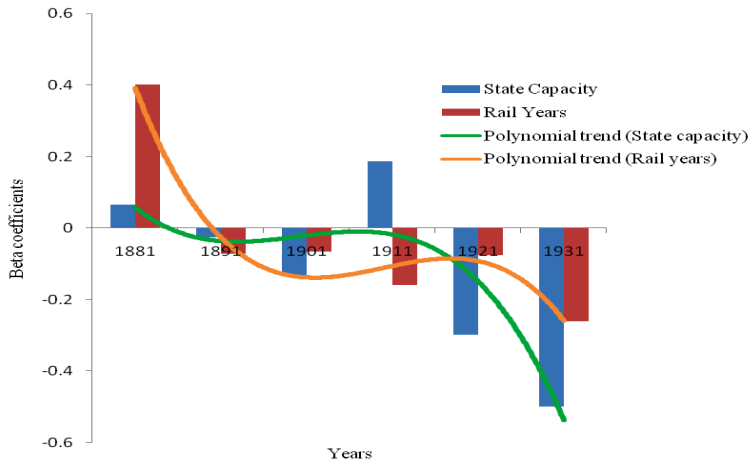
Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall in meters, mean annual temperature in degree Celsius, red, and alluvial soil dummy, dummy for a major river passing through the district, and total cropped area irrigated. Demographic and social controls include population density, female literacy rate (in natural log), and religious diversity/fragmentation index (RDI).

From the results in the table above, we can plausibly conclude that state capacity and railways infrastructure improved the health conditions in districts in Punjab, but the growing years saw little or no effect of the two. There happens to be a stagnation of the effects in the later years in our analysis. We can predict such stagnation as most of the districts were connected through a railway line by 1921. The effects of any natural calamities that would have a strong negative effect on the population's health were mitigated in other circumstances. For example, a crop failure in one district causing a shortage of food and a shortage of land taxation for the government would be substituted by the import of food grains from neighboring districts. Thus, openness to trade due to railway lines passing through districts made it possible for the districts to be less vulnerable to exogenous shocks caused due to shortage of rainfall or other environmental issues.

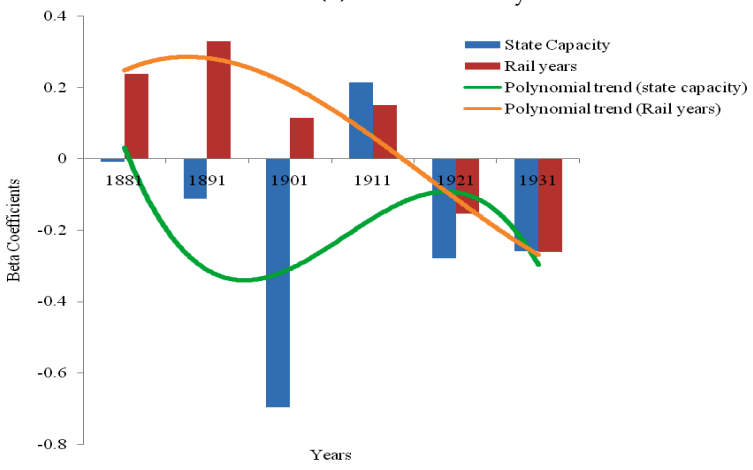
Table 3.5: Mortality Rates (Crude/Fever) and State Capacity

Panel A	Dependent Variable log Mortality Rates (all causes)					
Variables/Years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.016	-0.052	-0.117	0.098	-0.077**	-0.059**
	(0.110)	(0.312)	(0.247)	(0.119)	(0.028)	(0.028)
Rail years	0.017**	0.002	-0.002	-0.004	-0.002	-0.003
	(0.008)	(0.011)	(0.012)	(0.004)	(0.003)	(0.002)
Panel B	Dependent Variable log Mortality Rates (Fever)					
State Capacity	-0.009	-0.097	-0.390***	0.083	-0.079**	-0.074*
	(0.151)	(0.295)	(0.137)	(0.092)	(0.037)	(0.042)
Rail years	0.012	0.013	0.002	0.002	-0.002	-0.004
	(0.012)	(0.010)	(0.005)	(0.005)	(0.003)	(0.003)
Observations	25	25	27	28	28	28
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall, mean annual temperature, red and alluvial soil dummy, dummy for a major river passing through the district, and total cropped area irrigated. Demographic and social controls include population density, and religious diversity/fragmentation index (RDI).



(a) Crude Mortality



(b) Fever Mortality

Figure 3.3: Beta Coefficients with Crude and Fever Mortality Rates

Panel Analysis Results

In the cross-section analysis, we observed variations in health and education outcomes in districts cross-sectionally in each census year from 1881 to 1931. The results are robust as we use a range of controls and econometric specifications. However, the unobservable regional characteristics are necessary elements in an analysis. In the panel analysis, we use a fixed effect[37] identification strategy to control for unobservable, time-invariant characteristics of districts. This identification method of Panel-analysis is to complement our results from the cross-section analysis. The equation form of the panel analysis takes the following form:

For education outcomes:

$$ln(Literacy_{dt}) = \alpha_d + \beta StateCapacity_{dt} + \gamma RailYears_{dt} + \theta X_{dt} + \varepsilon_{dt} \tag{3.4}$$

For health outcomes:

$$ln(Infant_{dt}) = \alpha_d + \beta StateCapacity_{dt} + \gamma RailYears_{dt} + \theta X_{dt} + \varepsilon_{dt} \tag{3.5}$$

Table 3.6: Literacy Rates and State Capacity (Fixed-Effect)

Models	(1)	(2)	(3)
Dependent Variables	Literacy Rate (Total)	Literacy Rate (Male)	Literacy Rate (Female)
State Capacity	0.102**	0.101**	0.234
	(0.049)	(0.042)	(0.151)
Rail years	0.013***	0.010***	0.051***
	(0.001)	(0.001)	(0.004)
Rainfall	0.077	0.077	0.526***
	(0.062)	(0.055)	(0.115)
Temperature	-0.134***	-0.140***	-0.071
	(0.048)	(0.046)	(0.093)
Population density	0.001	0.001	-0.003
	(0.001)	(0.001)	(0.002)
Irrigated acres	0.075	0.090*	0.326**
	(0.058)	(0.050)	(0.143)
RDI	0.605	0.807**	0.321
	(0.419)	(0.350)	(1.266)
Cohort population	-0.392**	-0.458***	-0.356
	(0.148)	(0.120)	(0.321)
Constant	6.995***	7.927***	-1.493
	(1.604)	(1.398)	(2.966)
R^2 within	0.673	0.606	0.847
R^2 between	0.563	0.523	0.074
R^2 overall	0.564	0.494	0.363
Observations	160	160	160

Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. Railway Dummy takes value one if the district was connected to a railway line on a particular census year, zero otherwise. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall in meters, mean annual temperature in degree Celsius, red, and alluvial soil dummy, and total cropped area irrigated in natural log. Demographic and social controls include population density per sq. km. cohort population (total and gender-specific), and religious diversity/fragmentation index (RDI). All regressions include district fixed effects. The Dependent Variable in Model 1 is Literacy Rate (total) in the natural log, in Model 2 Literacy rate (male) in the natural log, and in model 3 Literacy rate (female) in the natural log.

The details of the control variables remain the same as in the previous equations. However, the panel analysis equations include the district fixed effects to control for time-invariant

[37] We test the data with pooled OLS with district fixed effects as well.

characteristics of the districts. The results for the fixed effect models for education outcome are presented in Table 3.6.

Table 3.6 shows that the State capacity is positive and significantly associated with the total and male literacy rates. The relationship is positive with the female literacy rate as well, but it is insignificant. These results complement the results from cross-section analysis where the overall and male literacy rates were observably affected by State capacity. The female literacy rates were mixed for a positive and negative association of state capacity in the models. The panel analysis suggests that the overall effect is positive for the total period considering specifications and the within district time-invariant characteristics.

Moreover, we can observe that the rail years variable is positive and significantly associated with the outcome variables in all the models. These results support the general outcomes from cross-section analysis where we find a positive link between rail years and literacy rates. This is rather a stronger depiction of overall and gender-specific literacy rates. The development of the rail transport network plausibly created a motivation for education that enabled more people to participate in the business and skilled labor force.

Furthermore, for the panel analysis with health outcomes, I analyze a fixed effect model using equation 3.5 for Mortality rates. The results of the specification are reported in Table 3.7.

Looking at the results in Table 3.7, we can observe that the State capacity is negatively associated with the outcome variables throughout all the models. However, it is significant for Infant mortality rates only. The models for child mortality, crude, and deaths due to fever are negative but insignificant. These results show that an increase in the State capacity potentially reduced the mortality rates in the districts in Punjab. The improvements in agricultural land revenues translated into more public health spending that helped in improving the general public's health. The results are stronger for the infant mortalities that is a more vulnerable age group.

Furthermore, looking at the rail years variable, we can observe the association with the outcome variables is negative and significant for infant and child mortality rates. It is negative with other remaining models but insignificant. This suggests that the transportation infrastructure development aided in improving business activities, movement of people and goods and services, creating more income and revenues for people to live a better and healthy life. Moreover, the government's revenues translated into better provision of services. This reduced mortality rates, and this was more observable for infants under the age of five years.

The panel analysis results strongly complement the results from cross-section analysis. The fixed effect model considers several characteristics that are related to particular districts that may affect the education and health outcomes. Moreover, this also caters for any omitted variable bias and within district variations. Hence, the panel analysis results can be considered as a robust analysis to the cross-section results.

Table 3.7: Health outcomes and State Capacity (Fixed Effect)

Models	(1)	(2)	(3)	(4)
Dependent Variables	IMR-1 (ln)	IMR-5 (ln)	Crude (ln)	Fever (ln)
State Capacity	-0.100**	-0.009	-0.081	-0.004
	(0.045)	(0.067)	(0.087)	(0.065)
Rail years	-0.003**	-0.006*	-0.001	-0.002
	(0.002)	(0.003)	(0.002)	(0.001)
Female Literacy	0.006	-0.022		
	(0.029)	(0.049)		
Rainfall	0.155***	0.155	0.269**	0.155*
	(0.052)	(0.127)	(0.100)	(0.085)
Temperature	0.112	0.296**	0.166**	0.466***
	(0.089)	(0.120)	(0.078)	(0.069)
Population density	0.000	0.001	-0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Irrigated acres	-0.012	-0.092	-0.098	-0.024
	(0.041)	(0.059)	(0.122)	(0.092)
RDI	0.078	0.582	0.553	1.554**
	(0.252)	(0.386)	(0.945)	(0.632)
Constant	2.825	-1.582	5.014**	-8.998***
	(1.903)	(2.673)	(2.358)	(1.721)
R^2 within	0.201	0.163	0.108	0.251
R^2 between	0.088	0.003	0.001	0.190
R^2 overall	0.007	0.001	0.002	0.108
Observations	161	161	161	161

Notes: Huber/White/sandwich estimator robust standard errors are reported in parentheses. */**/*** denote significance at the 10/5/1 percent levels. Railway Dummy takes value one if the district was connected to a railway line on a particular census year, zero otherwise. Rail Years denote the number of years a district has had a railroad as on a particular census year. Geographic controls include latitude, altitude, mean annual rainfall in meters, mean annual temperature in degree Celsius, red and alluvial soil dummies, a river passing through the district, and total cropped area irrigated (in natural log). Demographic and social controls include population density in sq.km., female literacy rate (in natural log), and religious diversity/fragmentation index (RDI). All regressions include district dummies. Dependent Variable in Model 1 is IMR-under-1 in natural log, in Model 2 IMR-under-5 in natural log, in Model 3 Crude deaths (per one hundred thousand) in natural log, and in model 4 Crude deaths due to Fever (per thousand) in natural log.

3.8 Conclusion

In this paper, I study how state capacity in generating financial resources and expansion in infrastructure development are linked to public service delivery across British colonial Punjab in the late 19^{th} and early 20^{th} century. Using unique district-level data that I collect from archival sources and using cross-section and panel fixed effect models, my contribution is to estimate the effects of financial capacity (land revenues in districts) and infrastructure development (rail-road construction) on health and education outcomes in colonial Punjab. This region was highly dependent on agricultural produce and faced large volatility in income due to certain weather conditions and different diseases. I find that financial capacity and rail-road networks in the districts potentially increased over time, and this had (quasi) positively affected health and education outcomes, but such effects reduced in magnitude with passing decades.

The effects of both the interest variables have a more substantial relation when geographic and social controls are not included. The results from the full models indicate that such controls for topographic and demographic variations played an important role in explaining health and education outcomes besides financial and infrastructure development. Moreover, the results also provide an insight that Punjab, being one of the last regions to come under British rule,

was a ground for trial-and-error tests for the British. The successes of the colonizer on the political and military front were prominent. In contrast, the welfare gains from an expansion of agriculture productivity and laying railway tracks benefited little to the province's people for health and education outcomes.

For education outcomes, I find that a one standard deviation increase in state capacity increased total literacy rates by 0.32 standard deviation in 1881 (based on β coefficient comparisons from the cross-section analysis). This change stood at 0.107 standard deviation by 1931, showing a positive but overall, more than a 50% decrease in magnitude. The effects on education outcome were prominent for males than for females when taking state capacity into account. However, the development of railroad networks had strong effects on female literacy improvements.

Moreover, I find that infant and child mortality rates have had somewhat opposite results for health outcomes. There is an overall reduction in the mortalities with increasing state capacity, but such reduction is negatively observable only after 1911. Furthermore, the effects for child mortality rates are stronger than those for the infant mortality rates showing that infants were more at risk during their infancy than their childhood age. Nevertheless, on average, the results portray a positive effect of increasing state capacity to infant deaths. However, these changes are very small to be noticed. I further test for overall and fever-related mortality rates. The results show an overall improvement in this case to state capacity. The rail years impact the overall mortality rates to reduce, but specific cause-related deaths (fever here) did not see greater improvements. The panel data results using a fixed effect specification complements the results from cross-section analysis.

This paper also sheds light on the mechanisms at work by relating the observed state capacity-driven reduction in mortality rates (infant and child mortality) to the observed railways' infrastructure development-driven increase in literacy rates. Though such effects only remain partial, they show that the province's development has had improved human development indicators.

While the findings in this paper argue that the state capacity and rail-road network development increase literacy and reduced mortality rates over time, a component of economic welfare over which the paper is silent is the agriculture product volatility and its effects on income volatilities. As in a larger part of developing countries, agriculture technology made real income volatilities very high. During the British era, famines were perennial concerns, and crop failure would often mean more deaths than usual. Though taking fever deaths, I partially test for such arguments; this is less representative to some extent. Disease to crops is another issue that this paper fails to consider as there is no particular dataset available in this regard. One of the potential and important questions to be investigated in this regard could be how changes in state capacity based on agriculture taxation and transportation could be determinants for safety against weather-born calamities that would affect people's well-being. Though some of such research work exists in the case of colonial India (see (Burgess and Donaldson, 2010; Donaldson, 2018), there is no such work, particularly on regional case studies. That lets the window of opportunity open for further research in this regard.

Bibliography

Acemoglu, D., Cheema, A., Khwaja, A. I., and Robinson, J. A. (2020). Trust in state and nonstate actors: Evidence from dispute resolution in Pakistan. *Journal of Political Economy*, 128(8):3090–3147.

Acemoglu, D., Johnson, S., and Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review*, 91(5):1369–1401.

Acemoglu, D., Johnson, S., and Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. *Handbook of economic growth*, 1:385–472.

Acemoglu, D., Naidu, S., Restrepo, P., and Robinson, J. A. (2015). Democracy, redistribution, and inequality. In *Handbook of income distribution*, volume 2, pages 1885–1966. Elsevier.

Acemoglu, D., Ticchi, D., and Vindigni, A. (2011). Emergence and persistence of inefficient states. *Journal of the European Economic Association*, 9(2):177–208.

Amsden, A. H. (1992). *Asia's next giant: South Korea and late industrialization*. Oxford University Press on Demand.

Asher, S. and Novosad, P. (2020). Rural roads and local economic development. *American Economic Review*, 110(3):797–823.

Atack, J., Margo, R., and Perlman, E. (2012). The impact of railroads on school enrollment in nineteenth century america. *Unpublished Working Paper, Boston University*.

Banerjee, A. and Iyer, L. (2005). History, institutions, and economic performance: The legacy of colonial land tenure systems in India. *American Economic Review*, 95(4):1190–1213.

Banerjee, A. V. and Iyer, L. (2008). *Colonial land tenure, electoral competition and public goods in India*. Harvard Business School.

Besley, T., Ilzetzki, E., and Persson, T. (2013). Weak states and steady states: The dynamics of fiscal capacity. *American Economic Journal: Macroeconomics*, 5(4):205–35.

Besley, T. and Persson, T. (2009). The origins of state capacity: Property rights, taxation, and politics. *American Economic Review*, 99(4):1218–44.

Besley, T. and Persson, T. (2010). State capacity, conflict, and development. *Econometrica*, 78(1):1–34.

Bogart, D. and Chaudhary, L. (2016). Railways in colonial india: An economic achievement? In *A New Economic History of Colonial India, edited by Latika Chaudhary, Bishnupriya Gupta, Tirthankar Roy and Anand V. Swamy*, pages 140–160. New York: Routledge.

Burgess, R. and Donaldson, D. (2010). Can openness mitigate the effects of weather shocks? evidence from india's famine era. *American Economic Review*, 100(2):449–53.

Chand, G. (1930). *Essential of federal finance: A contribution to the problem of financial re-adjustment in India*. Oxford University Press, London.

Chaudhary, L. (2010). Land revenues, schools and literacy: a historical examination of public and private funding of education. *The Indian Economic & Social History Review*, 47(2):179–204.

Chaudhary, L. (2015). Caste, colonialism and schooling. *A New Economic History of Colonial India*, page 161.

Chaudhary, L. and Garg, M. (2015). Does history matter? colonial education investments in i ndia. *The Economic History Review*, 68(3):937–961.

Chaudhary, L. and Rubin, J. (2011). Reading, writing, and religion: Institutions and human capital formation. *Journal of Comparative Economics*, 39(1):17–33.

Chaudhary, M. A. (1999). *Justice in practice: legal ethnography of a Pakistani Punjabi village*. Oxford University Press, USA.

Dodwell, H. (1932). *The Cambridge History of India, Volume VI, The Indian Empire, 1858-1918*. Cambridge University Press.

Donaldson, D. (2018). Railroads of the raj: Estimating the impact of transportation infrastructure. *American Economic Review*, 108(4-5):899–934.

Duflo, E. and Hanna, R. (2005). Monitoring Works: Getting Teachers to Come to School. Working Paper 11880, National Bureau of Economic Research.

Fearon, J. D. and Laitin, D. D. (2003). Ethnicity, insurgency, and civil war. *American Political Science Review*, pages 75–90.

Fenske, J., Kala, N., et al. (2017). Linguistic distance and market integration in india. *Centre for Competitive Advantage in the Global Economy Working Paper*, 331.

Fukuyama, F. (2014). *Political order and political decay: From the industrial revolution to the globalization of democracy*. Macmillan.

Geddes, B. (1994). *Politician's dilemma: building state capacity in Latin America*. Number 25. University of California Press.

Gennaioli, N. and Voth, H.-J. (2015). State capacity and military conflict. *The Review of Economic Studies*, 82(4):1409–1448.

Goodman, S., BenYishay, A., Lv, Z., and Runfola, D. (2019). Geoquery: Integrating hpc systems and public web-based geospatial data tools. *Computers & Geosciences*, 122:103–112.

Herbst, J. (2014). *States and power in Africa: Comparative lessons in authority and control*, volume 149. Princeton University Press.

Humphreys, M. (2005). Natural resources, conflict, and conflict resolution: Uncovering the mechanisms. *Journal of Conflict Resolution*, 49(4):508–537.

Hurd II, J. (1975). Railways and the expansion of markets in india, 1861–1921. *Explorations in Economic History*, 12(3):263–288.

Johnson, C. (1982). *MITI and the Japanese miracle: The growth of industrial policy, 1925-1975*. Stanford University Press.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., and Vishny, R. (1999). The quality of government. *The Journal of Law, Economics, and Organization*, 15(1):222–279.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., and Vishny, R. W. (1998). Law and finance. *Journal of Political Economy*, 106(6):1113–1155.

Lange, M. (2009). *Lineages of despotism and development: British colonialism and state power*. University of Chicago Press.

Langohr, V. (2005). Colonial education systems and the spread of local religious movements: The cases of british egypt and punjab. *Comparative Studies in Society and History*, 47(1):161–189.

Lee, A. (2019). Land, State Capacity, and Colonialism: Evidence From India. *Comparative Political Studies*, 52(3):412–444.

Leitner, G. W. (1882). *History of Indigenous Education in The Punjab Since Annexation and In 1882*. Printed by the Superintendent of Government Printing, Calcutta, India.

Migdal, J. S. (1988). *Strong societies and weak states: state-society relations and state capabilities in the Third World*. Princeton University Press.

Mukerji, S. N. (1951). *History of education in India*. Acharya book depot.

Nath, A. (1929). *The development of local self-government in the Punjab (1849-1900)*. Government Printer.

Nurullah, S. and Naik, P. J. (1943). *History of Education in India during the British period*. Macmillan, Bombay.

Reyhner, J. A. and Singh, N. K. (2014). *Indigenous Education in a Global Context*. Oxford University Press.

Sanyal, N. (1930). *Development of Indian Railways*. University of Calcutta, Calcutta.

Scott, J. C. (1999). *Seeing like a state: How certain schemes to improve the human condition have failed*. Yale University Press.

Shinwari, N. A. (2015). Understanding the Informal Justice System: Opportunities and possibilities for legal pluralism in Pakistan. CAMP.

Soifer, H. (2008). State infrastructural power: Approaches to conceptualization and measurement. *Studies in Comparative International Development*, 43(3-4):231.

Suryanarayan, P. (2017). Hollowing out the state: Franchise expansion and fiscal capacity in colonial India. *Available at: https://dx.doi.org/10.2139/ssrn.2951947*.

Talbot, I. (2011). The Punjab under colonialism: Order and transformation in British India. *Journal of Punjab Studies*, 14(1):3–10.

Tandon, S. (2013). Epidemics in Colonial Punjab. *Journal of Punjab Studies*, 20:217–242.

Tang, J. P. (2017). The engine and the reaper: Industrialization and mortality in late nineteenth century Japan. *Journal of Health Economics*, 56:145–162.

Tilly, C. and Ardant, G. (1975). *The formation of national states in Western Europe*, volume 8. Princeton Universsity Press.

Tilly, C. et al. (1992). *Coercion, capital, and European states, AD 990-1992*. Blackwell Oxford.

Tinker, H. (1954). *The foundations of local self-government in India, Pakistan, and Burma*, volume 1. University of London, Athlone Press.

Zurbrigg, S. (2018). *Epidemic Malaria and Hunger in Colonial Punjab: Weakened by Want*. Taylor & Francis.

Appendix 3A. Tables

Table 3A.1: Mean Literacy Rate (%)

	Male (%)			Female (%)			Total (%)		
Districts	**1881**	**1911**	**1931**	**1881**	**1911**	**1931**	**1881**	**1911**	**1931**
Ambala	4.554	8.043	10.4	0.126	0.698	1.9	2.567	4.894	6.664
Amritsar	5.068	7.243	10.31	0.147	0.823	2.22	2.85	4.443	6.716
Attock	.	5.422	6.389	.	0.524	1.24	.	3.099	3.945
DG Khan	4.309	4.802	5.274	0.021	0.127	0.45	2.387	2.68	3.101
Ferozpur	3.687	6.041	7.902	0.094	0.528	1.26	2.068	3.621	4.912
Gujranwala	5.088	5.164	8.028	0.064	0.538	2.05	2.781	3.134	5.366
Gujrat	3.056	5.123	7.907	0.037	0.409	1.23	1.632	2.952	4.837
Gurdaspur	3.921	5.013	6.933	0.071	0.408	1.04	2.155	2.99	4.269
Gurgaon	3.502	3.715	5.752	0.018	0.166	0.49	1.866	2.06	3.324
Hissar	2.887	4.588	5.837	0.016	0.169	0.42	1.571	2.576	3.345
Hoshiarpur	5.196	6.871	9.783	0.04	0.494	1.05	2.794	3.976	5.718
Jhang	6.71	6.966	7.137	0.065	0.37	1.66	3.669	3.919	4.587
Jhelum	3.999	7.904	10.47	0.051	0.645	1.72	2.151	4.457	6.295
Jullundur	5.084	6.328	8.965	0.118	0.554	1.46	2.831	3.793	5.538
Kangra	5.478	7.358	8.928	0.066	0.308	0.73	2.887	3.979	4.979
Karnal	2.857	4.048	5.521	0.023	0.154	0.52	1.556	2.285	3.277
Lahore	5.426	9.509	13.84	0.222	2.457	3.93	3.096	6.508	9.639
Lyallpur	.	5.128	9.314	.	0.562	1.5	.	3.155	5.781
Ludhiana	4.831	8.634	15	0.093	0.661	2.72	2.693	5.186	9.579
Mianwali	.	6.02	6.618	.	0.231	0.59	.	3.282	3.754
Montgomery (Sahiwal)	4.875	5.73	6.519	0.024	0.46	0.98	2.673	3.343	4.042
Multan	6.942	8.641	8.224	0.144	0.484	0.79	3.894	4.936	4.879
Muzaffargarh	4.413	6.731	5.404	0.072	0.207	0.35	2.435	3.739	3.089
Rawalpindi	5.536	10.06	15.2	0.206	2.007	3.06	3.124	6.368	9.617
Rohtak	3.48	3.684	6.142	0.02	0.129	0.35	1.879	2.045	3.462
Shahpur	4.102	6.603	8.326	0.055	0.836	2.17	2.171	3.998	5.512
Sialkot	3.704	5.339	6.41	0.086	0.462	1.13	2.015	3.162	4.024
Simla	16.57	23.61	26.78	3.114	13.1	9.2	11.76	19.71	20.44
TOTAL	**5.011**	**6.94**	**9.047**	**0.19972**	**1.018**	**1.65**	**2.86**	**4.296**	**5.739**

Table 3A.2: Literacy rate and state capacity

	Dependent Variable log Literacy rate (%) total					
Variables/years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.336**	0.442*	0.182	0.181	0.093	0.146**
	(0.156)	(0.234)	(0.152)	(0.154)	(0.073)	(0.068)
Constant	0.599***	0.610**	1.136***	1.088***	1.230***	1.371***
	(0.137)	(0.286)	(0.153)	(0.169)	(0.145)	(0.133)
Observations	25	25	28	28	28	28
R^2	0.12	0.32	0.05	0.05	0.04	0.10

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels.

Table 3A.3: Literacy rate, state capacity, and rail years

Dependent Variable log Literacy rate (%) total						
Variables/Years	1881	1891	1901	1911	1921	1931
State Capacity	0.322*	0.450*	0.181	0.181	0.101	0.145*
	(0.170)	(0.241)	(0.148)	(0.155)	(0.084)	(0.075)
Rail years	0.007	0.002	-0.001	0.000	-0.002	0.000
	(0.009)	(0.005)	(0.007)	(0.006)	(0.005)	(0.004)
Constant	0.574***	0.572*	1.166***	1.076***	1.289***	1.358***
	(0.129)	(0.291)	(0.162)	(0.177)	(0.196)	(0.204)
Observations	25	25	28	28	28	28
R^2	0.14	0.33	0.05	0.05	0.05	0.10
Controls	No	No	No	No	No	No

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year.

Table 3A.4: Literacy rate (male) and state capacity

Dependent Variable log Literacy rate (%) Male						
Variables/years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.320**	0.374*	0.162	0.136	0.072	0.126**
	(0.137)	(0.189)	(0.125)	(0.129)	(0.062)	(0.059)
Constant	1.206***	1.286***	1.718***	1.674***	1.781***	1.890***
	(0.124)	(0.235)	(0.131)	(0.145)	(0.127)	(0.116)
Observations	25	25	27	28	28	28
R^2	0.14	0.30	0.06	0.04	0.03	0.10

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels.

Table 3A.5: Literacy rates (male), state capacity, and rail years

Dependent Variable log Literacy rate (%) Male						
Variables/Years	1881	1891	1901	1911	1921	1931
State Capacity	0.307**	0.380*	0.160	0.135	0.081	0.129**
	(0.148)	(0.196)	(0.122)	(0.129)	(0.069)	(0.063)
Rail years	0.007	0.002	-0.002	-0.000	-0.002	-0.001
	(0.008)	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)
Constant	1.182***	1.254***	1.763***	1.685***	1.851***	1.930***
	(0.119)	(0.246)	(0.154)	(0.165)	(0.164)	(0.174)
Observations	25	25	27	28	28	28
R^2	0.16	0.31	0.06	0.04	0.05	0.10

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year.

Table 3A.6: Literacy rate (female) and state capacity

Dependent Variable log Literacy rate (%) Female						
Variables/years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.613	1.035*	0.311	0.464	0.309**	0.276**
	(0.489)	(0.575)	(0.352)	(0.314)	(0.149)	(0.133)
Constant	-3.292***	-3.231***	-1.483***	-1.343***	-0.892***	-0.331
	(0.505)	(0.704)	(0.378)	(0.402)	(0.318)	(0.288)
Observations	25	25	27	28	28	28
R^2	0.06	0.29	0.03	0.07	0.10	0.11

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels.

Table 3A.7: Literacy rate (female), state capacity, and rail years

Dependent Variable log Literacy rate (%) Female						
Variables/years	(1881)	(1891)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.561	1.080*	0.315	0.474	0.283	0.254
	(0.509)	(0.607)	(0.350)	(0.324)	(0.172)	(0.155)
Rail years	0.027	0.015	0.004	0.011	0.007	0.009
	(0.028)	(0.013)	(0.016)	(0.012)	(0.010)	(0.008)
Constant	-3.386***	-3.469***	-1.563***	-1.658***	-1.086**	-0.695*
	(0.468)	(0.705)	(0.364)	(0.372)	(0.423)	(0.403)
Observations	25	25	27	28	28	28
R^2	0.09	0.32	0.04	0.10	0.11	0.15

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year.

Table 3A.8: Infant Mortality and State Capacity

Dependent Variable log Infant Mortality Rates (Under 1)					
Variables/Years	(1881)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.203***	0.114**	0.116**	-0.093**	0.022
	(0.062)	(0.046)	(0.047)	(0.040)	(0.032)
Constant	5.115***	5.301***	5.103***	5.439***	5.128***
	(0.077)	(0.061)	(0.054)	(0.081)	(0.080)
Observations	25	28	28	28	28
R^2 0.24	0.19	0.20	0.13	0.01	

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels.

Table 3A.9: Infant Mortality, State Capacity, and Rail years

Dependent Variable log Infant Mortality Rates (Under 1)					
Variables/Years	(1881)	(1901)	(1911)	(1921)	(1931)
State Capacity	0.188***	0.113**	0.113***	-0.082*	0.027
	(0.064)	(0.049)	(0.039)	(0.044)	(0.034)
Rail years	0.008*	-0.001	-0.004**	-0.003	-0.002
	(0.005)	(0.002)	(0.002)	(0.003)	(0.002)
Constant	5.087***	5.328***	5.227***	5.522***	5.206***
	(0.074)	(0.074)	(0.059)	(0.110)	(0.085)
Observations	25	28	28	28	28
R^2	0.35	0.20	0.41	0.18	0.04

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year.

Table 3A.10: Child Mortality and State Capacity

Dependent Variable log Infant Mortality Rates (Under 5)					
Variables/Years	1881	1901	1911	1921	1931
State Capacity	-0.031	0.131	0.115	-0.225***	0.075**
	(0.100)	(0.106)	(0.075)	(0.050)	(0.036)
Constant	4.831***	4.711***	4.445***	5.236***	4.370***
	(0.119)	(0.124)	(0.109)	(0.113)	(0.092)
Observations	25	28	28	28	28
R^2	0.00	0.04	0.08	0.28	0.08

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels.

Table 3A.11: Child Mortality, State Capacity, and Rail years

Dependent Variable log Infant Mortality Rates (Under 5)					
Variables/Years	1881	1901	1911	1921	1931
State Capacity	-0.070	0.137	0.113	-0.230***	0.066
	(0.103)	(0.096)	(0.071)	(0.053)	(0.041)
Rail years	0.020**	0.005	-0.002	0.001	0.003
	(0.008)	(0.005)	(0.002)	(0.003)	(0.003)
Constant	4.762***	4.615***	4.516***	5.201***	4.228***
	(0.120)	(0.121)	(0.119)	(0.142)	(0.146)
Observations	25	28	28	28	28
R^2	0.30	0.07	0.11	0.28	0.14

Notes: Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. */**/*** denotes significance at the 10/5/1 percent levels. Rail Years denote the number of years a district has had a railroad as on a particular census year.

Table 3A.12: Variables, Measurement, and data sources

Variables	Measurement/Definitions and data sources
Literacy Rate	The total Literate population is divided by the total population of the district and multiplied by 100 to create crude percentage literacy rates. Gender-specific literacy rates are calculated in similar patterns taking their relevant population as the denominator. *Source:* Census of India, 1881 to 1931, Punjab Tables.
Population and Total surface area.	It includes the total and gender-specific population in districts. It also includes the religious population shares for four Major religious groups, Christians, Hindus, Muslims, and Sikhs. The total surface area in square km. The Religious Diversity Index (RDI) is calculated using population figures. *Source:* Census of India, 1881 to 1931, Punjab Tables.
Railway years	This includes the number of years a district has had or was exposed to a railway line passing through it. The years are calculated from each census year to the first opening of the date of the line. *Source:* Government of India, Railway department (Railway Board). History of Indian Railways, Constructed and in Progress corrected up to 31st March 1918. Simla, Government Central Press, 1919. History of Indian Railways, Constructed and in Progress corrected up to 31st March 1937. Printed by the Manager, Government of India Press Simla,1938. History of Indian Railways, Constructed and in Progress corrected up to 31st March 1945. Printed in India by the Manager of Publications Dehli by the Manager Government of India Press Simla, 1947.
Mortality Rates	The IMR1 and IMR5 as the total number of infant deaths in the relevant age bracket divided by total births in the year and multiplied by 1000. *Source:* Vital Statistics of the general population, Report on the Sanitary Administration of Punjab for the year ... 1881, 1882, 1897, 1898, 1902, 1911, 1921. Report on the Public Health Administration of Punjab during the year 1931.
Land Revenues	It includes revenue from fixed, fluctuating, and miscellaneous land revenues. This is reported as the total land revenues collected in each district. *Source:* Government of India, Department of Revenue and Agriculture, Agriculture Statistics of India for the years 1891-92 to 1895-96, 1896-97 to 1900-01, 1901-02 to 1904-05, 1906-07 to 1910-11, 1920-21, 1931-32. Appendix Tables of District Gazetteers for the districts where such document is available. The agriculture statistics. Relevant district gazetteers.
Cultivated Acres of Land	Net are cropped during the year. This excludes forests, land not available for cultivation, culturable waste other than fallow and current fallows. *Source:* Same as the sources for Land Revenues.
Irrigated Land	This includes the total area of crops irrigated from different sources which include majorly Government Canals, Private Canals, Tanks, and wells. The major irrigation system belonged to the government system. *Source:* Same as the sources for Land Revenues.
Rainfall	Mean annual rainfall in meters *Source:* For the years 1881 and 1891, we take figures from (Donaldson, 2018). For the years 1901-1931 (Goodman et al., 2019)
Temperature	Mean annual temperature in Celsius *Source:* (Goodman et al., 2019)
Soil Type	Dummy variable if soil type in the district is alluvial and red. *Source:* The soil character data is taken from the Food and Agriculture Organization of the United Nations (FAO) and (Banerjee and Iyer, 2005).

Source: Compiled by author using resources mentioned in the table.

Table 3A.13: Primary Source for district data

Districts	Data Gazetteers used
Ambala	1883-84, 1892-93, 1912, Statistical Tables 1935
Amritsar	1892-93, 1933 Statistical Tables
Attock	Statistical Tables 1907, 1933
Dera Ghazi Khan	1893-97, 1904
Ferozpur	1883-84, 1884-89, Statistical Table 1935
Gujrat	1882-83, 1892-93, 1921
Gujranwala	1893-94, Statistical Table 1935
Gurdaspur	1883-84, 1891-92, Statistical Tables 1912, 1914
Gurgaon	1883, 1910, Statistical Table 1935
Hisar	1883-84, 1891-92, 1907-08, Statistical Tables 1935
Hoshiyarpur	1883-84, 1904
Jhang	1883-84, 1908
Jhelum	1904
Jullunder	1883-84, 1904, Statistical Tables 1935
Kangra	1883-84, 1897, 1908, 1917, 1924-25
Karnal	1883-84, 1892, 1904
Lahore	1883-84, 1893-94, 1916
Ludhiana	1888-89, 1904
Layalpur	Statistical Tables 1912
Mianwali	1915, Statistical Tables 1935
Montgomery (Sahiwal)	1883-84, 1898-99, 1933
Multan	1883-84, 1901-02, 1923-24, Statistical Tables 1936
Muzaffargarh	1883-84, 1908, 1916, 1929
Rawalpindi	1893-94, Statistical Tables 1907
Rohtak	1883-84, Statistical Tables 1936
Shahpur	1883-84, 1897, 1912, 1917
Sialkot	1894-95, 1920, Statistical Tables 1936
Simla	1888-89, 1905, 1911, 1934

Table 3A.14: Summary Statistics Cross-section

Variables	Mean	Std.Dev.	Minimum	Maximum
Literacy rate 1881	2.86	1.95	1.556	11.762
Literacy rate 1891	3.601	2.125	2.016	13.254
Literacy rate 1901	4.297	2.734	2.046	17.375
Literacy rate 1911	4.296	3.222	2.045	19.708
Literacy rate 1921	4.566	3.111	2.45	19.3
Literacy rate 1931	5.739	3.44	3.089	20.437
Literacy rate male 1881	5.011	2.632	2.857	16.573
Literacy rate male 1891	6.302	2.795	3.711	18.429
Literacy rate male 1901	7.275	3.368	3.78	22.172
Literacy rate male 1911	6.94	3.671	3.684	23.61
Literacy rate male 1921	7.264	3.221	4.228	21.087
Literacy rate male 1931	9.047	4.412	5.274	26.776
Literacy rate female 1881	0.2	0.61	0.016	3.114
Literacy rate female 1891	0.332	0.868	0.043	4.471
Literacy rate female 1901	0.65	1.587	0.076	8.529
Literacy rate female 1911	1.018	2.423	0.127	13.101
Literacy rate female 1921	1.326	2.846	0.188	15.639
Literacy rate female 1931	1.65	1.72	0.346	9.202
Infant Mortality 1881	208.34	36.6	149.23	297.71
Infant Mortality 1901	232.82	31.3	190.37	317.55
Infant Mortality 1911	194.55	29.81	134.59	291.43
Infant Mortality 1921	196.24	41.51	102.44	284.98
Infant Mortality 1931	178.86	32.44	87.105	253.86
Child Mortality 1881	125.85	37.86	73.484	260.58
Child Mortality 1901	137.24	43.19	73.706	210.77
Child Mortality 1911	101.86	22.1	58.711	143.3
Child Mortality 1921	128.3	43.31	54.173	211.84
Child Mortality 1931	93.263	20.39	48.265	133.26
State Capacity 1881	1.04	0.413	0.192	1.845
State Capacity 1891	1.299	0.481	0.529	2.753
State Capacity 1901	1.231	0.493	0.302	2.15
State Capacity 1911	1.35	0.561	0.378	2.517
State Capacity 1921	1.96	0.847	0.459	4.303
State Capacity 1931	1.855	0.937	0.135	4.702
Rail-road years 1881	5.286	7.287	0	20
Rail-road years 1891	11.821	10.513	0	30
Rail-road years 1901	19.643	13.395	0	40
Rail-road years 1911	28.143	15.911	0	50
Rail-road years 1921	37.286	17.611	0	60
Rail-road years 1931	46.964	18.353	3	70

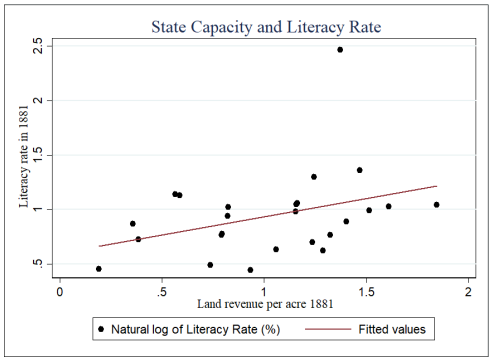
Notes: Literacy rates in percentages. Infant and child mortality rates one death in one 1000 live births. State Capacity is revenue per acre of cultivated land. Railroad years is the number of years a district was exposed to a railway line in a given census year.

Table 3A.15: Boys' Primary Schools in the province of Punjab

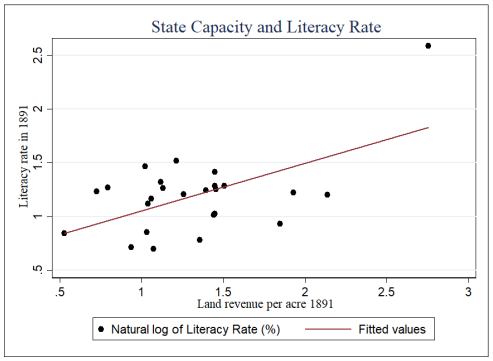
Types of school and scholars	1907	1912	1917	1922	1927	1932	1937
District Board Schools	2,186	2,445	3,305	4,422	4,454	4,191	4,546
Pupils therein	98,733	129,737	168,888	203,744	285,733	260,943	254,393
Municipal Schools	86	73	107	180	260	313	320
Pupils	6,969	7,451	10,595	71,411	39,054	52,164	54,246
Aided Schools	724	744	1,335	867	986	1,003	823
Pupils	28,875	34,915	58,167	42,876	59,091	68,547	61,815
Unaided Schools	142	146	163	137	192	89	113
Pupils	5,608	6,081	7,047	5,166	7,987	3,902	5,569
Total Schools	3,151	3,417	4,918	2,527	5,912	5,611	5,811
Total Pupils	141,559	179,588	245,819	270,704	393,178	386,870	376,687
Total, including boys in primary classes of secondary schools	183,177	239,330	309,211	378,695	723,204	784,292	717,380

Source: Adopted from *The foundations of local self-government in India, Pakistan and Burma*, by Tinker (1954). Appendix Tables pp.352-353.

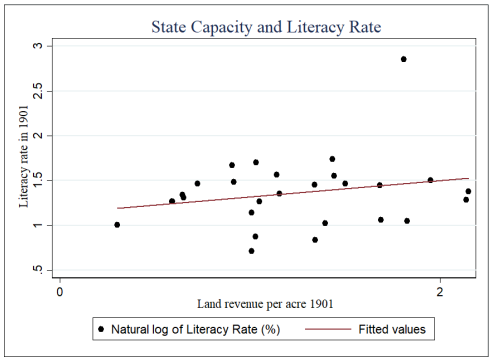
Appendix 3B. Figures



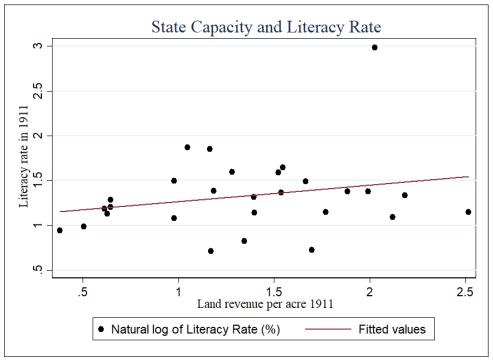
(a) 1881



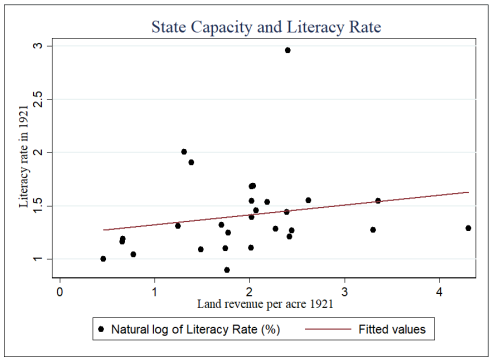
(b) 1891



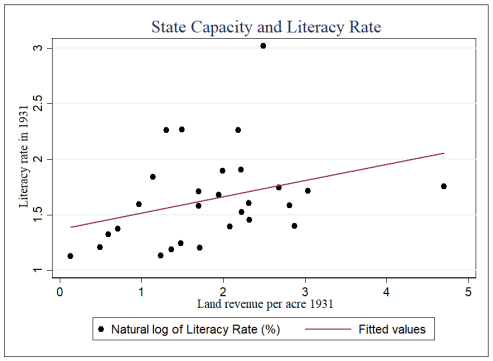
(c) 1901



(d) 1911

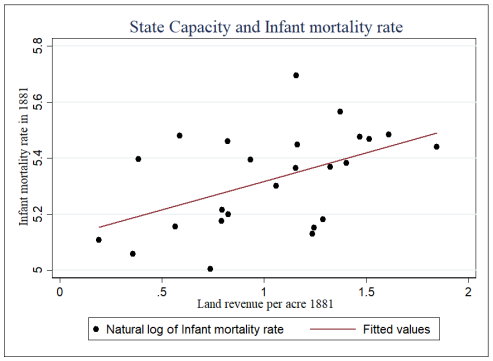


(e) 1921

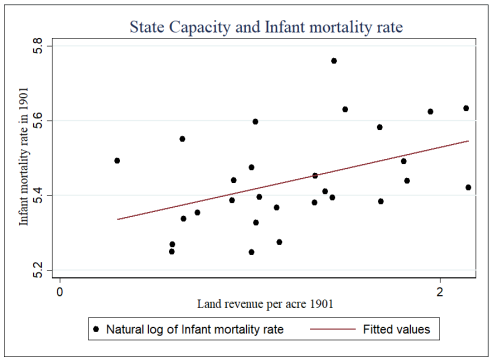


(f) 1931

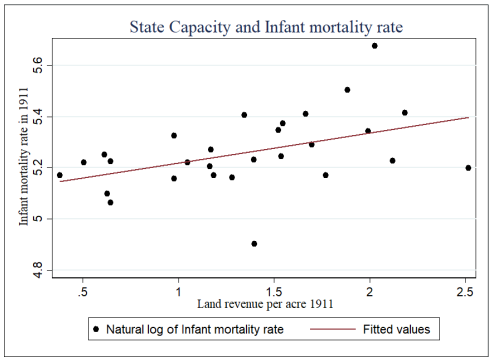
Figure 3B.1: State Capacity and Literacy Rates



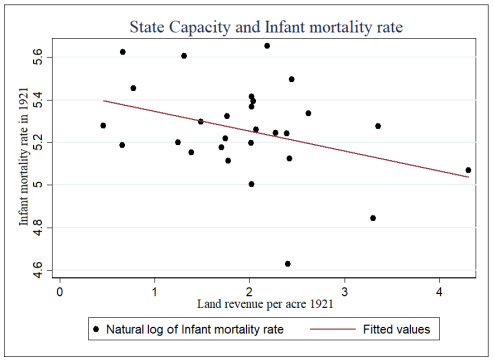
(a) 1881



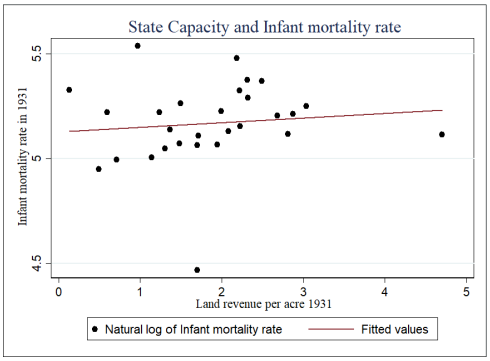
(b) 1901



(c) 1911

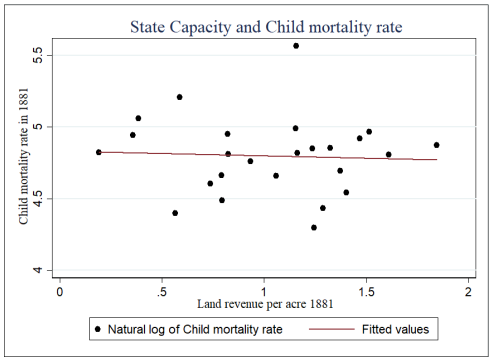


(d) 1921

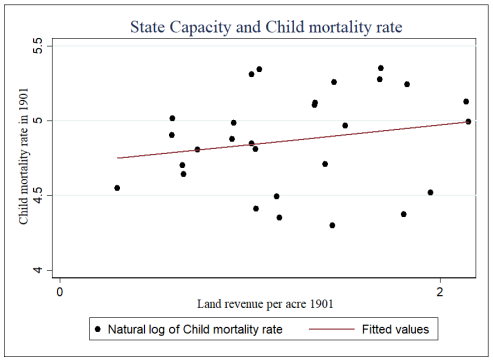


(e) 1931

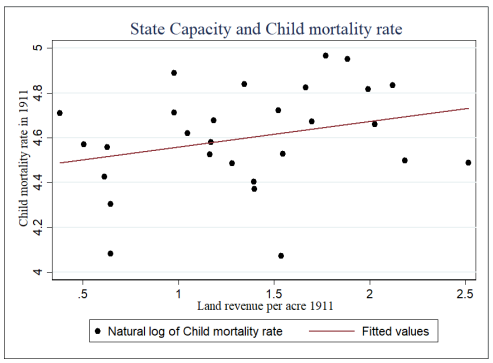
Figure 3B.2: State Capacity and Infant Mortality Rates



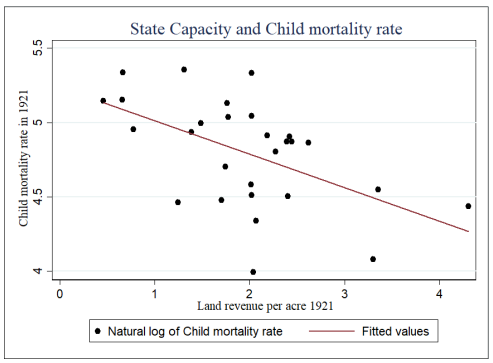
(a) 1881



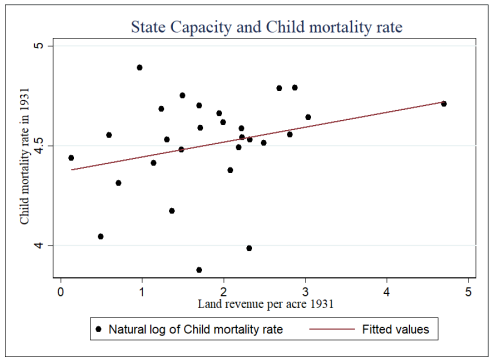
(b) 1901



(c) 1911



(d) 1921



(e) 1931

Figure 3B.3: State Capacity and Child Mortality rates

Conclusion

Over the last few decades, several countries have undergone substantial political and financial reforms. The decentralization reforms have been among the most prominent ones of all. The public sector services delivery has remained at the heart of all the decentralized reforms. A piece of considerable evidence shows that decentralization has empowered lower tiers of the government around the world. These sub-national governments have contributed to the growth and development of regional economies, which have further supported national economic goals.

This thesis contributes to the literature by providing empirical evidence on the effects of decentralized authorities on sub-national governments and their effects in providing local public services. In particular, it pays great attention to the regional context of Asia. It explores answers to, generally, three questions: (i) how decentralization reforms have been implemented in Pakistan, and what changes has it brought to social and economic services? (ii) How have decentralization reforms performed in reducing the regional inequalities in Asia? (iii) How has state capacity affected the local public services provision in colonial Punjab?

Although this thesis attempts to identify several channels through which decentralized services delivery could be improved, it does not identify several other important matters related to the decentralization study. The thesis is silent on various questions like governance, corruption, voter education, accountability measures, and party affiliations. However, the evidence provided in each chapter has a novel addition to the literature in bringing out the decentralized governments and their influential role in services delivery and reducing inequalities.

This thesis also raises several questions: Why have decentralization reforms not flourished under the elected governments in Pakistan? Despite rapid growth in Asia, why have several countries failed to curtail regional inequalities and promote equitable economic development opportunities for all? Why were colonial policies partially effective for the local population's welfare? What lessons can the Asian countries learn from their failure to benefit from the decentralization? These areas provide an opportunity for future research.