

# **Spatial Inequality and Development\***

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\* This is the Introduction to an edited volume of papers, from the Cornell-LSE-WIDER conference on Spatial Inequality and Development. The conference is part of a larger WIDER project on Spatial Disparities in Human Development.

## 1. Five Questions

What exactly is spatial inequality? What are its determinants? How has it been evolving? Why does it matter? And what, if any, should be the policy response to spatial inequality?

These questions have become important in recent years as, amidst a growing concern about increasing inequality, the spatial dimensions of inequality have begun to attract considerable policy interest. In China, Mexico, Russia, India, and South Africa, as well as most other developing and transition economies, there is a sense that spatial and regional inequality, of economic activity, incomes and social indicators, is on the increase. To some extent this may be a normal feature of economic growth, as new activities develop around coasts or border regions. But are such patterns transient or permanent? What factors are conducive to the spread of activity from booming to backwards regions? Also important in the policy debate is a perceived sense that increasing internal spatial inequality is related to greater openness of economies, and to globalization in general.

Spatial inequality matters for a number of reasons. Market failures, and the positive and negative externalities associated with clustering and congestion, mean that outcomes are likely to be inefficient. The growth of mega-cities may be one aspect of this, but policy responses are far from clear. Should infrastructure expenditure be concentrated or dispersed? Should internal migration flows be restricted, or facilitated in order to narrow spatial wage gaps? Spatial inequality is a dimension of overall inequality, but it has added significance when spatial and regional divisions align with political and ethnic tensions to undermine social and political stability.

But despite these important popular and policy concerns, there is remarkably little systematic documentation of the facts of what has happened to spatial and regional inequality over the past ten to twenty years. Correspondingly, there is insufficient understanding of the determinants of internal spatial inequality in a globalizing world. As a result, the policy discussion tends to take place in something of an analytical and empirical vacuum. This volume of papers is the result of the first in a series of general and region-specific conferences on spatial inequality and development, which are in turn part of a project organized by the World Institute for Development Economics Research.

Collectively, the papers in this volume represent an attempt to answer the questions posed above, based on data from 25 countries covering all regions of the world. They bring together perspectives and expertise in development economics and in economic geography. They form a well researched entry point into an area of growing analytical and policy importance. This introduction provides an outline of the volume and brief descriptions of the papers, and ends by highlighting key issues and areas for further research.

## 2. Overview of the Volume

The volume begins with papers on measurement issues. An essential first step in measuring spatial inequality in a country is to develop accurate measures of real income disparities across regions within countries. The recent spurt of interest in economic geography has led to a greater focus on regional level estimates of output within a country, but the paper by Aten and Heston (this volume) addresses head on the important question of accounting for regional price differences in making these calculations. While the PPP project has been invaluable in generating data on price variations across countries, there is very little comparable data on price variations across regions within countries. Given this limitation, the authors develop indirect methods, by modeling the variation in prices for the regional units in the world for which there is indeed regional price data, as a function of variables for which data is more generally available. The preferred estimated relationship can then be used to generate price indices for other regions of the world, and these prices can in turn be used to convert nominal output data into real output. The technique developed by Aten and Heston will prove indispensable to empirical researchers working on spatial inequality, whether in developing or developed countries.

Data availability is equally a problem in terms of household surveys which form the basis of much of the empirical work on interpersonal inequality, and the measurement of poverty in developing countries. The problem here is that while household surveys collect detailed information on income, consumption and social indicators, their sample sizes are not large enough to allow adequate disaggregation to regional or sub-regional levels within a country. On the other hand, census data do not have much of the detailed information at the household level needed for inequality and poverty analysis. The obvious answer is to combine these data sources, and the paper by Elbers et. al. (this volume) does just that. The approach is similar in some ways to that of Aten and Heston. The variable of interest which is available only in the household survey, in this case some measure of household well being, is modeled as function of explanatory variables in the household survey that are also available in the census (or a survey with a much larger sample survey). The relationship estimated on the household survey is then applied to the census to generate an effectively larger sample of household well being, which can then be disaggregated at the regional and sub-regional levels to study spatial inequality in household wellbeing.

The power of their technique is then illustrated by Elbers et. al by application to Ecuador, Madagascar and Mozambique. They decompose national inequality into inequality within and between spatial units at successively finer levels of disaggregation. A major conclusion, consistent with the general inequality decomposition literature, is that the within group component of inequality stays high (in excess of 75%) even at what seems to be very high levels of disaggregation (in Ecuador, for example, down to the level of 915 local units with an average of just over 1000 households). Thus the contribution of average variations across spatial units, to total interpersonal inequality, seems to be no greater than 25 %. Does this mean that spatial inequality is not a

phenomenon of great policy interest? In fact, the papers in this volume suggest otherwise, and this point will be taken up towards the end of this introduction.

The second section of the volume moves from the perspective of measurement of income inequality to the perspective of economic geography. The paper by Escobal and Torero (this volume) looks at the micro level and investigates the determinants of the spatial variation in household level wellbeing in Peru, using household survey data for 1991, 1994, 1996 and 1997. They first of all show the high level of spatial inequality in Peru. But they also argue that these geographical differences can be accounted for by variation in private and especially public assets. Once these are accounted for, pure geography in the sense of altitude or temperature does not influence measures of household wellbeing. However, as they recognize and highlight, this simply pushes the question back one stage—the effect of geography on the provision of such an uneven distribution of public infrastructure, and the concentration of economic activity over and above the influence of physical geographical constraints.

The recent theoretical literature has suggested the importance of location and agglomeration externalities as key determinant of spatial concentration of economic activity and income. The empirical literature has lagged behind the theoretical developments, and the two papers in this section are attempts to identify and quantify these factors in the data. The paper by Davis and Weinstein (this volume) investigates the effect of region size on regional productivity, allowing for possible spillover effects across neighboring regions, and other more standard explanatory factors. Using data from 40 Japanese regions, they find that own size does matter in explaining regional total factor productivity—doubling own size raises productivity by 3.5%. Moreover, the nature of neighboring regions matters too for a region's own productivity. The uneven pattern of activity in Japan contributes to overall efficiency—if aggregate activity were to be spread evenly across the regions of Japan, output would be lower by 5 %.

Ravallion's contribution to this volume comes at the issue of externalities from the micro level of household survey data. Starting with panel data on 5,600 farm households from 111 counties in four provinces of China, he seeks an explanation of household consumption growth over the period 1985-90. He estimates a model of consumption growth that has household level variables and locality level explanatory, allowing for time variant fixed effects. There is strong evidence of geographical externalities, in the sense that locality level variables have an effect on consumption growth over and above household level attributes. The explanation is that the level and nature of local economic activity, in the aggregate, affects the household level returns to human capital and infrastructure.

The previous sections established that spatial inequality can be large, and that location externalities play a key role in explaining variations in wellbeing across space. But do these spatial differences persist, or do they tend to diminish over time? The next two papers in the volume are contributions to the literature on regional convergence. Using data on Indian states, Bandyopadhyay (this volume) confirms a complex pattern. Indian states are evolving into a pattern of two clusters, with convergence within each

cluster, but with the clusters diverging from each other. The geographical contiguity of the two clusters in the Indian case supports further the importance of near neighbor effects as identified by Davis and Weinstein (this volume).

The paper by Azzoni et. al. (this volume) presents an important criticism of the convergence literature. This literature focuses on the convergence of an aggregate like per capita income at the regional level. Azzoni et. al. argue that per capita income is a blend of demographic and economic factors—for example a combination of the age income relationship and the age structure for a region. Using micro age-income level data across Brazilian regions, they show that the rate of convergence differs across age cohorts, and the aggregate results on convergence thus reflect the age composition of different regions, and of course changes in this age composition. The aggregate data suggest a speed of convergence which is much slower than the convergence for specific age cohorts. This opens up a new line of research, opening up the convergence black box as the title of the paper suggests, which should become more prevalent as more extensive micro level data become available for developing countries.

The next two papers in the volume investigate the importance of the regional linkage between national growth and micro level poverty reduction. Friedman (this volume) uses six household surveys over the fifteen year period 1984-99 to analyze the impact of growth on poverty. He finds a very close connection between national growth and poverty reduction. But he finds rural poverty reduction that was more responsive to growth in the central locations of Java and Bali than it was in the more remote regions like Kalimantan. He suggests that, once again, public infrastructure such as transport networks can explain this variation.

In their paper, Demery et. al. investigate the relationship between growth and poverty reduction using household survey data for eight African countries. Their conclusions are similar to those of Friedman for Indonesia. While economic growth is a key correlate of poverty reduction, its impact on poverty depends crucially on how remote poor households are from the centers of economic activity, and how well served they are to infrastructure services. During a period of strong economic growth in Uganda between 1992 and 2000, for example, the incidence of poverty fell by a half in the Central Province, but by only 9 per cent in the remote Northern Province. In Ghana between 1992 and 1998, poverty in the capital city Accra fell sharply, but not so sharply in other, less well connected, urban areas, and indeed it increased in the remote northern Savannah zone. Further detailed analysis highlights the importance of infrastructure in explaining these variations in the extent to which national growth is translated into poverty reduction across space.

As noted at the start of this introduction, one of the areas of concern in spatial inequality is the extent to which the increases seen in the last decade or two have been connected with the opening up that many economies have experienced, to trade and to foreign direct investment. The next section of the volume takes up this important question. The findings of Rodriguez-Pose and Sanchez-Reaza are consistent with a growing literature on regional inequality in Mexico post-NAFTA. The authors find

unmistakable trends towards greater regional inequality and polarization. The earlier trend towards regional convergence has been reversed, and there is growing polarization between the North and the South. Clearly, proximity to the US market has been a determinant in the concentration of economic activity, and these forces have interacted with uneven distribution of infrastructure and public services to create very different opportunities for the different regions of Mexico.

Many studies take the spatial inequality of wage rates as the relevant object of study. The next two papers in this section of the volume investigate spatial variation in wage rates, in China and in Africa respectively. Growing regional inequalities in China over the last two decades are much discussed in the literature, and in her paper Lin takes up the inter-regional wage inequality dimension of this question. Specifically, she focuses on the effects on wages of differential access to international markets. Defining “market access” and “supplier access” variables, she finds that about a quarter of the wage difference in the coastal provinces and about 15 % of the differences in the interior provinces can be explained by a provinces market access and supplier access. Since China’s provinces are as large as many individual countries (like Mexico), this is further support for the proposition that greater openness to trade can lead to greater spatial inequality in living standards, even when such opening up increases overall efficiency and growth, as it has done in China.

The paper by te Velde and Morrissey is a comprehensive study of wage differentials in five African countries. Not surprisingly, wages are higher in the capital city compared to the rest of the country. This is partly because workers in the capital city have more years of formal education, which is shown to be a key individual level determinant of wages. It is also partly due to the fact that foreign owned firms are more likely to be located in the capital city, and it is also shown that these firms are more likely to pay higher wages than indigenously owned firms. If these foreign firms are also more productive, then the efficiency gains will have to be taken into account in assessing the consequences for distribution of opening up the economy to foreign firms. Finally, correcting for individual worker characteristics like education and tenure, and firm characteristics like size and foreign ownership, they find that workers in the capital city earn a substantial premium compared to the rest of the country of as much as 28%. One problem with interpreting this goes back to the first paper in this volume, by Aten and Heston. Since te Velde and Morrissey do not have data on price variations within a country, they cannot establish definitively that the nominal wage premium they establish in fact survives in real terms. In general, since the cost of living is higher in capital cities, the real wage differentials would be far less.

The economies in transition are a particularly interesting setting in which to study spatial inequality. Their rapid liberalizations and opening up to the external world are known to have increased inequality and in some cases poverty. What exactly are the spatial dimensions of this increase in inequality? The last two papers in this volume take up this issue, paying particular attention to data quality and interpretation. In their study of the Czech Republic, Hungary, Poland and Russia, Forster et. al. present a finding that is consistent with the outcome in many other countries—the capital city and well

connected urban areas closer to western markets in the European Union have gained from overall economic growth, while remote regions have not done as well or actually lost out from the process of transition so far. These gaps, and relatedly the rural-urban gap, have increased.

Yemtsov conducts an in depth study of the evolution of inequality and poverty in the Russian regions over the period 1994-2000, based on the Household Budget Survey. He finds that the contribution of between region inequality to total interpersonal inequality is 33%, a little higher than for the countries in Africa and Latin America studies by Elbers et al. But it has been growing—in fact, most of the increase in interpersonal inequality in Russia is accounted for by the increase in the between regional component. Not surprisingly, standard convergence tests show no convergence between Russian regions. If these trends continue, Yemtsov calculates that in a decade's time the majority of the Russian poor will be concentrated in a few impoverished regions, a picture of the concentration of poverty that bears similarity to a number of other countries such as Peru also studies in this volume.

### **3. The Five Questions Again**

Let us return to the five questions posed at the start. First, what exactly is spatial inequality? The dominant perspective on inequality in economics comes from considerations of interpersonal inequality—how individuals differ from each other along dimensions such as income, consumption, education, and health (in what follows, we will use income/consumption as the representative dimension). One way of approaching spatial inequality is to start from interpersonal inequality and consider its spatial dimensions. For any given delineation of individuals into mutually exclusive and exhaustive spatial units, each unit can be characterized by its per capita income and its population share. With this set up there are several possible characterizations of spatial inequality.

- (i) Unweighted variation in per capita income across spatial units.
- (ii) Population share weighted variation in per capita income across spatial units.
- (iii) Contribution of variation in per capita income across spatial units to income variation across all individuals.

All of these conceptualizations of spatial inequality are present in the literature, and in this volume. The first of them is the effective object of interest in the large number of studies on regional convergence (although they should all pay heed to the difficulties of taking into account regional price variations, as highlighted by Aten and Heston in this volume). In the papers by Bandyopadhyay and by Azzoni et. al, in this volume, each spatial unit is treated as one observation, irrespective of its population size, and convergence is analyzed on this set of observations.

But it is the last two conceptualizations that come closest to the instinct of mainstream economics to treat interpersonal inequality as being the fundamental object

of interest. Spatial inequality is clearly related to variation across spatial units and per capita income of a spatial unit is the analog of individual income. The question can then be asked—what would have been the inequality among individuals if all individuals within a spatial unit had the per capita income of that unit, so that the only variation across individuals was that attributable to space? This is essentially the population share weighted variation in per capita income across spatial units. From this perspective, therefore, (ii) has claim to be a measure of spatial inequality. But if the ultimate object is overall interpersonal inequality, then we are led to (iii), the percentage of total interpersonal inequality “accounted for” by (ii). As shown in this volume, taking (iii) as the concept of spatial inequality leads empirically to the conclusion that spatial inequality accounts for, at most, one third of total interpersonal inequality. Most of the variation across individuals is within spatial units, not across them, even for quite fine disaggregations, as shown in the papers by Elbers et al and by Remtsov.

What are the determinants of spatial inequality? If all economic activity were to take place on a “featureless plane”, and if economic activity had the standard neoclassical properties, economic activity would be evenly distributed across space and there would be no spatial dimension to inequality. But the world does not satisfy either of these two assumptions. There are real geographical features such as mountains and coasts and forests and rivers that can affect the distribution of economic activity and spatial inequality in wellbeing. But one conclusion from the studies in this volume (eg the papers by Escobal and Torero, Friedman and Demery et. al.), and the literature more broadly, is that the impact of these natural features is not as important as the geographical distribution of other features—specifically, infrastructure and public services. As shown in a number of papers in this volume, a key determinant of household wellbeing in a region, over and above household specific characteristics, is the quantity and quality of infrastructure in that region.

However, even without variations in physical features, or infrastructure variations across regions, once the standard assumptions of neoclassical economics are dropped a number of possibilities arise for the propagation of spatial inequality. The new economic geography has highlighted, in particular, location and agglomeration externalities. These can arise because of knowledge spillovers, thick market effects, or input-output linkages between firms. They operate at various spatial levels; within regions of dense economic activity; within cities; and within narrowly specialized industrial districts of cities. Evidence has slowly begun to accumulate on the magnitude of the agglomeration externalities that create these disparities. The papers by Davis and Weinstein and by Ravallion in this paper are an important contribution to this literature, and highlight the importance of agglomeration effects and location externalities.

How has spatial inequality been evolving over the past two decades? If the evidence presented in this volume is anything to go by, it has been on the increase. Its relationship to greater openness in trade and investment is investigated by Rodriguez-Pose and Sanchez-Reaza for Mexico and by Lin for China. Even where the last two decades have brought overall growth and poverty reduction, the benefits of this growth have not flowed evenly across space. Spatial inequality has grown (especially in

transition economies, as documented by Forster et al, and by Yemtsov), with the result that poverty reduction has been uneven across regions within a country (as documented for Africa by Demery et al and for Indonesia by Friedman). However, a number of key questions remain. To what extent is some increase in spatial inequality a natural feature of development, as growth is initially concentrated in a few regions? Is this increase temporary, and how long is it likely to take for growth to spread from region to region? Some existing research suggests a pattern of increasing then decreasing spatial inequality, but further research is needed to identify factors that are conducive to the dispersion of activity.

Why does spatial inequality matter, and is a policy response appropriate? We have seen that spatial inequality accounts for only around one-third of total inequality, and part of this may be transient rather than permanent. Does this mean that spatial inequality is unimportant, as some might be tempted to argue? One argument in favor of doing nothing, or very little, is that if our ultimate objective is total interpersonal inequality, and if spatial inequality is at most one third of this total, surely policy should focus on inequality within spatial units (which accounts for two thirds of the total) rather than between. There are several responses to this. First, one third is smaller than two thirds, but is still quite big—eliminating spatial inequality would have an impact on inequality that is far larger than some cross-country variations in inequality. And, as in the case of Russia, there are periods when even though spatial inequality is relatively small, much of the increase in total inequality is in fact increase in spatial inequality. However, the real question here is what policy instruments are available to address within and between group inequalities, and what the cost benefit of each instrument is. It may well turn out that “per unit of inequality reduction” the instrument that addresses between group inequality is cost effective. This will depend on the specifics of the case -- addressing between group inequality cannot be simply dismissed because between group inequality is a smaller than within group inequality.

Furthermore, it might be the case that the distribution of individual attributes, such as ability, is the same in all regions. Spatial inequality is then particularly inequitable and – especially when aligned with political, religious or ethnic tensions – may be dangerous to social and political stability. If spatial divisions align with ethnic, religious or language splits, as so often happens, then the between group component of inequality takes on a greater significance than its contribution to interpersonal inequality. In such cases, we ignore growing spatial inequality at our peril. Even when spatial units do not represent ethnic or other cleavages, but command the allegiance of the population as political entities, increasing disparities in group averages may lead to tensions and conflict in some cases.

Additional arguments derive from the real income losses that may be associated with spatial inequality. Spatial location decisions are associated with multiple market failures, particularly when agglomeration forces are present. These market failures depress real income, and may also retard growth as they depress the returns to job creation. For example, it is often suggested that prime cities are excessively large. There may be negative externalities arising from congestion costs in large cities. In addition,

the presence of agglomeration economies and increasing returns to city formation gives rise to a coordination failure, as it is not profitable for a single firm to relocate and establish a new center of activity. What is needed, if new centres are to be established, is a collective or policy coordinated movement.

Complex policy choices also arise with migration and infrastructure. According to one view there is too little migration, and part of the problem of lagging regions arises because of individuals' reluctance to emigrate from such regions. The reason for the reluctance to migrate may be attachment to the area of birth, or may be that individuals are locked into declining regions by location specific human capital. However, in neither of these cases is there a market failure. Failures, and consequent arguments for policy, arise if migrating individuals exert positive or negative externalities on other individuals in the locations that they are leaving or that they are joining. It is then far from clear that there is too little migration – there may well be too much, particularly into established urban centres. Similarly with infrastructure. As Escobal and Torero (this volume) show, provision of public infrastructure is an important determinant of household well-being. Such investments may allow individuals to increase the return to their general and location specific human capital and be a powerful instrument in favor of greater spatial equality. However, the benefits of such an allocation need to be weighed against the costs, particularly as urban infrastructure needs are often pressing.

The case for policy interventions to ensure a more spatially equitable and efficient allocation of infrastructure and public services has been made powerfully in the papers in this volume. But the specifics of this policy conclusion still need to be developed. The benefits of such an allocation need to be weighed against the costs, so both will have to be quantified. In order to do this we will need a deeper and more detailed understanding of the determinants of spatial inequality, and how exactly policy interventions in infrastructure and other areas will impinge on it. The papers in this volume have made a start. A full research agenda lies ahead.

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