Decentralization and Inequalities in Asia

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[Preliminary draft]

Abstract

In this paper we analyse how decentralization is associated with regional disparities in 19 Asian countries. Fiscal decentralization literature is mixed on the effects on regional inequalities, whereas political decentralization is yet an area for a greater research in the field. Unlike previous literature we examine the effects of different decentralization measures on inequality both individually and in a mix scenario. We find that decentralization increases inequalities, if at all, with fiscal indicators and partially reduces inequalities with political decentralization measures. These results implicate that overall decentralization policies are necessary in reducing inequalities but they are conditional on certain economic and political institutional arrangements.The use of G2SLS instrumental variable estimation technique further confirms our findings. Our results are robust to the use of alternative measures of regional inequalities.

Key words: Fiscal Decentralization, Political Decentralization, Regional disparities, Instrumental Variable.

1 Introduction

An important question that the scholars are actively seeking answer to is whether decentralization increases or decreases regional inequalities. On the positive side it is argued that the fiscal capacity of sub-national government's plays an important role in promoting regional convergence. The proximity of local representatives to local population and making policies based on better information on regional preferences makes them a powerful institution in improving regional incomes. Inter jurisdictional competition enhances productivity to compete national and international markets. In the same vein the lower levels of governments make efforts to maintain and/or amplify their tax base in competition with other regions. In contrast to its decreasing effects on regional inequalities, decentralization may equally increase disparities among regions. It reduces re-distributive capacity of higher levels of government. Furthermore, regions rich in natural resource, more industries, and coastal towns will be more competitive (in production and distribution) than poorer regions for fiscal resources. This out-competes the poorer regions and thereby increases their probabilities of worsening disparities. Moreover, local governments are constrained by several factors like resource dearth, institutional capacity, local elite capture, and corruption. This further hinders their way in public services delivery. Hence, the debate on decentralization in reducing the gap in regional disparities remains unanswered to full length to date due to certain financial and institutional challenges in decentralization studies.

There has been a growing demand for decentralization during past few decades. The motivation for such policy reforms has remained to be different in different countries (Shah and Thompson, 2004). However, broadly speaking the decentralization reforms debate has centered on two sets of questions (Jütting et al., 2004). The first set of available literature mainly explores the causes and consequences of decentralization reforms (Oates, 1972; Manor, 1999). The second set investigates decentralization and its link with certain variables like corruption (Fisman and Gatti, 2002; Fan et al., 2009) and government quality (Treisman, 2002), government responsiveness to meet the local people's needs (Faguet, 2002), Public service delivery (Litvack and Seddon, 1999), income inequalities(Lessmann, 2012), and political

Stability (Annan, 2002). Hence, the two sets make it a study of policy set up from a political and economic perspective.

Many countries have adopted decentralization as a major policy reform in one way or another during the past four decades. The link between decentralization and regional inequalities has not, however, often been straight forward and it has received researcher's attention only recently. Probing into the question whether there is an effect of decentralization in reducing inequalities among regions needs comprehensive studies with deep understanding of policy and institutional coordination channels. The prominent way for inequality reducing effect of decentralization is often discussed through the local authority for local decision making. Decentralization promotes local participation thereby increasing opportunities and empowerment of local masses particularly the poor, women, youth, and ethnic and religious minorities whose rights are not properly represented in decision making (Grävingholt et al., 2006). The increasing participation of poor in decision making formulates policies that benefit them the most. But does all this reduce inequalities among regions? Is providing fiscal authorities and/or political autonomy alone can work? The quest to find an ultimate answer to these questions is mantra of the day.

In recent past the inequalities have been growing thereby causing political instabilities in one way or another around the world. Regional disparities in income, economic opportunities, and social indicators are emerging issues in contemporary times. The element of spatial inequalities has been a driving force for policy makers' 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). As a matter of fact widening income inequalities are a defining challenge of the contemporary times (Dabla-Norris et al., 2015). Income inequality negatively affects growth and its sustainability Ostry et al. (2014); Berg and Ostry (2017).

Despite the fact that spatial inequalities are an important concern of the contemporary political arena, a few systematic studies have existed on the matter of regional and spatial inequalities during last three decades. The main reason for such dearth of studies on this important field is due to non availability of comprehensive and reliable data for a genuine analysis on regional inequalities. Moreover, the studies available to date are more inclined towards studying developed countries because the data for developing countries is not easy to trace for a reasonable inference. The results obtained by studies from developed countries provide an insight for further research but it is hard to generalize those results for rest of the world. We contribute to the existing literature taking data on Asian countries that have often been ignored in most of the studies. The choice of Asian countries is driven by the motivation that Asia is the largest continent both in geographical area and population. This makes these countries a solid ground for decentralization reforms and its effects on inequalities. To this end we construct a unique data-set[1] from different resources for some of the Asian countries.

As mentioned above the role of decentralization and its impact on regional inequalities have received a great attention in the public debates recently. Such debates centre on the arguments that decentralization improves efficiency of the public sector(Oates, 1972), but it is also likely to reduce the inter-jurisdictional redistribution powers which consequently encourages regional inequalities (Prud'Homme, 1995). Hence, there exists a rift between redistribution and efficiency in 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 regard decentralization as an important policy tool on their development agenda, decentralization and its effects are more relevant to developing countries (Gopal et al., 2008).

The existing literary studies related to redistribution, as an outcome of decentralization, is mixed. Rodríguez-Pose and Gill (2004) find that decentralization has an increasing effect on regional inequalities. While Lessmann (2009) and Ezcurra and Pascual (2008) find a decreasing effect of decentralization on regional inequalities. Some research studies conclude different effects of decentralization on inequalities for countries with high or low income (Shankar and Shah, 2003; Rodríguez-Pose and Ezcurra, 2010). The rationalization for different results are plausibly due to different country samples, types of variables, analysis time period, measurement of degree of decentralization, and many country specific conditions.

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

This encourages the field of study to explore more on this issue that includes a broader range of data-set with more countries with different economic development levels, and different measurements of decentralization reforms from fiscal and political aspects, institutional arrangements (coordination channels). This paper aims at contributing to the growing literature of this field by using appropriate empirical methods with a set of countries from Asia. Thus, we are interest in finding out the regional inequalities within countries and among regional economies in Asia.

Since the basic purpose of the paper is to see decentralization and its consequent effects on changing dynamics of regional inequalities from a political economy aspect, we focus precisely on a set of Asian countries. We construct a data-set for the period 1990-2015 for 19 Asian countries. The selection of countries is dictated by the availability of data on regional economies in these countries. The panel is highly imbalanced. The data-set comes from different sources. Table 7[2] in Appendix A lists all countries, the time period for which data is calculated, and their potential sources.

The paper follows the sequences in the manner given ahead. Section two discusses the theoretical background of decentralization and regional inequalities with a brief discussion on existing empirical studies. Section three discusses the data on regional inequalities and their calculations. Section four presents empirical analysis with data and methodology. Section five summarizes the results and some robustness checks. Section six concludes the paper.

2 Decentralization and regional disparities

2.1 Theoretical background

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)[3]. Moreover, the theoretical literature criticizes the participation of lower levels of governments in major re-distributive policies (services delivery) (Oates, 1972; Musgrave, 1959). However, the sub-national governments may possibly be a part of such policies (Bahl et al., 2002). Although not directly responsible for any obligations, the mere presence of these institutions is helpful. This supports an idea for sub-national governments in reducing regional inequalities.

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

The 'first-generation theory' on fiscal federalism criticises 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 a jurisdiction with more generous redistribution mechanism (for poor) and minimal tax and/or transfer schemes (for rich)(Musgrave, 1959; Oates, 1972). 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 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-nationals would rather not engage in redistribution process (provision of public services). Hence, according to this strand in literature the redistribution on 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[4].

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[2]The table of summary statistics is given in Table 1 in online Appendix

[3]See Figure 1 and 2 in the text for the channels through which decentralization affects inequalities.

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

On the contrary to the above the 'second-generation 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, therefore, reduce regional income inequalities which would equally decrease national income inequalities. Moreover, the second-generation theory also emphasises the role of transfers from central governments to sub-nationals [see (Weingast, 2006)]. The dependency of lower levels of government on central transfers undermines their local targeted preferences for public services delivery. The dependency on local own revenues will, on the other hand, induce equalization [See (Padovano, 2007)].

The first generation theory on fiscal federalism is normative in nature and assumes that the decision-makers are philanthropic in maximizing social welfare (Musgrave, 1959; Oates, 1972; Rubinfeld, 1987). The second generation theory builds on first generation but recognizes that public officials goals are motivated by political institutions that are systematically (often) diverging from maximizing general public's welfare (Qian and Weingast, 1997). In fact the second generation theory does not challenge the first generation theory in spirit but complements it from a different perspective. Hence, the theory on decentralization can be seen from the institutional channels working together to maximize social welfare.

Besides the fiscal arrangements from the fiscal federalism theories, the institutional arrangements are a complementary in strengthening decentralized system of government. This could be understood by looking at post-communist and post-authoritarian countries[5] that inherited decentralized structure but have often faced political obstacles in implementing greater economic reforms packages (Treisman, 2002).

The menace of poverty and inequality remains a crucial focus of almost all policy reforms in developing countries. The causes of increasing inequalities within a country and among regions are several. While countries are concerned to fight the perils of poverty they are equally going through challenges of making institutional arrangements for success of policy reforms aimed at curbing poverty and inequalities. One of the major institutional arrangements among many is political restructuring (fiscal and political decentralization).

The past few decades have witnessed several countries adopting decentralization policies from a small to a large scale. Besides several reasons for such reforms, generally speaking, the growing number of federal countries and a large population share living in such countries [40% of 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 a higher demand for political power devolution (decision making authority to sub national governments).The benefits of such political and administrative (organizational) set-up 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).

The theoretical discussion presented above implicates that the urge for decentralization is generally based on two major arguments that could be retrieved from literature on fiscal federalism. (1) Decentralization increases allocative efficiency (Ahmad and Tanzi, 2002) and/or productive efficiency. (2) Decentralization incentivizes 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). Such arrangements like political decentralization where local representatives are elected by local residents through an electoral process undermine the inducement for rent seeking by these officials. Moreover, specifically if political decentralization is accompanied by a strong legal framework, it promotes legitimacy of public officials and enhances public participation in politics thereby deepening democratic nature of institutions (Blair, 2000; Crook et al., 1998). Hence, the drive for decentralization is motivated by the arguments of efficiency gains and accountability of public representatives. The efficiency gains

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[5]Yugoslavia, Russia, Brazil for example.

primarily focus to the better fiscal management and the accountability argument encourages political participation of local people. As a matter of fact both (fiscal and political) measures of decentralization are important for a successful policy reform and reducing regional inequalities.

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 has an effect on poor lives in one way or the other (See Figure 1 & 2). More precisely, either decentralization reforms would improve the condition of local population ensuring more equal distribution of income and equal opportunities of growth for the local residents or worsen the condition by increasing disparities in income and concentration of resources to one and/or few regions. Such outcomes also depend on certain necessary arrangements and country specific conditions. Moreover, it is crucial to bear in mind that success of same set of arrangements 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).
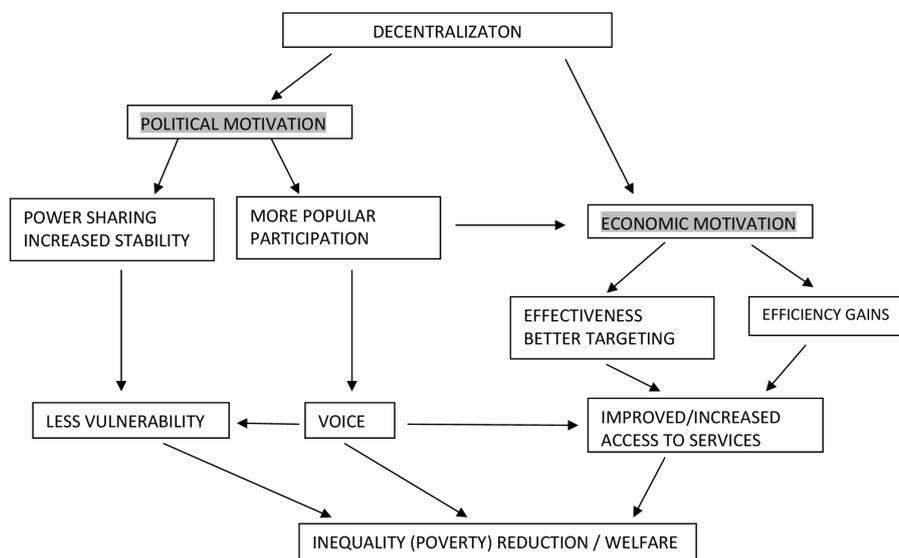

Figure 1: Decentralization channels of influence adopted from (Jütting et al., 2004) with modifications

Furthermore, the study conduct by Von Braun and Grote (2002) makes a comprehensive and in-depth study on decentralization and its impact on poverty and inequality. They conclude that decentralization reduces disparities but under certain conditions. The conditions should be dealt within the framework of political, fiscal, and administrative decentralization simultaneously because they are all strongly interacting in their impacts on inequalities. They also suggest taking into account 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 etc. are necessary for understanding the link of decentralization to poverty reduction and maintaining inequalities.

Furthermore, Lessmann (2006) studies the case of 17 OECD countries for the 1980-2001 period taking into account both cross-section and panel data analysis finds that fiscal decentralization (separately and) along with certain national characteristics affects inequality in regions. His analysis based on Ordinary Least Square (OLS) and fixed effects estimates depicts 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 further authenticated by Ezcurra and Pascual (2008) who study expenditure decentralization with a sample of 12 states in the European Union (EU).
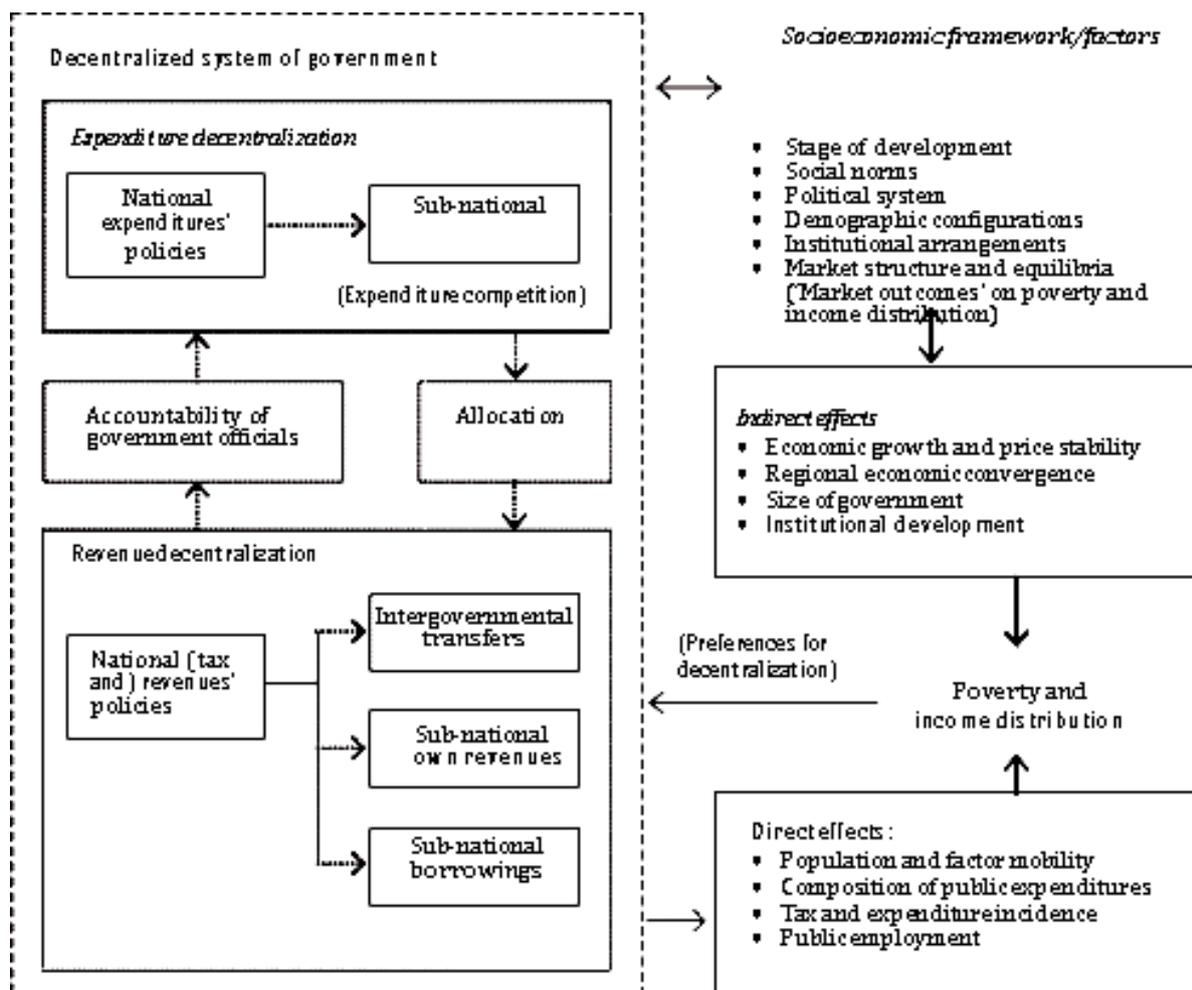
Figure 2: Effects of fiscal decentralization on poverty and income inequality adopted from (Sepulveda and Martinez-Vazquez, 2011)

The studies mentioned above use different indicators of decentralization and find an impact on reducing regional disparities.

In the same vein Rodríguez-Pose and Ezcurra (2010) suggest that the impact of decentralization is dependent 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) is effective in mitigating regional disparities in countries with high income, and works considerably the opposite 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 the importance of per capita GDP has a crucial conditioning role interacting with fiscal decentralization in reducing disparities among regions. The study is conducted with 56 countries for the period of 1980-2009.

Following similar lines, Kyriacou and Roca-Sagalés (2014) finds 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 use data for a panel of 24 OECD countries over the period of 1984-2006. Their results suggest that decentralization is effective in reducing disparities in countries with high quality of government setting, but conversely enhance disparities in countries with low quality of governance.

Similarly, 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 labour productivity. They further argue that for equalising regional productivity the composition of government (left or centre left parties) plays a vital role in creating conditions for success of decentralization.

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

Kim et al. (2003) study the case of 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 1990s. They find a positive correlation between the distribution of regional incomes and spatial distribution for some services (education, employment, transportation and water supply). On 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 suggest 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 rapid increase in inland-coastal inequalities during periods of 1980s and 90s.

Similarly, Bonet (2006) studied the case of Colombia and finds that decentralization reforms proved to encourage inequalities in Colombian regions. The results posit the possible reasons of such outcomes are due to 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 above Akai et al. (2009) study the case of United States and find that decentralization has a negative effect on regional inequalities in lower income counties (not largely though). It decreases inequalities where the counties have lower 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 region, different measure of degree 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 comparable study on decentralization and regional disparities. We take the opportunity to add to the growing literature by studying 19 Asian economies for this purpose.

Before plunging into details to data and econometric estimations section, it is important to understand the inequality measures and its calculation in the sample countries. The following section briefly explains the data and measurement techniques of regional income inequalities in these countries.

3 Regional Inequalities in Asia

The most challenging task in an 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. More precisely, the data on regions based on homogeneous economic and territorial level 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 on developed countries could be found easily as they keep a strong check on the statistics; it is developing countries that often do not have the same advantage of keeping data. 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 Penn World Tables. The details of variable and their potential

data sources are listed in Table 8 in Appendix A. Despite the fact regional data, where available, it is difficult to measure regional inequalities.

The regional inequalities are measured through different indicators by different scholars. However, most commonly used measure is regional GDP per capita(Shankar and Shah, 2003; Rodríguez-Pose and Gill, 2004; Lessmann, 2009, 2012)[6]. 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 pattern of OECD classifications for some countries. We consider state/provincial level data for the countries that are not classified under OECD or for which any classification is not available. Following the common measures used in the contemporary literature[(Shankar and Shah, 2003; Lessmann, 2009)] we calculate disparity measures using simple coefficient of variation (CV) and Population Weighted Coefficient of Variation (PW-CV) that are calculated based on regional GDP per capita data[7]. The CV can be used for comparisons of regional disparities in countries across time. The problem rises using CV in comparison between countries because inequality measure is sensitive to the number of regions. The PW-CV measure is used for adjusted population size. This measure is used in literature as a measure that is independent from of the scale, size of population, and number of territorial regions taken into consideration. This measure somewhat overcomes the problems raised by CV as it incorporates regional deviations weighted by their relative share in the national population. This satisfies the Pigou-Dalton principle [(Pigou, 1912; Dalton, 1920)] which states that transfer of resources from richer regions to poor regions reduces inequalities among them. The formulas for calculation of both inequality measures are as following:

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

$$PW - CV = \frac{1}{\bar{y}} [\frac{1}{n} \sum p_i (\bar{y} - y_i)^2]^{1/2} \tag{2}$$

Where $\bar{y}$ is the measure of the average GDP per capita of country. y_i is the GDP per capita of region$_i$. The share of population of region in total population of country is denoted by p_i. n is the number of sub national regions. Our data-set 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 1 below:

These measures range from 0 (perfect equality means equal per capita GRDP for different regions) and 1 (inequality 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 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.

The trend of inequalities within country disparities is equally important for any empirical analysis. The graph below (Figure 2) shows within country disparities for some of the countries in the list. Figure 3 presents the averages over the total period for all countries.

4 Empirical Analysis

4.1 Data and methodology

This section provides information on data and empirical analysis 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 explain certain variables and their link to inequality measures.

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[6](Canaleta et al., 2004) uses regional GDP per employee for regional inequality measure.
[7]We calculate the CV and PW-CV using 454 regions from our sample countries

Table 1: Regional Inequalities in Asia

Country	Coefficient of Variation	PW-Coefficient of Variation
Bangladesh	0.32	0.23
China	0.60	0.45
Georgia	0.43	0.72
India	0.51	0.41
Indonesia	0.92	0.76
Iran, Islamic Republic	0.78	0.58
Japan	0.22	0.48
Kazakhstan	0.57	0.45
Korea, Rep.	0.25	0.25
Kyrgyz Republic	0.51	0.52
Malaysia	0.44	0.55
Mongolia	0.92	1.06
Pakistan	0.24	0.19
Philippines	0.73	0.71
Sri Lanka	0.41	0.55
Thailand	1.08	1.31
Turkey	0.48	0.82
Uzbekistan	0.32	0.32
Vietnam	0.69	0.85
Average	0.55	0.59
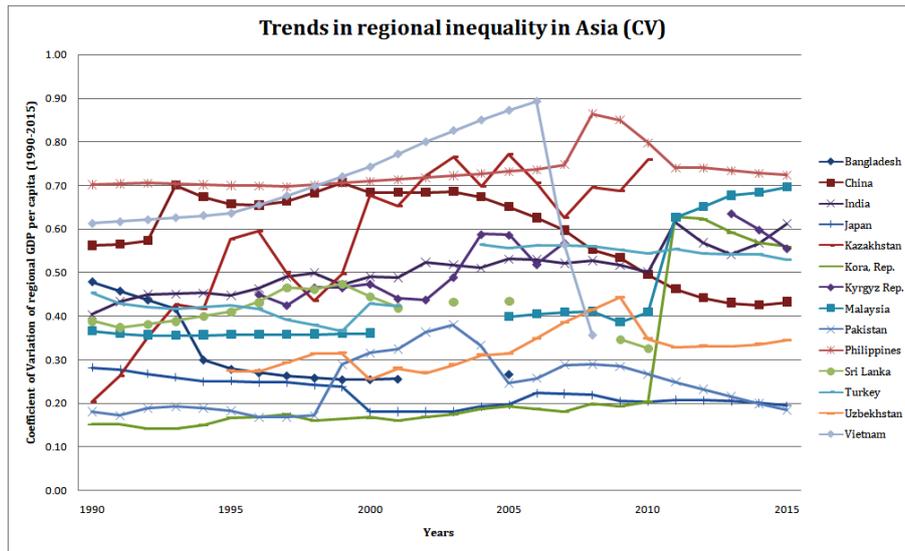
Figure 3: Trends in regional inequalities in Asia (CV)

Regional disparities, as explained in the previous section, are calculated from the regional GDP per capita. The regional GDP per capita are defined in terms of International \$ (PPP). The data on regional GDP per capita is gathered from different sources and are converted into International PPP values from the local currency.

For the decentralization[8] measure we use data from International Monetary Fund (IMF) Government Financial Statistics (GFS) database. This applies to countries where GFS data is available from IMF database. For the other countries we calculate the same from national budget documents. The measures are Expenditure and Revenue decentralization that relate to sub-national governments' (SNGs')[9] share of expenditure and/or revenue to total government expenditures (revenues). These measures are commonly used in the literature for decentralization measure. We equally take into account the Vertical fiscal im-

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[8]See (Schneider, 2003)for conceptual understanding on the definitions of different decentralization measures.
[9]Sub national governments include state/province and local governments.
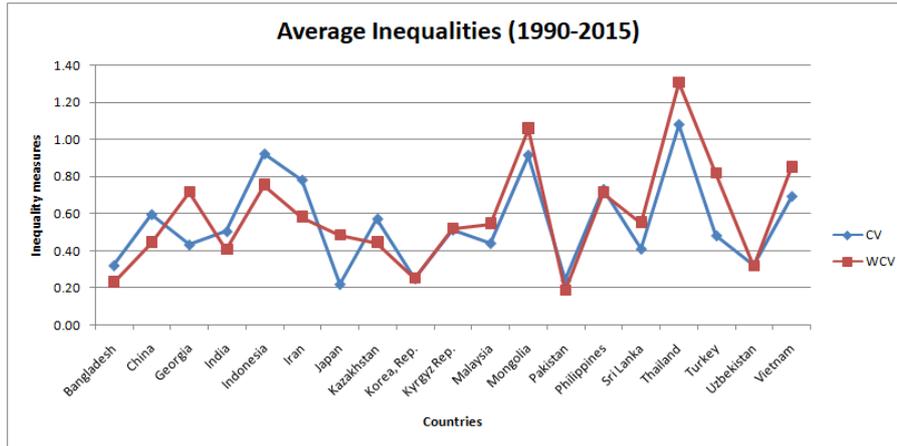
Figure 4: Trends in regional inequalities in Asia (CV & PW-CV) Country averages

balance (VFIB). This measures the transfers from central government to lower level governments. This is also known as transfer dependency of sub national governments. Similarly we also take tax decentralization measure that measures tax revenues of lower level governments as a share in total tax revenues of general government. The purpose of including these measures (VFIB and tax decentralization) is justified on grounds that expenditure (revenue) decentralization measures provide limited information on autonomy of lower tiers of governments.

For measuring Political decentralization indicators we follow some of the measure provided by (Treisman, 2008). We take into account the measures of a dummy variable that denotes countries with a federal constitution[10] and number of sub national government tiers that reflects government division in many levels. The degree of sub-national autonomy is an important factor in decentralization studies as it provides a shelter to lower level governments to take decisions based on their needs. For capturing this measure we take advantage from (Treisman, 2008) data-set that uses several dummy indicators for lower tiers' authority and legislative capacity on matters not specified by law to one level of government. We also include the sum of both measures following (Lessmann, 2012). Furthermore, the autonomy of sub-national governments could also be seen through the elections of local representatives by local people. The political participation is crucial for a decentralized system of government as it ensures accountability of the elected members to local people. For this we take two variables (dummy) that take value 1 if the elections are held at the lower level (Second level and lowest level) and 0 otherwise.

It is important to note that the measures of fiscal and political decentralization used in our study may fail to fairly capture the degree and magnitude of decentralization. The main source of the data on fiscal measure is from GFS of IMF for which the researchers have noted certain 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. Similarly the tax autonomy enjoyed by the local governments is not included in the details. Furthermore, the measures of political decentralization, although more closely defined, may have similar caveats. Overall, it implies that these widely available measures for decentralization have their limitations. Owing to these, our results hing on the strengths and weaknesses of these measures.

The fiscal and political decentralization measures are of the primary interest in this study. However, several other factors that have direct or indirect effect on regional inequalities are necessary to be included in the analysis.

We include GDP per capita and its squared values in the regression to control for regional development and check for Kuznet's hypothesis (Kuznets, 1955). In fact richer countries have higher advantage in

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[10]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).

promoting regional development and thereby reducing within country disparities among regions. The empirical studies on spatial inequality has taken into account 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 to a particular stage it starts to decrease with the level of development improving. Accordingly, the spatial inequalities would tend to have an inverted U-Shaped relationship.

Furthermore, we include number of regions[11] that were used for calculating regional inequality measures[12]. This variable controls for possible heterogeneity issues since all countries' territorial size are largely different and cannot be compared to one another in anyway.

Population of a country is another important factor in development studies. (Kuznets, 1955) hypothesized that as countries grow richer, inequalities first rise and then fall. These traces out the so-called Kuznet's curve. Looking at the curve in an spatial equivalent manner, the income gap between urban and rural areas rises at first and then narrows. In order to cater for this widening and narrowing gap in rural urban areas and agglomeration effect we include share of 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 centres, this variable controls for the effect of it. Furthermore, we also make a Geographical Concentration Index (GCI) variable to control for a further agglomeration effect.[13] It captures the concentration of country's population in each of its regions with respect to the surface area of regions.

Other control variable is the trade openness of a country. It is the share of trade as 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).

Ethnic (religious) divisions are considered as an important factor in creating inequalities and fueling civil conflicts. A large number of 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). 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 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 labour, 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 richer by using channel of corruption and misuse of the resources which increase inequalities among people. The data for natural resource rent comes from World Bank WDI.

The unemployment ratios have an effect on regional inequalities (Lessmann, 2009). We include the unemployment rate as a percentage of total labour force. We equally use log of total area of a country measured in square KM. This controls for the size of the country because larger countries will tend to have a larger land to be used for economic purposes, and a larger human resource endowment.

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[11]State and/or provinces

[12]This indicator is not included in the regressions when analysing data with Gini Index.

[13]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.

As a further aside we include democratic quality[14] 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 favours lower income inequalities, yet the empirical studies are inconclusive on the link. It is well noted in the works of Timmons (2010) and Acemoglu et al. (2015).

4.2 Estimation techniques

We carry out the empirical technique in this paper in different steps. At first we use long period averages to analyse the link between regional inequalities and decentralization measures (both Fiscal and political). The idea for using long period averages is to compare the inequalities between countries. The model for cross-section analysis takes the following form:

$$Inequality_i = \alpha + \sum_{j=1}^{k} \beta_j X_{j,i} + \gamma DECENT_i + \epsilon_i \tag{3}$$

Where Inequality is the measure of regional inequalities (measured in CV, PW-CV and/or Gini) in country i. α is a constant, $X_{j,i}$ is a list of control variables that have an effect on inequality. The $DECENT_i$ is one of different decentralization measures (political and/or fiscal), and ϵ_i represents the error term. The model provides us with information on how do regional inequalities relate with the decentralization indicators across countries. The results of cross-section OLS regression are presented in Table 2. We only discuss the coefficients related to decentralization measures and their effects on inequality.

5 Results

Our baseline empirical analysis tests the impact of decentralization (fiscal and political) on regional inequalities using cross-section analysis with long period averages. Looking at the results in Table 2[15] we can observe that the measures of fiscal decentralization do not exhibit any observable significant impact on disparities. The expenditure and revenue indicators are positive whereas the tax and VFIB are negative. However, only VFIB is significantly associated to inequality measure which indicates a lower dependency on transfers from central government will lead to a plausible decrease in inequalities. The fiscal measures represent the share of sub-national governments' fiscal autonomy. This indicates that the fiscal autonomy is limited in most of the Asian countries. The share of fiscal authority has remained limited for most of the sample countries. The low re-distributive capacity and limited tax and revenue generation of local governments is a possible reason for these outcomes. However, the first look at the relationships of these variables to inequality measure is a mix of positive and negative associations.

Unlike the fiscal measures, political measures show a negative and significant effect on regional inequalities. The results in table 2 show that most of the indicators (column 5 to 9) are significant. The federal dummy indicating that if a country has a federal constitution it has a reducing impact on regional disparities. The system of government provides information how power structure is distributed among different units of a country. This is an indicator of how fragmentation in government can counter inequalities. Responsibilities distributed among government levels is helpful in lowering inequalities.

Similarly, constitutional autonomy to sub-national governments in making law is an indicator of local decision making authority. Although, it is not a complete autonomy on law making but providing sub-national governments to be able to practice their local jurisdiction authority to make laws on a specific constitutional questions empowers them. The results show that having autonomy acts significantly in reducing regional disparities in countries.

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[14]The democracy index provided by Polity IV project ranges from 0 (poor democracy index score) to 10 (highest democracy index score)

[15]Analysis with population weighted coefficient of variation and GINI Index (World Bank data) is calculated on same pattern. The results are presented in online Appendix in Table 2 and Table 3. They support our findings from the baseline results

<div align="center">Table 2: Cross-section Results</div>

	Dependent variable: Coefficient of Variation (CV) of regional GDP per capita (1990-2015)											
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Expenditure Decentralization	0.338											
	(0.390)											
Revenue Decentralization		0.225										
		(1.568)										
Tax Decentralization			-0.148									
			(0.306)									
Vertical Fiscal Imbalance				**-0.190***								
				(0.028)								
Federal Govt.					**-0.467***							
					(0.089)							
Sub-national Govt. tiers						0.385						
						(0.188)						
Autonomy							**-0.553***					
							(0.179)					
Residual autonomy								**-0.467***				
								(0.089)				
Autonomy/residual									**-0.334***			
									(0.044)			
Bottom tier elections										0.058		
										(0.424)		
Second tier elections											0.188	
											(0.260)	
Bottom/second elections												0.073
												(0.164)
Trade openness	0.001	0.001	0.007*	0.007***	0.001	0.003	0.003	0.001	0.002**	0.001	0.001	0.001
	(0.003)	(0.004)	(0.001)	(0.000)	(0.001)	(0.003)	(0.002)	(0.001)	(0.001)	(0.004)	(0.003)	(0.003)
Natural resource rents	0.011	0.003	0.003	0.000	0.008	0.006	0.018	0.008	0.015***	0.005	0.005	0.006
	(0.018)	(0.024)	(0.003)	(0.000)	(0.009)	(0.008)	(0.009)	(0.009)	(0.003)	(0.018)	(0.016)	(0.018)
GDPPC	0.528	1.378	2.499	2.843**	0.784	-0.097	1.724	0.784	1.267**	0.952	1.215	0.992
	(1.536)	(2.184)	(0.431)	(0.057)	(0.781)	(0.909)	(0.774)	(0.781)	(0.357)	(1.176)	(1.215)	(1.211)
GDPPC2	-0.031	-0.084	-0.154	-0.174**	-0.046	0.011	-0.117	-0.046	-0.083**	-0.059	-0.076	-0.062
	(0.096)	(0.136)	(0.027)	(0.004)	(0.054)	(0.061)	(0.053)	(0.054)	(0.023)	(0.070)	(0.075)	(0.075)
Ethnicity	0.205	0.508	0.784	0.977**	0.600**	0.611	0.222	0.600**	0.450**	0.293	0.194	0.216
	(0.524)	(0.521)	(0.149)	(0.016)	(0.179)	(0.264)	(0.303)	(0.179)	(0.115)	(0.691)	(0.553)	(0.613)
Surface area	-0.016	-0.040	-0.062	-0.086**	-0.013	-0.046	-0.100	-0.013	-0.067**	0.005	0.008	0.015
	(0.072)	(0.158)	(0.028)	(0.003)	(0.071)	(0.043)	(0.068)	(0.071)	(0.023)	(0.114)	(0.085)	(0.093)
Urbanization rate	-0.005	-0.002	0.003	0.004*	-0.005	-0.001	0.005	-0.005	0.001	-0.002	-0.003	-0.002
	(0.010)	(0.014)	(0.002)	(0.000)	(0.006)	(0.005)	(0.006)	(0.006)	(0.002)	(0.013)	(0.010)	(0.011)
Unemployment rate	0.004	-0.002	-0.009	-0.014**	-0.035*	0.015	-0.022	-0.035*	-0.036**	-0.008	-0.004	-0.007
	(0.038)	(0.050)	(0.004)	(0.001)	(0.012)	(0.027)	(0.018)	(0.012)	(0.006)	(0.037)	(0.036)	(0.037)
Concentration Index	-0.076	0.380	1.823	2.003**	0.329	0.479	1.049	0.329	0.794*	0.171	0.079	0.095
	(0.865)	(1.638)	(0.444)	(0.037)	(0.539)	(0.324)	(0.620)	(0.539)	(0.260)	(0.721)	(0.732)	(0.723)
Territorial Units	0.009	0.008	0.006	0.005**	0.005	0.005	0.009**	0.005	0.007***	0.007	0.007	0.007
	(0.004)	(0.007)	(0.001)	(0.000)	(0.003)	(0.002)	(0.002)	(0.003)	(0.001)	(0.006)	(0.004)	(0.005)
Constant	-1.738	-4.971	-10.099	-11.243**	-2.670	-1.180	-5.212	-2.670	-3.851*	-3.537	-4.569	-3.782
	(5.377)	(9.288)	(1.664)	(0.221)	(2.289)	(2.534)	(2.427)	(2.289)	(1.268)	(3.745)	(4.010)	(3.983)
Observations	15	14	13	13	15	15	15	15	15	15	15	15
R^2	0.79	0.75	1.00	1.00	0.94	0.89	0.91	0.94	0.98	0.74	0.77	0.76

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

Furthermore, another indicator of local autonomy is the residual authority in making local legislation on matters that are not constitutionally assigned to any other level of government. The indicator shows a negative and significant effect on regional disparities. The sub national governments could make legislation based on local preferences and thereby possibly decrease regional inequalities by targeting the important needs of the population.

Following (Lessmann, 2009) courtesy of combining the constitutional autonomy and residual authority as an indicator of a stronger local self government, we see that this indicator follows the results from its individual components. It is negative and significant meaning that presence of more autonomy in law making at the lower tiers of government reduces regional inequalities. This further indicates more constitutionally approved autonomy to sub national governments improves their capacity in increasing welfare.

Other indicators of political decentralization, the electoral procedures taken at the lower levels of government (column 10 to 12), indicate a positive relationship but all of them are far from being significant. The elite capture in local politics could be at work in this regard (See (Bardhan and Mookherjee, 2005). The rent seeking behaviour of local politician increases inequalities as the policies would be biased against poor.

The indicator of having more tiers of government did not significantly have any impact on regional inequalities though it has a positive relationship showing that having more tiers may possibly increase

disparities in regions.

In the remaining list of independent variables we only discuss 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 inequalities, tracing out a Kuznet's curve.

The results from the cross section analysis are a mere first prospects to look at the relationship of regional inequalities with decentralization measures. The results show different measures have different directions on impacting inequalities in Asian countries. However, the cross section analysis has several limitations. There may be country specific factors that might affect regional inequalities. The control variables in cross section analysis may not consider and capture the same. The results may be biased in this case. In order to overcome this issue we use panel data analysis for complete set of data. The panel data analysis incorporates unobserved heterogeneity and allows investigating within country variations by including country fixed effects (Baltagi, 2008). This may potentially improve the results. However, the panel analysis is not without shortcomings. We discuss the same later in the paper.

For the second set of analysis we use Panel data method. For the analysis we use the formula as following:

$$Inequality_{i,t} = \alpha_i + \sum_{j=1}^{k} \beta_j X_{j,i,t} + \gamma DECENT_{i,t} + \mu_t + \epsilon_{i,t} \qquad (4)$$

We resort on the use of two approaches for our analysis with panel data. We use annual data at first and 5 year averages on second step in each estimation methods. However, we only report the panel analysis result in the paper for the sake of brevity[16]. We estimate[17] the data with fixed effect (FE) and/or Random Effect, and feasible generalized least square (FGLS) method. We use FGLS as it is asymptotically more efficient than pooled ordinary least square (OLS) estimator when series exhibits heteroscedasticity (Wooldridge, 2002). As a matter of fact most of the political decentralization measures do not vary over time, making it difficult to include country fixed effects with those measures. Using cross-section analysis as above or use of random effect seems only way to analyse in this situation. However, the fiscal decentralization measures change over time so we could use fixed effects analysis in this regard. The results of panel data (FE/RE and FGLS analysis) using annual data are presented in Table 3 and 4 respectively.[18]

Looking at the results from panel analysis[19] (column 1 to 4) the results in table 3 show that the fiscal decentralization measures portray a mixed association with the inequality variable. Unlike the cross-section analysis above, the expenditure indicator is negative but insignificant. Similarly the tax and VFIB indicators are positive but insignificant in contrast to cross-section results where these were negative. Among all indicators, revenue indicator is positive and significance at 5% level, indicating an increasing effect on regional inequalities. The tax decentralization measure is positive as well. This indicates that these measures tend to increase regional inequalities.

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[16]All analysis with 5 year averages are available upon request from the author. We do not include these results in the paper. The use of 5 year averages is based on consideration of business cycle effects. This neutralizes the effects of cyclical fluctuations. It also solves for the issues arising from missing values in variables (Easterly, 1999; Higgins and Williamson, 2002). This should also deal with reverse causality issue [see (Furceri and Zdzienicka, 2012)]

[17]Potential econometric issues often arise with non-stationary data, problems with heteroskedasticity, serial correlation, and endogeneiety. We test for stationarity and multicolinearity (though not an issue with panel data) of our data and find it not a problem in our case as the ADF (Fisher Chi-square) test were zero or equal to zero rejecting the null hypothesis for the presence of unit root process, and the correlation matrix coefficients were almost all below 0.50 in absolute values.

[18]We use Random effect analysis for time invariant variables. The Hausman test is conducted for each model and it indicates the use of FE model in case of fiscal decentralization measures. We conduct hausman test to choose between Hausman Taylor estimations and Random effect models. The group wise heteroskedasticity and serial correlation tests are conducted for each model to make sure to use these restrictions in FGLS estimation.

[19]An alternate analysis using Population Weighted Coefficient of Variation (PW-CV) and Gini index as a dependent variable(s) supports our findings. The results are presented in Table 4 and Table 5 in online Appendix.

Table 3: Panel results annual data (FE/RE)

| | Dependent variable: Coefficient of Variation (CV) of regional GDP per capita (1990-2015) | | | | | | | | | | | |
| | Fixed Effect | | | | Random Effect | | | | | | | |
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Expenditure Decentralization	-0.040											
	(0.047)											
Revenue Decentralization		0.167**										
		(0.066)										
Tax Decentralization			0.035									
			(0.058)									
Vertical Fiscal Imbalance				0.017								
				(0.033)								
Federal Govt.					-0.409***							
					(0.057)							
Sub-national Govt. tiers						0.291***						
						(0.061)						
Autonomy							-0.332***					
							(0.083)					
Residual autonomy								-0.409***				
								(0.057)				
Autonomy/residual									-0.353***			
									(0.056)			
Bottom tier elections										0.187		
										(0.155)		
Second tier elections											0.205*	
											(0.113)	
Bottom/second elections												0.158
												(0.171)
Trade openness	0.001	0.001	0.001*	0.001	0.002***	0.002***	0.003***	0.002***	0.002***	0.002	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Natural resource rents	0.007*	0.007**	0.007*	0.007*	0.004	0.005*	0.010***	0.004	0.009***	0.005	0.004	0.004
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.006)	(0.005)	(0.006)
GDPPC	-0.003	-0.096	-0.541	0.018	0.251	-0.124	0.482**	0.251	0.307	0.552	0.933***	0.531*
	(0.501)	(0.447)	(0.554)	(0.483)	(0.196)	(0.314)	(0.231)	(0.196)	(0.187)	(0.338)	(0.346)	(0.314)
$GDPPC^2$	-0.003	0.004	0.027	-0.004	-0.013	0.013	-0.034**	-0.013	-0.022*	-0.036*	-0.058***	-0.034*
	(0.033)	(0.030)	(0.031)	(0.032)	(0.013)	(0.022)	(0.016)	(0.013)	(0.011)	(0.021)	(0.022)	(0.020)
Ethnicity	0.285	0.291	0.232	0.277	0.471***	0.475***	0.155	0.471***	0.354***	0.086	0.116	0.091
	(0.479)	(0.415)	(0.476)	(0.491)	(0.091)	(0.137)	(0.126)	(0.091)	(0.065)	(0.217)	(0.156)	(0.210)
Surface area	24.695*	17.507	14.735	22.574*	0.044**	0.001	0.021	0.044**	0.016	0.051*	0.031	0.038
	(13.225)	(11.382)	(10.028)	(12.329)	(0.019)	(0.025)	(0.020)	(0.019)	(0.014)	(0.026)	(0.024)	(0.027)
Urbanization rate	-0.010**	-0.009*	-0.012**	-0.010**	-0.006***	-0.004*	-0.001	-0.006***	-0.002	-0.002	-0.005	-0.002
	(0.005)	(0.004)	(0.005)	(0.005)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.005)	(0.004)	(0.005)
Unemployment rate	0.005	0.005	0.003	0.005	-0.017***	0.010	-0.001	-0.017***	-0.015**	-0.004	0.002	-0.005
	(0.003)	(0.003)	(0.004)	(0.003)	(0.006)	(0.008)	(0.008)	(0.006)	(0.007)	(0.009)	(0.008)	(0.009)
Concentration Index	0.048*	0.061**	0.055**	0.046*	0.036	0.088**	0.099**	0.036	0.083**	0.016	0.014	0.005
	(0.023)	(0.021)	(0.023)	(0.021)	(0.037)	(0.038)	(0.049)	(0.037)	(0.042)	(0.048)	(0.049)	(0.052)
Territorial Units	0.000	0.000	0.000	0.000	0.004***	0.004***	0.007***	0.004***	0.006***	0.004	0.007***	0.005*
	(.)	(.)	(.)	(.)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)
Democratic quality	-0.003	-0.003	-0.004	-0.003	0.008	0.006	0.010	0.008	0.005	0.002	0.004	-0.002
	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.011)	(0.009)
Constant	-326.42*	-231.51	-190.46	-299.28*	-1.27*	-0.99	-1.84**	-1.272*	-0.98	-2.45**	-3.77***	-2.25*
	(176.86)	(152.62)	(133.15)	(165.28)	(0.70)	(1.07)	(0.91)	(0.71)	(0.756)	(1.26)	(1.27)	(1.21)
Observations	262	256	241	253	293	293	293	293	293	293	293	280
R^2	0.47	0.49	0.49	0.48								

Hausman test is conduct for each model between FE and RE for time variant variables (column 1 to 4) and RE and Hausman Taylor estimates (column 5 to 11).

All models include time dummies (not shown). Robust Standard errors in parenthesis. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1

Turning to the measures of political decentralization measures (column 5 to 9) we find most of the indicators are negative and significant (except sub-national government tiers which is positive and significant). This indicates that these variables tend to decrease regional inequalities. Moreover, the electoral decentralization measures (column 10 and 12) are positively associated to inequality measure with only second tier elections indicator significance at 10% level. These results show a similar patterns for a larger part as in cross-section results above.

For analysis of data with FGLS we refer to Table 4[20]. The results in table 4 are robust to our analysis from previous models as this includes any estimation issues arising from the heteroskedasticity and serial correlation in panels. These results posit a stronger evidence of the relationship between decentralization measures and regional inequalities. We can observe the measures of fiscal decentralization (column 1 to 4) are positively associated to inequality measure. However, they indicate the direction of the relationship but fail to observe any significance other then zero.

Furthermore, all the indicators of political decentralization measure (except sub-national tiers that is positive and significant) are negative and significant (column 5 to 9). This indicates political decentralization tends to reduce regional inequalities. In addition, the electoral decentralization measures (column

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[20]Robustness test using Population Weighted Coefficient of Variation (PW-CV) and Gini index as a dependent variable(s) supports our findings from the cross-section and panel analysis. The results are presented in Table 6 and Table 7 in online Appendix.

Table 4: Panel results annual data (FGLS)

Models	Dependent variable: Coefficient of Variation (CV) of regional GDP per capita (1990-2015)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Expenditure Decentralization	0.047											
	(0.028)											
Revenue Decentralization		0.055										
		(0.041)										
Tax Decentralization			0.074									
			(0.045)									
Vertical Fiscal Imbalance				0.009								
				(0.019)								
Federal Govt.					-0.341***							
					(0.044)							
Sub-national Govt. tiers						0.248***						
						(0.040)						
Autonomy							-0.186***					
							(0.052)					
Residual autonomy								-0.341***				
								(0.044)				
Autonomy/residual									-0.294***			
									(0.040)			
Bottom tier elections										0.091		
										(0.076)		
Second tier elections											0.165**	
											(0.071)	
Bottom/second elections												0.026
												(0.088)
Trade openness	0.001***	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(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	0.003**	0.003***	0.003***	0.003**	0.003**	0.004***	0.004***	0.003**	0.004***	0.003**	0.003***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPPC	0.463***	0.521***	0.703***	0.535***	0.223	-0.142	0.411***	0.223	0.323**	0.138	0.343	0.201
	(0.159)	(0.150)	(0.144)	(0.160)	(0.150)	(0.146)	(0.157)	(0.150)	(0.155)	(0.218)	(0.230)	(0.234)
$GDPPC^2$	-0.027***	-0.030***	-0.040***	-0.031***	-0.012	0.015	-0.027***	-0.012	-0.022**	-0.010	-0.023	-0.013
	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.014)	(0.015)	(0.015)
Ethnicity	0.352***	0.384***	0.508***	0.378***	0.503***	0.543***	0.335***	0.503***	0.412***	0.333***	0.347***	0.303**
	(0.069)	(0.076)	(0.075)	(0.081)	(0.072)	(0.070)	(0.074)	(0.072)	(0.072)	(0.124)	(0.108)	(0.135)
Surface area	0.019	0.020	-0.008	0.026**	0.030**	-0.007	0.015	0.030**	0.017	0.035	0.026	0.015
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)	(0.013)	(0.013)	(0.023)	(0.019)	(0.027)
Urbanization rate	-0.004**	-0.004***	-0.003**	-0.004**	-0.005***	-0.004***	-0.002	-0.005***	-0.001	-0.003	-0.004**	-0.003
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Unemployment rate	-0.002	-0.003	-0.004	-0.004	-0.009***	0.001	-0.004	-0.009***	-0.006**	-0.001	-0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Concentration Index	0.003	0.004	0.010	0.002	0.002	0.012	0.006	0.002	0.007	0.002	0.001	0.001
	(0.013)	(0.013)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
Territorial Units	0.007***	0.007***	0.007***	0.007***	0.006***	0.005***	0.007***	0.006***	0.006***	0.006***	0.008***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Democratic quality	-0.001	-0.001	-0.003	-0.001	-0.002	-0.001	-0.002	-0.002	-0.003	-0.003	-0.003	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Constant	-1.899***	-2.183***	-2.758***	-2.337***	-0.995*	-0.516	-1.493***	-0.995*	-1.126*	-0.658	-1.337	-0.687
	(0.598)	(0.586)	(0.573)	(0.634)	(0.562)	(0.534)	(0.581)	(0.562)	(0.590)	(0.846)	(0.880)	(0.915)
Observations	262	256	241	253	293	293	293	293	293	293	293	280

Robust Standard errors in parenthesis. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1

All regressions include time dummies (not shown) and controls for heteroskedasticity and AR(1).

10 to 12) show a positive association to regional inequality measure with only second tier elections variable significant at 5% level. These results support our findings from cross-section analysis (Table 2) and Panel analysis with FE/RE (Table 3).[21]

5.1 Robustness

The question at this point is what can we compare and conclude from the results obtained in cross-section and the panel data analysis. We could see the results follow the same line of relationship of independent variables with inequality measure. It is evident that almost all the measures of fiscal decentralization either do not seem to have any significant effect or, if at all, are positively related to inequality measure. The political decentralization measures on the other hand however, show a mixed relationship to inequality measures. It is negative and significant for autonomy indicators and positive and significant for electoral decentralization. This indeed is insightful to understand that the political decisions from national level policy framework is negatively associated to inequalities and the regional political participation positively associates to regional disparities. However, it makes it difficult to conclude a definite relationship between political decentralization measures and regional inequalities.

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[21] We observe trade openness has remained strongly significant in most of the models. Suspecting the moderating effect of trade openness, We tried an interaction approach with trade openness and decentralization measures. The specification tests the hypothesis that the level of trade openness moderates decentralization-inequality relationship. The statistically significant coefficient on interaction terms renders supports for this hypothesis. The results support our findings from our models here, however, the interaction results can be discussed in details separately. we do not include the same in the paper here.

As a first step in robustness check we seek to understand if the presence of fiscal and political decentralization indicators in one regression will have a different effect on regional inequalities. The idea is based on an expectation that fiscal decentralization can be implemented successfully if it is supported from the political institutional arrangements and vice versa. For instance a closer check and balance mechanism from the public representatives on how financial resources for different projects are managed by administrative units can increase the efficient use of resources and reduce the risk of financial leakages. Moreover, this enables local labour to have surety of being rightfully paid, and local public to have confidence that their taxes are spent for their welfare. Similarly, a strong anti-corruption mechanism hinders the leakages on the fiscal matters and reduces political representative's powers to embezzle public funds by supporting a particular interest group. Furthermore, an active public participation in decision making and follow-up can further ensure success of decentralization reforms. Hence, both the indicators can work in complementary manners to an effective policy outcome.

Owing to this, we carry out the test on our panel data analysis[22] with the following form:

$$Inequality_{i,t} = \alpha_i + \sum_{j=1}^{k} \beta_j X_{j,i,t} + \gamma FDECENT_{i,t} + \theta PDECENT_{i,t} + \mu_t + \epsilon_{i,t} \qquad (5)$$

Where F and P are fiscal and political decentralization indicators and other controls are similar to that of equation 4 above. Keeping in mind several possible combinations of the two indicators from our models, we only test expenditure and revenue decentralization measures with a few political decentralization indicators. The result of expenditure decentralization combined with political indicators are presented in Table 5.[23].

The results in Table 5 show that the fiscal indicators remain positively associated to inequality measures when controlling for anyone of the political decentralization indicators. It is significant in two models. Although, it is negative in model 5 when controlling for second tier elections on political side, it is insignificantly different from zero. The alternate inequality measures and the test with Revenue decentralization support our findings from Table 5.

In addition to the above, our results from cross-section and panel analysis are a first step in understanding the relationship between decentralization and inequality. However, 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 other hand that the 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 centralized budget to make equal re-distributive budgeting. Thus expecting decentralization measures being endogenous the literature calls for an instrumental variable approach to solve the issue.

Although in an attempt to cater for endogeneity issue we take long period averages with cross-section and panels approach with certain specifications to see the relationship of decentralization and inequality measures, the methods do not fully solve the issue. Since, the association between decentralization and regional inequalities is of a lower importance in studying between country variations as in case of cross-section analysis. In contrast, panel analysis is more focused on within country variations. Keeping in mind the within country variation as a major focus to our study we make use of IV estimation technique using (random effect) two-stage least squares (G2SLS) method. This also enables us to check the validity of our results from panel analysis (FE/RE and FGLS etimations).

As a matter of fact it is often very difficult to find an instrument that exogenously determines the measures of decentralization (both fiscal and political indicators). The standard instruments that the available literature uses include country size(Arikan, 2004), geographic fragmentation Index (Canavire-Bacarreza et al., 2020), population size, and trade openness (Sepulveda and Martinez-Vazquez, 2011),

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[22]We only test the notion of having both the indicators in one equation with FGLS model.

[23]The test with alternate measures of inequality (PW-CV and Gini Index) are presented in Table 8 and 9 in online appendix. The results for Revenue decentralization with (CV, PW-CV, and Gini index) are presented in Table 10 to Table 12 in Online appendix.

Table 5: Panel results (FD and PD mix) annual data (FGLS)

Dependent variable: Coefficient of Variation (CV) of regional GDP per capita (1990-2015)						
Models	(1)	(2)	(3)	(4)	(5)	(6)
Expenditure Decentralization	0.066**	0.016	0.028	0.029	-0.011	0.058*
	(0.029)	(0.025)	(0.025)	(0.029)	(0.029)	(0.032)
Autonomy	-0.175***					
	(0.049)					
Residual autonomy		-0.383***				
		(0.048)				
Autonomy/residual authority			-0.298***			
			(0.035)			
Bottom tier elections				0.113*		
				(0.058)		
Second tier elections					0.241***	
					(0.055)	
Bottom/second elections						0.033
						(0.058)
Trade openness	0.002***	0.001***	0.001***	0.001***	0.001***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Natural resource rent	0.005***	0.002*	0.005***	0.004***	0.004***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPPC	0.557***	0.218	0.432***	0.490***	0.756***	0.492***
	(0.131)	(0.150)	(0.136)	(0.161)	(0.182)	(0.149)
GDPPC^2	-0.035***	-0.011	-0.028***	-0.032***	-0.047***	-0.030***
	(0.008)	(0.009)	(0.008)	(0.010)	(0.012)	(0.009)
Ethnicity	0.311***	0.548***	0.396***	0.259***	0.262***	0.261***
	(0.057)	(0.066)	(0.061)	(0.082)	(0.077)	(0.076)
Surface area	0.007	0.036***	0.012	0.034**	0.028**	0.017
	(0.012)	(0.013)	(0.011)	(0.016)	(0.014)	(0.016)
Urbanization rate	-0.002	-0.005***	-0.001	-0.002	-0.005***	-0.003*
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Unemployment rate	-0.003	-0.009***	-0.007***	-0.003	-0.000	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Concentration Index	0.012	0.003	0.010	0.005	-0.002	0.004
	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
Territorial Units	0.008***	0.006***	0.007***	0.006***	0.008***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic quality	-0.003	-0.001	-0.003	-0.002	-0.004	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-2.087***	-1.107**	-1.544***	-2.108***	-3.051***	-1.953***
	(0.491)	(0.554)	(0.521)	(0.605)	(0.691)	(0.561)
Observations	262	262	262	262	262	256

Robust Standard errors in parenthesis. Coefficients significant at 1% level *** p<0.01, at 5% level ** p<0.05, at 10% level * p<0.1
All regressions include time dummies (not shown) and controls for heteroskedasticity and AR(1).

or lagged values (fiscal decentralization)(Bartolini et al., 2016), democracy(Lessmann, 2012). However, we resort at using certain institutional channels that we believe are necessary for a successful policy implementation such as decentralization reforms. Owing to this we use an index of democracy as defined by Polity2 Index (Marshall et al., 2018) (the number of years a country has experienced democracy). This indicates the trust of people in institution of democracy and participation in decision making. Furthermore, we use democratic accountability which implicates if the public representatives do not perform in an optimal way, they will be at risk of voted out. Similarly, bureaucratic quality plays an important role in strengthening the institution of democracy and suppressing economic crisis on the risk of democratic breakdown (Andersen and Krishnarajan, 2019). We include corruption index, and government stability scores to control for financial and political risks to countries. We further use indicators of a stronger sub-national government measures; municipal elections[24] (municipal governments locally elected) and municipal and state elections[25] (municipal and state/provincial governments locally

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[24]The indicator takes the value of 0 if neither the local executive nor the legislative were locally elected, 1 if the executive was appointed by the central government and the legislative was locally elected, and 2 if both the executive and legislative were locally elected.

[25]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, legislature at either municipal or state/provincial government elected; 2 if both locally elected at 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

Models	Dependent Variable: Coefficient of Variation of Regional GDP per capita (1990-2015)				
	(1)	(2)	(3)	(4)	(5)
Expenditure Decentralization	0.826**				
	(0.400)				
Revenue Decentralization		1.674*			
		(0.952)			
Tax Decentralization			0.545		
			(0.570)		
Autonomy/residual authority				-0.511***	
				(0.0582)	
Bottom/second elections					0.294
					(0.239)
Trade openness	0.000594	-0.000586	0.00326**	0.00294***	0.00220***
	(0.00126)	(0.00257)	(0.00130)	(0.000539)	(0.000796)
Natural resource rent	0.0315***	0.0256***	0.0105**	0.0114***	0.0277***
	(0.0100)	(0.00979)	(0.00536)	(0.00343)	(0.00335)
GDPPC	1.116**	2.047**	1.081**	-0.721*	-0.647
	(0.473)	(0.884)	(0.488)	(0.398)	(0.436)
GDPPC^2	-0.0708**	-0.117**	-0.0640**	0.0446*	0.0319
	(0.0293)	(0.0488)	(0.0285)	(0.0251)	(0.0265)
Ethnicity	-0.183	0.795**	0.451***	0.794***	0.222
	(0.148)	(0.403)	(0.174)	(0.196)	(0.593)
Surface area	-0.118	-0.241	-0.0323	0.0314	0.124
	(0.0740)	(0.176)	(0.0615)	(0.0364)	(0.234)
Urbanization rate	-0.00324	-0.00464	-0.00261	-0.00811***	-0.0114*
	(0.00215)	(0.00340)	(0.00261)	(0.00261)	(0.00690)
Unemployment rate	-0.00233	-0.0177**	-0.0133**	-0.0156***	0.00954
	(0.00436)	(0.00746)	(0.00644)	(0.00493)	(0.0155)
Concentration Index	0.0526	0.0705	0.106*	0.0473*	0.0760***
	(0.0463)	(0.0445)	(0.0546)	(0.0246)	(0.0248)
Territorial units	0.0130***	0.0117**	0.00654**	0.00702***	0.0101***
	(0.00333)	(0.00461)	(0.00258)	(0.00191)	(0.00339)
Democratic quality	0.00768	0.00901	0.00744	0.00444	0.0123
	(0.0153)	(0.0188)	(0.0150)	(0.00861)	(0.0156)
Constant	-2.794	-5.691**	-4.058**	2.669*	1.429
	(1.718)	(2.400)	(1.863)	(1.591)	(3.276)
Observations	222	216	201	192	165
Number of country	13	12	11	11	9
Wald test	77.95	40.40	72.61	495.15	442.55
p-value	0.000	0.000	0.000	0.000	0.000
R^2 within	0.0390	0.1338	0.1686	0.0712	0.2235
R^2 between	0.7980	0.7730	0.9389	0.9775	0.9759
R^2 overall	0.7300	0.7242	0.8869	0.9217	0.9363
Instruments	DEMOC18 CORRUPT	DEMOC18 BUREAUQ GOVSTABLE	DEMOC18 BUREAUQ	DEMOC18 BUREAUQ CORRUPT STATPREL	DEMOC18 DEMACC MUNELEC
Sargan-Hansen statistic	2.694	4.512	0.205	2.614	2.981
	0.1007	0.1048	0.6505	0.4551	0.2253

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
All regressions include year dummies (not shown). Standard errors calculated clustering on country level in all regressions.

elected)[26].

The institutional quality plays an important role in making decentralization reforms work. As a matter of fact all policy reforms aiming at fighting the menace of inequalities are designed in stronger institutional frameworks. Our instruments are valid that they help financial and political accountability on 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 explained below[27].

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government and only legislature elected at the other; and 4 if all locally elected.

[26] 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.

[27] We only test the instrumental variable technique with CV and not with alternate measures.

Looking at the results from G2SLS in Table 6 we find that among fiscal decentralization measures expenditure and revenue decentralization indicate a positive and significant association to inequalities. Expenditure indicator is instrumented with institutional controls for years of democracy and the indicator of corruption within the political system. Furthermore, the indicator of revenue is instrumented with bureaucratic quality and government stability index in addition to years of democracy. Tax decentralization indicator does not exhibit significance, however, it is positively associated to outcome variable. The autonomy indicator is negative and significantly associated to regional inequalities. It is instrumented by years of democracy, bureaucratic quality, corruption within the political system, and the elections on municipality and state level. Furthermore, these results are in strong support to our results found with cross-section and panel analysis. Our instruments are valuable as they explain the decentralization measures well. The validity of our instruments in each model is tested by Sargan-Hansen over-identification test. The results of the test are reported along with the instrumental variable results in Table 6. Hence, we find our results robust to the use of instrumental estimation techniques.

6   Summary and Conclusion

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

In this paper we explore the link between decentralization and regional disparities in 19 Asian countries through different econometric approaches. We use a rich data-set 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 income inequalities are complex and often work in opposite directions. Therefore, it is difficult to make anticipations on what possible net effect decentralization (political, fiscal, and administrative) may have on inequalities.

Looking from the theoretical perspective it is asserted that decentralization may increase regional inequality. This could be induced by weak redistribution capacity of the central government as a result of decentralization (Prud'Homme, 1995). In contrast it could be that 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 effect. On 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 taking political autonomy indicators. However, his ultimate results are contingent on the level of economic development.

Our analysis takes political and financial decentralization indicators (individually and in a mix scenario) 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 capacity in 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, fund embezzlement, and capacity of sub-national governments undermine growth and convergence. This results in increasing disparities as local authorities fail to deliver to the public demand and impact regional economic growth. These results are in line with the empirical literature that find increasing effects of fiscal decentralization on regional inequalities (Shankar and Shah, 2003; Canaleta et al., 2004; Akai et al., 2005; Ezcurra and Pascual, 2008; Lessmann, 2009; Rodríguez-Pose and Ezcurra, 2010).

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

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

From a policy perspective our empirical analyses have a greater implication in understanding decentralization trajectories in Asian countries. The countries with large area and population in the region adopt decentralization for one reason or the other, 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 dimensions of decentralization is related to inequalities in a simultaneous manner. The policy makers desiring to reduce inequalities should not consider initially decentralization in separate dimensions but also make sure the process is pursued simultaneously in multiple dimensions to achieve economic and political goals. Keeping in view the larger part of world population living in Asia with a very diverse social set up the paper imperatively suggests for further extensive research on a larger scale. The results presented in our analysis provide an insight to 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 the political autonomy.

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Appendix A

Table 7: 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
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
		Dpartment 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 8: 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 measures 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 grants as a share of sub national governments' expenditures. This is also known as dependency ratio. A higher degree would mean more dependency on higher tier of government.	IMF GFS, Regional budget documents
Federal System Dummy	A dummy variable for countries with a federal constitution system of government.	Treisman (2008) OECD country profiles
Sub-national tiers	The number of government administrative tiers.	Treisman (2008) 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.	Treisman (2008)
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.	Treisman (2008)
Autonomy and/or residual authority	SNGs autonomy and/or residual authority (sum)	Treisman (2008) 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)	Treisman (2008)
Elections on second tier	A dummy variable to show if the elections are conducted at the second tier of government (electoral decentralization measure)	Treisman (2008)
Elections on bottom and/or second tier	The elections at second and/or bottom tier of government.	Treisman (2008) 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 kilometres.	WDI, World Bank
Urbanization Rate	Share of Urban population as a percentage of total country population.	WDI, World Bank
Unemployment Rate	Share of unemployed population in total labour 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 fractionalizationindex corresponds 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.	L.Dranzova (2019) Harverd Dataverse
DEMOCRACY	Democracy index as reported by Polity IV project.	Marshell and Gur (2018)
DEMOC18	Number of years of democracy since 1800 as provided by democracy index reported by Polity IV project.	Marshell and Gur (2018)
DEMACC	Democratic accountability measure as reported by ICRG database.	ICRG (2017)
BUREAUQ	BUREAUCRATIC quality indicates institutional strength and quality of the bureaucracy as reported by ICRG database.	ICRG (2017)
CORRUPTION	This indicates corruption within the political system as reported by ICRG database.	ICRG (2017)
STABILITY	This indicates government stability indicated by government unity, legislative strength, and popular support as reported by ICRG database.	ICRG (2017)
MUNELEC	An indicator if the local executive and legislative are locally elected.	IADB (2017)
STATPRELE	An indicator if the all local executive and legislative are elected locally at state and muncipal level.	IADB (2017)