

**Spatial Inequality and Economic Development:  
Theories, Facts and Policies**

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## **Abstract**

Spatial inequality is an important feature of many developing countries which seems to increase with economic growth and development. At the same time, there seems to be little consensus on the causes of spatial inequality and on a list of effective policy instruments which may foster or reduce spatial inequality. This paper examines the theoretical and empirical literature on spatial inequality to learn what we know and do not know about the causes of spatial inequality, to investigate what policies may or may not ameliorate spatial inequality, and to determine whether policy makers can identify and implement policies that promote or reduce spatial inequality.

## **1. Introduction**

Spatial inequalities in income, health, education and poverty present significant economic and political challenges for the governments of many developing countries. While systematic evidence on the extent of spatial inequality in developing countries is still relatively scarce, a growing body of work has documented the existence of spatial inequalities in many forms in various countries in Asia, Europe, Africa and Latin America (Kanbur and Venables (2005a,b), Kanbur, Venables and Wan (2006)). Because rapid economic growth is often associated with uneven regional and urban development, policy makers are also concerned that development is likely to exacerbate rather than reduce spatial inequalities. Yet, despite these concerns, there seems to be little consensus on the causes of spatial inequality and how policy makers should respond to growing spatial inequalities.

From the standpoint of economic efficiency, spatial inequality may be beneficial or harmful. If spatial inequality results from regional specialization based on comparative advantage or returns to scale in production, then spatial inequality may be beneficial as productivity is increased. But if spatial inequality is caused by external economies that are not internalized, then the level of inequality may not be optimal. In particular, spatial inequality in the form of the excessive concentration of urban population in large primate cities may impose a variety of social ills in society. From the standpoint of equity, spatial inequality may be socially undesirable if it contributes to social inequality across regions. Moreover, spatial inequality may be socially de-stabilizing if the regional divergence in economic welfare and political interests contributes to general social instability.

Thus, for scholars and policy makers, there are many important questions concerning spatial inequality and development. What are the causes of spatial inequality? What is the nature

of our evidence on the various causes? What is the optimal level of spatial inequality? Does rapid growth accelerate spatial inequality? Is the rise of spatial inequality necessary for development? To what extent is the rise in spatial inequality a short-run or a long-run phenomenon? Do globalization and international trade increase spatial inequality within nations? What can governments do to promote or reduce spatial inequality?

This paper seeks to shed some light on these important questions by reviewing the current state of knowledge on the theories, empirics and policies of spatial inequality and development. In recent years, even though research on spatial inequality of developing countries remains in a nascent stage, there has been an explosion of new research on the general causes of spatial agglomeration both theoretical and empirical (Henderson and Thisse (2004)). In theory, there have been significant advances in highlighting the micro-foundations of spatial agglomerations; in empirics, the advent of the computer along with advances in empirical methods have greatly expanded the quality of empirical evidence on agglomeration economies.

Even for policy makers, a basic knowledge of the developments in the theory of economic geography may be needed to evaluate the merits of policies proposed by various scholars. In economics, innovations in theory continue to dictate the course of scholarly discourse. Empirical studies rarely have a decisive impact on policy or theory. Even though the amount of empirical evidence has increased substantially in recent years, policy directives are likely to be influenced by a scholar's theoretical perspective and a subjective weighing of the evidence rather than solely by the scales of systematic empirical evidence. Because theories that have little proven empirical track record can quickly enter the realm of policy discourse, policy makers must take heed of the inherent theory bias in economics.

While issues concerning regional and urban inequality are usually addressed separately, policy makers need to make sense of the interdependent nature of regional and urban spatial inequality. Because the fields of regional and urban economics developed separately, the literature on spatial inequality treats regional inequality and urban inequality as two separate phenomena. Once again, the most important reason for this dichotomy is due to theory – namely, it is extremely difficult to develop a unified theory of regions and cities in a satisfactory manner (see Fujita et. al (1999)). Only in the extreme case where cities are uniform in size and are uniformly distributed across regions do we expect urban inequality to have limited impact on regional inequality. In reality, city sizes and their geographic distribution are both very uneven.

To the extent that industrial revolution and urbanization go hand in hand, the rise of North-South regional core-peripheries are likely to be intimately related to urban development. The U.S. North-South divergence in incomes and industrial structures between the late nineteenth and the early twentieth centuries coincided with rapid urban development in the North as compared to the South. Even at a more regional level, it is impossible to imagine the rise of the city of Chicago as the mercantile center of the Midwestern U.S. in the late nineteenth century without its access to a rich rural hinterland (Cronon (1991)). Conversely, for a given population, the extent of urban scale economies is likely to influence the number of cities and their geographic distribution across regions. In the U.S., it probably is not a simple coincidence that urban densities rose significantly when regional inequality rose but fell considerably when regional inequality fell (Kim (1995, 1998, 2007a)).

Policy makers face a bewildering array of empirical evidence on spatial inequality which is difficult, if not impossible, to evaluate. Studies vary greatly in terms of focus, but also in their methods of measurement of spatial inequality which often are not comparable. The problem is

most severe for studies of developing nations where scholars must resort to survey rather than government census data. While it is extremely challenging to summarize this literature, some important themes emerge. Policy makers need to take into account the dynamic nature of spatial inequality, must be able to evaluate the impact of foreign trade on spatial inequality and, perhaps most importantly, understand the role of political institutions on spatial inequality.

The paper is organized as follows. Section 2 reviews the recent advances in the theories of regional and urban spatial inequality. In addition to the standard theories of spatial agglomeration, this section examines the impact of trade and political institutions on spatial inequality. Section 3 reviews the evidence on spatial inequality for developing and developed nations from both regional and urban perspectives. Section 4 outlines the policy implications and lessons which emerge from the literature on spatial inequality. Finally, section 5 concludes with a summary evaluation and suggestions for future research and investigation.

## **2. Theories of Spatial Inequalities**

From the perspective of theory, spatial inequality is fundamentally determined by the location decisions of firms and households. Firms choose locations to maximize profits whereas households do so to maximize job market outcomes and utility. While firms and households generally care about the quality of both of their regional and urban environments, there is no widely accepted general theory of spatial location which seems to incorporate regional and urban location decisions in a unified manner (see Fujita et. al (1999), Fujita and Thisse (2002), Berliant (2007)). Rather, the field of economic geography is divided into two fields: regional and urban economics (see Kim and Margo (2004)).

The traditional regional science models based on the central place theory possessed a regional-urban perspective, but these models have now been discredited as not having a rigorous theoretical foundation.<sup>1</sup> Instead, regional models, to the extent that they exist, are largely based on models of international or interregional trade. While it is impossible to imagine interregional (international) trade without the existence of cities, a simple perusal of standard texts in international trade will reveal a complete absence of discussion on cities.<sup>2</sup> Conversely, urban models are devoid of regional location decisions. In the classic Henderson (1974) model, cities are islands which differ only by scale. The study of the size distribution of cities without references to their locations form an important research agenda for urban economists.

Since the various theories of economic geography provide different causal explanations for spatial inequality and elicit different policy responses to combat inequality, it is important to review them in some detail. In recent years, theoretical innovations in modeling increasing returns have led to the formalization of many traditional concepts such as Marshallian externalities (technological spillovers, labor market pooling, access to non-traded intermediate inputs) and non-pecuniary externalities (forward and backward linkages and market size), which in turn has clarified the forces of spatial agglomeration and dispersion.

In general, spatial inequality is the net result of the balance of forces of concentration and dispersion. From the regional perspective, the centripetal forces of geographic concentration are natural advantages, Marshallian externalities, and non-pecuniary externalities whereas the centrifugal forces of dispersion are immobility in factors and goods caused by high

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1 The central place theory of Christaller and Losch is motivated to explain an hierarchy of cities and towns (central places) which serve rural markets. However, as pointed out by Fujita, Krugman and Venables (1999), the central place theory is not an economic model based on optimization and the equilibrium behavior of firms and households but rather a useful descriptive classification scheme.

2 To reiterate the importance of theory, international or interregional trade models usually do not address cities because neoclassical models based on comparative advantage cannot be easily adapted to incorporate city formation. Starret's theorem demonstrates that regional specialization, cities and trade cannot be equilibrium outcomes under the standard neoclassical assumptions (see Fujita and Thisse (2002)).

transportation and communications costs. From an urban perspective, the most important difference is the addition of new costs of concentration in the form of congestion costs which result from the fixed supply of land. Concentration leads to increased housing and commuting costs as well as costs caused by greater crime, pollution and exposure to disease.

This section also explores the impact of globalization and trade on spatial inequality, the influence of institutions on spatial inequality, and the relationship between household inequality and spatial inequality. First, globalization is a major force in world development today. While the forces which determine the location of firms and households caused by foreign and domestic trade are identical, citizens rarely view the economic impact of foreign and domestic trade in similar ways. Second, regional differences in institutions may affect regional inequality. Furthermore, the distribution of political and fiscal power between the federal, state and local governments is likely to impact urban inequality. Third, household income inequality is a big concern for policy makers. Thus, it is important to understand whether spatial inequality contributes to household income inequality.

## **2.1. Theories of Regional Inequality**

In regional economics, there are two classes of models which possess very different policy implications for dealing with regional inequality. In one class of models based on the standard neoclassical assumptions of constant returns to scale and perfect competition, the role of government involvement is relatively limited to infrastructural investments which affect the mobility of goods, labor and other factors.<sup>3</sup> Governments may have little ability to influence

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<sup>3</sup> The two important neoclassical models of trade, Ricardian and Heckscher-Ohlin (HO), present two different theories of regional inequality based on comparative advantage. For the Ricardian model, the source of regional comparative advantage is differences in technologies; for the HO model, the source is differences in resource endowments. If goods are mobile but factors immobile, then both theories predict a rise in regional spatial inequality based on comparative advantage. In the Ricardian model, if a region possesses absolute advantage in terms of technology, then its workers will earn higher wages before or after economic integration; in the HO model, the factor price equalization theorem implies that regional differences in incomes can only result from differences in

centripetal forces which are based on comparative advantage stemming from technology or resources, but it may increase regional specialization or inequality by lowering the mobility of goods or may decrease inequality by lowering the mobility of factors.

The potential role for government intervention is significantly higher in the so-called “new models of economic geography” based on imperfect competition and increasing returns.<sup>4</sup> First, due to the potential for “cumulative causation” forces, small subsidies can potentially have significant first order effects.<sup>5</sup> Second, infrastructural investments which increase the mobility of goods, labor and capital may have significant impact on spatial inequality due to the self-enforcing nature of increasing returns. Third, since the equilibrium market allocations are inefficient in these models, markets will not reach the optimal level of spatial inequality without government intervention.

When the sources of increasing returns are forward and backward linkages rather than market size and internal scale economies in production, then it is possible to derive an inverted

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regional industrial structures. On the other hand, if factors are mobile, all workers will migrate to the region with absolute advantages whereas migration will lead to interregional convergence in the HO model.

4 The “new economic geography” models, commonly associated with Paul Krugman, contain five essential ingredients: increasing returns to scale that are internal to the firm, imperfect competition (usually Spence-Dixit-Stiglitz monopolistic competition), trade costs (Samuelson’s “iceberg form” where goods melt away by distance), endogenous firm location and most importantly, endogenous location of demand. As Head and Mayer (2004) note, the first four ingredients give rise to the agglomeration economies of home market effects, but the last ingredient, endogenous location of demand, creates the well-known process of circular causation which causes core-periphery regions to arise from initially symmetric regions. In Krugman’s (1991a,b) model, there are two regions, North and South, and two goods, agricultural and manufacturing. Agricultural goods are homogenous, produced under constant returns and perfect competition; manufacturing goods are differentiated, produced under scale economies and monopolistic competition. The only input to production is labor; agricultural workers are immobile whereas manufacturing workers are mobile. The transportation costs of agricultural goods are costless, but those of manufacturing goods are costly. When transportation costs of manufacturing goods are high, then regions are symmetric and manufacturing is dispersed in both regions; however, as transportation costs fall, manufacturing becomes concentrated in one region (North) and the other region becomes an agricultural periphery (South). The intuition is simple: the concentration of manufacturing workers in the North creates larger markets which in turn lowers the costs of production due to economies of scale.

5 Because the models typically contain multiple equilibria, a slight perturbation caused by an industrial subsidy to an industry in a given region may increase spatial inequality dramatically. Even if two regions are initially identical, a slight advantage given to one region through tax subsidies may trigger a sharp rise in spatial inequality between these regions. Because increasing returns create a momentum of their own, cumulative causation will lead to the rise of core-periphery regions (Krugman (1991a,b)). However, there is little empirical support for such a hypothesis.

U-pattern of geographic concentration where regional inequality first rises and then falls.<sup>6</sup>

Forward linkages exist when increased production by upstream firms provides positive pecuniary externalities to downstream firms. Backward linkages exist when increased production by downstream firms provides positive pecuniary externalities to upstream firms. When labor is immobile, an initial fall in the transportation costs of final goods leads to geographic concentration and regional inequality, but when transportation costs fall further, then regional inequality declines and the location of manufacturing firms becomes more dispersed.<sup>7</sup> Thus, at least in principle, a policy which significantly lowers the transportation costs of final goods may under certain conditions lead to a long-run reduction in regional inequality.

For policy makers in developing countries, it is important to understand that these standard models of geography may prove to be an inadequate guide for understanding regional inequality in developing countries. Most of these models are static and do not contain elements of a structural shift in economic activities from agriculture to manufacturing and services – one of the hallmarks of development. First, as shown in Puga (1999), the extent of regional inequality may be limited by the manufacturing firms' ability to recruit workers from the agricultural sector. Thus, the potential for agglomeration depends critically upon the labor mobility of workers between the two sectors. Second, Murata (2002, 2007) shows that the level of regional

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6 See Krugman and Venables (1995), Venables (1996) and Puga (1999). Puga (1999) presents the most general version of the model where the results of the other papers can be derived as special cases. The model is similar to Krugman's (1991b) in that it has two regions and two goods (agricultural and manufacturing). Agricultural good is homogenous and is produced using labor and land under constant returns to scale in a perfectly competitive market; land is immobile, agricultural goods are freely mobile; consumers have Spence-Dixit-Stiglitz preferences for varieties; and, goods are produced with scale economies but they can be used both as a final consumption good or as an intermediate good for use in the same industry as in Ethier (1982). This latter specification captures the idea of forward and backward linkages in the sense of Hirschman (1958).

7 Puga (1999, p.324): "At high trade costs firms want to be where final demand is, so they split between regions. At intermediate levels of trade costs firms cluster to exploit cost and demand linkages. However, without interregional labour mobility, agglomeration opens wage differences. At low levels of trade costs, firm wants to be where immobile factors are cheaper, so they spread across regions again."

inequality may be constrained by consumer expenditure patterns.<sup>8</sup> Regional inequality generally arises as an economy shifts from agriculture to manufacturing, but the degree of shift may depend on the rapidity by which consumers increase their expenditure shares in manufacturing.

## **2.2. Theories of Urban Inequality**

For policy makers, it is critical to understand that urban inequality and regional inequality are highly interdependent. Even though most models of urban inequality do not address the issue of regional inequality, urban inequality affects regional inequality in a variety of ways. First, the well-known urban-rural wage gap will lead to regional inequality if there are regional differences in the rates of urbanization. Thus, an increase in the urban-rural wage gap may contribute to a growing regional inequality. Second, urban specialization in different industries may contribute to regional inequality if regions possess different types of cities. Third, the size distribution of cities will undoubtedly influence regional inequality. If cities are uniformly small, then urbanization is likely to have limited impact on regional inequality. However, if cities differ in size as they usually do, then urban inequality may have a major impact on regional inequality. For example, urban primacy or the concentration of a significant share of the urban population in few central cities will no doubt cause regional inequality. Thus, policies which reduce the importance of urban primacy are likely to contribute to greater regional equality.

The theories of urban inequality differ from those of regional inequality in one important respect: the treatment of land. Whereas regional immobility of factors constrain regional inequality by limiting agglomeration economies, the most important limiting factor for urban

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<sup>8</sup> In Murata (2007), the structural shift from agriculture to manufacturing is gained by introducing non-homothetic preferences which, by invoking Engel's law, shifts consumer demand from agricultural to manufacturing goods. In this model, the pre-industrial economy is defined by prohibitive interregional transportation costs. As transportation costs fall with development, the extent of market increases for manufactured goods and consumers' purchasing power rises as prices fall. Initially, at low demand for manufactures, due to low agglomeration economies, manufacturing remains dispersed. As transportation costs continue to fall further, however, the increase in expenditure shares in manufacturing leads to agglomeration forces sufficient enough to create a pattern of core-periphery.

scale or inequality is congestion costs associated with land. As firms and workers concentrate in one urban location to take advantage of agglomeration economies, they also bid up land rents. The optimal city size is determined by the balance of agglomeration economies and congestion costs. There are many sources of urban agglomeration economies. Duranton and Puga (2004) provide a useful list of categories based on economies of sharing, matching, and learning.<sup>9</sup>

In Henderson's (1974) classic model of the systems of cities, the balance of centripetal forces of Marshallian externalities and centrifugal forces of land rents and commuting costs determine the size distribution of cities. Because externalities are assumed to be industry-specific (localization economies), a city specializes in a single industry and its size is determined by the strength of its Marshallian externalities. From this theoretical perspective, urban inequality is likely to rise if localization economies are particularly strong in a few industries and is likely to fall if congestion costs are more significant relative to agglomeration forces.

In a the more recent model of cities, Abdel-Rahman and Fujita (1990) show that, if the centripetal force is changed from Marshallian externalities to the Spence-Dixit-Stiglitz-Ethier type of pecuniary externalities, then similar results in terms of the size distribution of cities arises. In the latter model, city-sizes and wages are positively-related to the variety of intermediate inputs, but unlike in Henderson (1988), cities are not of optimal sizes. In this model, urban inequality may rise if the strength of spillovers from forward and backward linkages is significant and concentrated in a few industries.

These two models provide different motivations for why cities may specialize or diversify in different industries. In the Henderson (1974) type model, the nature of Marshallian

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<sup>9</sup> The categories are based on micro-foundations of agglomeration economies. The sharing category includes sharing of indivisibilities in the provision of public goods and facilities, the gains from variety, the gains from individual specialization and risk; the matching category includes improving quality and chances of matches; and, the learning category includes knowledge generation, diffusion, and accumulation (see Duranton and Puga (2004)).

externalities determines the types of cities. If externalities are of the localization type (specific to industries), then cities are likely to be specialized; however, if externalities are of the urbanization type (specific to cities), then cities are likely to be diverse. However, in the urban models based on the Spence-Dixit-Stiglitz-Ethier type of pecuniary externalities, Abdel-Rahman (1996) shows that the extent of urban specialization or diversification may be functions of inter-city transportation costs. When inter-city transportation costs are low, then cities specialize to take advantage of the agglomeration economies from a greater variety of non-traded inputs; however, when inter-city transportation costs are high, then cities become diversified to economize on transportation costs. Thus, urban specialization, like regional specialization, may also be limited by intercity transportation costs as well as local congestion costs.

For policy makers, as with the standard models of regional inequality, these models of urban inequality are likely to prove inadequate guides for understanding urban inequality in developing countries. With the exception of Puga (1998), there is no rural-urban interaction and there is no consideration of a structural shift in economic activities from agriculture in rural areas to manufacturing and services in cities. Thus, these urban models seem particularly disconnected from the classic urban models of development such as Lewis (1954) and Harris and Todaro (1970). In Lewis (1954), the assumption of an elastic supply of unskilled labor from rural areas fuels industrial development in cities; in Harris and Todaro (1970), the rural to urban migration is caused by a politically determined minimum wage in cities and rural-urban migration may result in ex post poor outcomes for migrants if they do not obtain jobs in the formal sector but become unemployed in the informal sector.

In the standard models discussed above, the urban-rural wage gap is determined by the forces of agglomeration economies and diseconomies and transportation costs. However, Rauch

(1993), building on the basics of the Harris and Todaro (1970) model, provides a different rationale for why urban-rural wage gap arises. In Rauch's model, there are two urban sectors, formal and informal, and one rural sector. Wages are highest in the formal urban sector, but lowest in the informal urban sector. Ex ante, a rural worker will migrate to the city if the expected income is higher in the city, but ex post, the rural worker will only be better off if the person lands a job in the former sector. Thus, uncertainties in labor search may contribute to the urban-rural wage gap.

However, Rauch shows that urban inequality may follow an inverted-U pattern in the spirit of Kuznets. In the early phase of development, when population is mostly rural, rural incomes are relatively low. Consequently, a greater number of rural agents are willing to risk "underemployment" in the informal sector at the prospect of landing a higher wage in the formal urban sector job. Because income inequality is higher between the formal and informal urban jobs, the initial rise in urbanization leads to greater income inequality. However, as the rural population decreases with urbanization, the urban-rural wage differentials decline and urbanization rates fall. Rural agents are less willing to incur the risks of "underemployment" in the informal sector and, as a consequence, income inequality declines.

### **2.3. Trade and Spatial Inequality**

Globalization may increase or decrease spatial inequality. In principle, the impact of globalization on spatial inequality is the same as those of domestic trade as discussed above. To the extent that some regions may benefit more from external trade than others, international trade may increase regional spatial inequality. From a neoclassical perspective, unless regions and their cities have identical exposure to trade and similar comparative advantage, foreign trade is likely to increase spatial inequality. More likely, regions and cities which have natural resources

for exports or natural advantages such as nearness to rivers, coasts, and transportation networks are likely to benefit from external trade whereas those in remote areas are not.

From an increasing returns perspective, spatial inequality is likely to rise as some regions may capture the benefits of increasing returns from foreign trade while others remain more reliant on domestic trade. However, a recent work by Puga and Venables (1999) suggests that, under certain circumstances, trade liberalization may reduce regional and urban spatial inequality over time in sequential regional waves.<sup>10</sup> Initially, industries concentrate in one region. When the wage gap widens between this region and the poor regions, industry will migrate toward one of the poor regions. Due to agglomeration economies, the migration will be concentrated in only one of the poor regions. Over time, as the process continues, more poor regions will join the group. In their model, Puga and Venables find that import-substitution policies (increases in tariffs) or trade liberalization (fall in tariffs) can both be used to attract industries for under-developed regions but that welfare levels are higher under the trade liberalization scenario.

Krugman and Livas (1996) show that foreign trade may also reduce urban inequality. In their model, the forces of urban inequality, the centripetal forces of backward and forward linkages are counter-balanced by centrifugal forces of commuting costs and land rents. When tariff rates are prohibitively high for any foreign trade with the rest of the world, then the stable equilibrium is the concentration of manufacturing in one primate city. Under this setting, the concentration of domestic firms and workers in one city produces sufficiently strong forward and backward linkages to offset the costs of urban congestion. However, when trade is liberalized, then centripetal forces decline causing manufacturing to disperse to the other city. Thus, trade liberalization causes the primate city to decline causing greater urban equality.

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<sup>10</sup> Puga and Venables (1999)'s model is based on the increasing returns model of Krugman and Venables (1995) and Puga (1999).

## **2.4. Institutions and Spatial Inequality**

Institutions matter for growth and development, but they also matter for spatial inequality. While most of the recent studies have focused on understanding the impact of institutions on the development and growth of nations, regional differences in the quality of institutions may also significantly impact regional economic development within nations (Banerjee and Iyer (2005), Kapur and Kim (2006), Kim (2007b), and Bruhn and Gallego (2007)). Moreover, political institutions which determine the distribution of power and fiscal resources between federal, state and local governments can play a major role in determining spatial inequality (Henderson (2002), Kim (2008)).

Scholars have proposed a variety of explanations for why nations or regions possess different institutions such as accidents of history (North (1990)), factor endowments (Engerman and Sokoloff (1997)), climate and native population density (Acemoglu et. al (2001, 2002)). While differences in the institutions of regions within a nation may be more difficult to sustain than those at the international level, regional differences do persist, and even when these differences are removed, their impact may persist over time.

Especially in developing nations, political institutions are likely to contribute to urban inequality if property rights are easier to establish and defend in cities where one has access to courts and the legal system. Moreover, political corruption and instability may also contribute to urban inequality in the form of urban primacy if proximity to a primate city makes it easier to shield oneself from the threat of violence, to make illegal bribes easier to conceal, or to have access to information and communication. In a simplified model, Ades and Glaeser (1995) show that the benefits of political primacy is likely to be higher in dictatorships than in democracies.

Federalism or the balance of political power between the federal, state and local jurisdictions is also likely to matter greatly for spatial inequality. In the United States, the nation emerged with a weak federal government that gave significant political power to the states and local governments until the second half of the twentieth century. As a consequence, American-style federalism is likely to have contributed to greater spatial equality over time (Kim (2008)).<sup>11</sup> On the other hand, many countries in Latin America emerged with strong federal but weak local governments (Sokoloff and Zolt (2006)). Latin American-style federalism is likely to have contributed significantly to great spatial inequality over time.

## **2.5 Relationship Between Household Income Inequality and Spatial Inequality**

One of the most important topics of interest in development economics is income inequality, but there is little discussion on the potential relationship between spatial inequality and household income inequality. In theory, household income inequality can increase without an increase in spatial inequality if the rise in inequality is solely intra-regional. In practice, however, an increase in spatial inequality is likely to contribute to an increase in household income inequality. Indeed, Kuznets' (1955) argument for the existence of the inverted U-pattern of household income inequality contained a strong geographic component and inspired Williamson's (1965) inverted U-pattern of regional inequality.

For Kuznets, the rise in household income inequality with development is fundamentally caused by a structural shift in the economy from agriculture to manufacturing industries. Kuznets identified two forces of increasing household inequality: first, savings inequality will increase causing increased household income inequality; second, since household income inequality is

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<sup>11</sup> With the signing of the Constitution, the United States emerged with a relatively weak federal, but strong state governments with emphasis on states' rights. However, between 1850 and 1900, local municipal governments came to dominate government expenditures. In the twentieth century, the state and federal government became increasingly more important over time. Nevertheless, American-style federalism has given significant political and economic power to their local and state governments (Kim (2008)).

higher in urban manufacturing than in rural agriculture, the industrial shift, by the logic of industry decomposition identity, leads to higher income inequality. Yet, as economies mature, Kuznets argued that the dynamics of the growing economy worked against these forces of household inequality. Kuznets conjectured that governments worked to lower the accumulation of the savings of the very wealthy, demographic factors such as immigration reduced the size of the top income bracket, the democratic nature of capitalism favored the widening of the entrepreneurial class, and the gradual shift into services compressed incomes.

Lindert and Williamson (1985) provide a discussion of a number of forces which may be correlated with long-run income equality. Among the most interesting is the following demographic theory. In the early phase of the industrial revolution, there is an elastic supply of agrarian base workers (Lewis (1954)) who suppress the wages of unskilled workers with industrialization; however, as the incomes of skilled workers rise, the depression of unskilled wages leads to higher income inequality. However, as the industrial revolution matures and skills deepen, the wages of skilled and unskilled converge and cause a decline in income inequality. Other factors that might lower the wages of unskilled workers during the early industrial period are higher fertility, lower infant mortality, and immigration.

### **3. Evidence of Spatial Inequality**

This section presents evidence of regional and urban spatial inequality. Section 3.1 presents a short discussion on measuring regional and urban spatial inequality. Section 3.2 presents evidence on regional spatial inequality of developing and developed nations, section 3.3 on urban spatial inequality, section 3.4 compares the relationship between regional and urban spatial inequality, and evidence on their long-run trends are presented in section 3.5. The

following sections, 3.6-3.8, examine empirical evidence on the impact of trade and institutions on spatial inequality as well as evidence on the relationship between household income inequality and spatial inequality.

### **3.1. Measuring Spatial Inequality**

There are many methods of measuring spatial inequality, but a few are more prominently featured in the literature. For measuring regional inequality, the location Gini coefficient is the simplest and most widely used measure (Krugman (1991a)). Like the Gini coefficient used to measure household income inequality, the locational counterpart measures the extent to which geographic activity is concentrated.<sup>12</sup> In recent years, however, several important alternative measures have been proposed. First, since an industry may be geographically concentrated for random reasons if it contains a few very large firms, Ellison-Glaeser (1997) propose an alternative measure which corrects for an industry's scale economy (also see Maurel and Sedillot (1999)). Second, since regional units are geographically coarse units of observation, Duranton and Overman (2005) develop a distance-based measure which utilizes the Euclidian distance between every pair of establishments. Finally, Brulhart and Traeger (2005) suggest using entropy indices which are decomposable into within-region and between-region components.

For measuring urban inequality, scholars have focused on urban productivity and the size distribution of cities. Since wages and productivity are generally positively correlated with city sizes, differences in wages and productivity measure urban inequality. In addition, urban inequality is also often measured using the rank-size distribution of cities. In particular, urban primacy or the concentration of the urban population in the largest cities is often used as a

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<sup>12</sup> For a detailed discussion on the properties of the Gini coefficient in the context of household income inequality, see Ray (1998, chapter 6).

measure of urban inequality. Unfortunately, there is no measure which relates urban inequality with regional inequality.

### **3.2. Evidence on Regional Spatial Inequality**

Studies on regional inequality are somewhat challenging to summarize because they differ on many dimensions such as indices of geographic concentration, geographic units of observation as well as theoretical motivation and empirical specification. In addition, given the difficulty of constructing regional inequality measures which are comparable across many nations, there is no international cross-sectional or panel analysis as in the urban inequality literature (see below) or as in the household income literature. As a result, the literature on regional inequality is dominated by country-specific studies. Nevertheless, the review of the various nations in developed and developing nations may facilitate comparisons.

Due to the scarcity of reliable census data, the evidence for developing nations is often based on survey data. Perhaps due to poor data quality or greater variance in the economic circumstances of developing nations, the evidence on spatial inequality is more varied. For developed nations, even though there are important variations in the level of spatial inequality, the industrial patterns of spatial localization are fairly similar across many countries.

#### **3.2a. Regional Inequality in Developing Countries**

The most striking pattern which emerges from the data on the spatial inequality of developing countries is its varied nature. Thus, nation-specific geographic and political factors may play a disproportionately larger role in shaping the patterns of spatial inequality in developing as compared to developed nations. These variations in the patterns of inequality of developing nations present significant challenges in identifying the causes of spatial inequality.<sup>13</sup>

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<sup>13</sup> The World Institute for Development Economics Research Project of the United Nations University titled “Spatial Disparities in Human Development,” directed by Ravi Kanbur and Anthony Venables, presents evidence on

In countries as diverse as China and Mexico, the trends in spatial inequality seems to have fluctuated over time until the late twentieth century when inequality rose sharply in both countries. In China, inequality rose markedly during the period of the Great Leap Forward and the Great Famine between 1952 and 1960, but fell during the recovery period up to 1967. Inequality rose again during the Cultural Revolution period between 1967-1976, but subsequently fell during the period of rural reform. In the two most recent decades between 1984-2000, however, inequality has risen substantially with decentralization and the sharp rise in international trade (Kanbur and Zhang (2006)). Moreover, this recent increase in inequality seems to have been characterized by an increase in intra-province inequality in household incomes and wages (Knight et. al (2006)).

In Mexico, North-South regional disparities were fairly high in 1970, fell between 1970 and 1985, but then rose substantially between 1985 and 1990 (Rodriguez-Pose and Sanchez-Reaza (2005)). When Mexico's government imposed high trade barriers as part of its import-substitution industrialization strategy, industrial employment was concentrated in Mexico City; however, as trade liberalized, industrial activity shifted to the U.S.-Mexico border (Hanson (1997)). In a more recent paper, Hanson (2007) finds that globalization in the 1990s increased geographic labor income inequalities as incomes in states with high exposure to trade benefited relative to those in states with low exposure to trade.

For many nations, there is evidence that inequality within regions is as significant as inequality across regions. In the East European Nations of the Czech Republic, Hungary, Poland and Russia, evidence suggests that regional inequalities rose in the 1990s and that regional

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the extent of spatial inequality for over 50 developing countries. While the nature of evidence varies considerably across different countries, they argue that spatial inequality has been increasing for many developing countries in recent years. The reader can find a useful summary of their project in Kanbur and Venables (2005a, 2005b) and elsewhere.

inequality was the highest in Russia and lowest in Poland (Forster et. al (2005)). The data also suggest that the vast majority of the inequality was caused by intra-regional rather than inter-regional variation in these countries. In Ecuador, Madagascar and Mozambique, within-community or intra-regional inequality was just as important as between-community or inter-regional inequality. In all these countries, Elbers et. al (2005) find that there are considerable variations in inequality across communities and that geographic location is a good predictor of local-level inequality even after controlling for some basic demographic and economic characteristics.

In some countries such as Brazil, regional spatial inequality was significant but declined between 1981 and 1997 (Azzoni et. al (2005)), but in other countries, regional inequality was stable at relatively low levels. In Peru, regional inequality measured using expenditure and literacy was low and remained relatively low between 1972-1993 (Escobal and Torero (2005)). In the Philippines, regional spatial inequality seems to have declined in recent years between 1985-2000 (Balisacan and Fuwa (2006)), as it has also done in Indonesia between 1984-1999 (Friedman (2005)), and in South Africa between 1990 and 2000 (Naude and Krugell (2003)).

### **3.2b. Regional Inequality in Developed Countries**

For developed countries, the evidence on regional spatial inequality is much more robust and consistent across countries. Despite important variations, the main source of spatial inequality in developed nations seems to be driven by geographic differences in industrial concentration. Since some industries such as textiles are much more geographically concentrated than industries such as food or electrical machinery, spatial inequality is caused by the spatial variations in concentrated industries. In general, other industries such as agricultural and mining

tend to contribute to spatial inequality as natural resources are distributed unequally whereas most services, especially those that serve local markets, tend to reduce spatial inequality.

For the United States, there is considerable evidence for a long-run inverted U-pattern of regional inequality, especially in the manufacturing sector. Kim (1995) finds that U.S. regions became more specialized or unequal between the mid-nineteenth and the turn of the twentieth centuries and then became significantly de-specialized in the second half of the twentieth century. Similar results are obtained from industrial localization patterns over time. Based on the locational Gini coefficient at the 2-digit and 3-digit industries, Kim (1995) finds that manufacturing industries became more localized between 1890 and the turn of the twentieth century, but then became significantly more dispersed over the second half of the twentieth century.<sup>14</sup> At any given point in time, the traditional, low-tech industries such as textiles, apparel, and tobacco were much more localized than the medium- to high-tech industries such as electrical, transportation, etc. Consequently, the gradual shift in manufacturing from low-tech to high-tech industries contributed to the general dispersal of manufacturing over time.

For the entire aggregate economy, there is some evidence for an inverted U-pattern which peaked a little earlier in time. Kim (1998) investigates the patterns of regional specialization in all sectors - agriculture, manufacturing and services. Regional specialization by crops in agriculture rose over time but the shift in economic activity from agriculture to manufacturing and then to services contributed to a significant convergence in regional industrial structures. Kim (1998) shows that the divergence in industrial structures between North and South, northern specialization in manufacturing and southern specialization in agriculture, accounts for about

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<sup>14</sup> The industrial classification usually follows the general rule: the 1-digit category represents the most aggregate sectors such as agriculture, manufacturing, mining, construction, and services, but the categories becomes finer and finer as one moves from 1-digit to 4-digit industries. Kim (1995) points out that as one moves from 2- to 4-digit industries, the finer classification of industries is likely to contribute to a greater localization of industries by simply defining industries more narrowly.

half of the regional divergence in wages. In addition, the regional convergence in wages was significantly correlated with regional convergence in industrial structures.

For a more recent period, Ellison and Glaeser (1997) show that, even after controlling for the size distribution of plants and the size distribution of geographic areas, industry localization is prevalent for a great majority of industries. At the 4-digit industry level, they find that industries such as tobacco, textiles, and leather were most localized whereas industries such as furniture and fixtures, paper, printing and publishing, petroleum and coal, rubber and plastics, stone, clay and glass, industrial machinery, and instruments were dispersed. Thus, even though Ellison and Glaeser use a different index, there seems to be considerable similarities in industry localization patterns with those found in Kim (1995). At the more aggregate level, Holmes and Stevens (2004) show that mining industries were most localized followed by construction and manufacturing; but services such as wholesale trade, retail trade, and finance, insurance, and real estate were least localized. Thus, the growth of services is likely to lead to greater convergence in incomes across regions.

Dumais et. al (2002) demonstrate that the apparent stable empirical relationship in the localization patterns across industries and over time masks the dynamic nature of the spatial economy. At any given point in time, new firms are born, old firms die, existing firms expand/open new plants or contract/close down old plants. Between 1972 and 1992, Dumais et. al (2002) show that geographic concentration according to the Ellison-Glaeser index fell slightly from 0.039 to 0.034. They find that the variations in the plant life cycle contributed significantly to the variations in the geographic concentration of U.S. manufacturing industries over this period. New firm births accounted for three-fourths of the geographic de-concentration over the

twenty year period as more firms started away from centers of industry; on the other hand, firm deaths increased geographic concentration as firm closure was higher in the periphery.

For Great Britain, Duranton and Overman (2005) show that if a distance-based measure is used to measure localization as compared to the Ellison-Glaeser index, industries in the UK are much less localized. If they use the Ellison-Glaeser index, they find that 94% of UK industries are localized; however, if the distance measure is used, they find that only a bare majority or 51% of industries in the UK are localized whereas 26% are dispersed. The UK industry localization patterns at the 4-digit industry level seem to differ slightly from that of the U.S.; Duranton and Overman (2005) find that textiles, publishing, instruments and appliances are most localized whereas food and drink, wood, petroleum, and minerals are dispersed. From a longer perspective, Crafts and Mulatu (2006) find that industry localization and regional specialization in Great Britain remained relatively stable over a surprisingly long period between 1841 and 1911.<sup>15</sup>

For France, Maurel and Sedillot (1999) use a slight variation of the Ellison-Glaeser index to investigate the geographic concentration in 1993. They find that 27% of the French industries at the 4-digit industry level were very localized, 23% moderately localized, and that about half of the industries displayed a low degree of concentration. The most localized industries were extractive industries such as iron ore and coal, shipbuilding, traditional industries such as leather and textiles, and printing and publishing. Least localized industries were motor vehicles, sound recording and reproducing apparatus, farm machinery, electronic components, rubber products, metal work for construction, and non-ferrous metals. Surprisingly, they find that the correlation between the U.S. and French industry localization was 0.60; the main outliers were furniture and

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<sup>15</sup> For Spain, Tirado et. al (2002) find that the geographic concentration of industries rose markedly during the industrial period between 1856 and 1893, causing a sharp rise in regional inequality.

transportation which were significantly more localized in the U.S., and printing and publishing which was more localized in France.

For Europe as whole, Midelfart-Knarvik et. al (2000) provide a useful summary of the patterns of regional inequality and industry localization for the period between 1970 and 1995. When compared to the U.S., European regional specialization or inequality is smaller and European industries are generally more dispersed. Yet surprisingly, European regional inequality in income per capita is higher than that of the U.S. (Puga (2002)). The reasons are not clear.

The trends in European regional industrial inequality seem to differ from those in regional income inequality as well. For most European countries, the industrial structure converged during the 1970s, reversed the trend in the early 1980s, and then diverged significantly toward the 1990s. On the other hand, European regional income per capita converged between 1950 and 1980 and then stopped converging between 1980 and 1995. When the regional incomes are decomposed in greater detail between 1980 and 1995, however, evidence shows that regional inequalities widened significantly but that this divergence was counter-balanced by a substantial convergence in inequalities between countries (Puga (2002)).

Midelfart-Knarvik et. al (2000) find that many industries experienced significant changes in their location between 1970 and 1995. Many slow-growing, labor-intensive industries were initially dispersed but became more concentrated over time in peripheral low wage regions. Whereas about half of the geographically concentrated industries remained concentrated over time, many medium- to high-tech industries in high-growth sectors became more dispersed across Europe. Like in the U.S., services were generally more dispersed so that the shift from manufacturing to services contributed to the general decrease in regional inequality in Europe.

### 3.3. Evidence of Urban Spatial Inequality

One of the most basic measures of urban inequality is the urban-rural wage gap. Because urban wages are typically higher than rural wages, urbanization introduces spatial inequality in wages and incomes between cities and rural areas as well as cities of different sizes. Rosenthal and Strange (2004), summarizing the evidence from numerous studies that estimate the level of urbanization economies, report that productivity increases approximately between 3 to 8% as a city's size doubles. Similarly, Glaeser and Maré (2001) find that U.S. workers in cities earn 33% more than those in rural areas. The urban wage premium is also found by Wheeler (2004) and Kim (2006) among others.

Given these findings, the recent urban experience in Africa presents a significant puzzle. Since cities are associated with higher wages and productivity, urbanization is usually correlated with income growth.<sup>16</sup> However, between 1970 and 1995, Africa's GDP per capita fell by 0.66% per year but its urban population grew by 5.3% per year (Fay and Opal (2000)). Thus, is Africa's urbanization caused by "pathological" non-economic factors such as war, ethnic conflict or bright lights rather than by urban agglomeration economies and higher productivity?

Fay and Opal (2000) argue that Africa's level of urbanization is not altogether different from countries with similar levels of income and economic structure. Rather, because Africa was under-urbanized during the colonial period, they suggest that the recent surge in urbanization without growth may be accounted for by a catching-up hypothesis. Kessides (2005) also argues that urbanization in Africa is not excessive or imbalanced, but that the Sub-Saharan Africa's urbanization, as well as those in South Asia, Middle East, North Africa, Latin America and the Caribbean, seems only weakly correlated with industrialization. Rather, urbanization in these

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<sup>16</sup> For example, Henderson (2002) finds that 70% of the cross-country variation in urbanization is explained by variations in GDP per capita (also see Fay and Opal (2000)).

regions seems to be fueled by the growth in the informal service sector. However, Barrios et. al (2006) finds that the rural migrants to cities were not pulled by these jobs but rather were pushed out of their rural locations. Climatic change, namely the lack of rain, significantly dampened agricultural productivity in rural sub-Saharan Africa and pushed farmers into cities. In addition, McCormick and Wahba (2003) find that international migrants who return bring greater savings into Egypt's urban areas as compared to rural areas further widening spatial inequalities.

The distribution of city sizes by population provides another important alternative measure for urban spatial inequality.<sup>17</sup> Urban inequality is greater when the urban population is concentrated in few of the largest cities but is much lower if the population is even distributed across cities large and small. While the estimates are often sensitive to the definition of a city, Rosen and Resnick (1980) find that a large majority of countries possess city size distribution which favor smaller cities. Thus, urban inequality seems moderate for a majority of nations. However, there seems to be some evidence that urban inequality is greater in developing countries. Soo (2005) finds that size distribution is significantly skewed toward larger cities in Kenya, Morocco, Mozambique, Columbia, Ecuador, Guatemala, Jordan, Malaysia, Saudi Arabia, and South Korea but toward the smaller cities in most of the developed nations such as Canada, Belgium, Denmark, United Kingdom and United States.

Urban inequality measured using primacy may also be higher in developing countries, but its relationship may not linear. For 38 countries in varying levels of development,

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<sup>17</sup> There are two standard measures: rank-size distribution or Zipf's Law and urban primacy. First, the most common distribution used to study urban sizes is the Pareto distribution:  $R = \alpha C^{-\beta}$  where R is the rank of an urban area or the number of urban areas with population C or more, C is the population of the urban area, and  $\alpha$  and  $\beta$  are constants. The distribution is typically estimated in the following log form:  $\log(R) = \log(\alpha) - \beta \log(C)$ . If  $\beta$  is equal to 1, then city sizes are deemed to be evenly distributed; however, if  $\beta$  is greater or less than 1, then city sizes are skewed toward smaller cities or larger cities, respectively. Second, urban primacy is calculated using the share of the urban population in the largest city or cities or the ratio of the largest city to the sum of the top five cities or top fifty cities.

Wheaton and Shishido (1981) examine urban concentration using two different measures, a Hirfindel index and urban primacy, using metropolitan areas which account for 70% of the total urban population. As GNP per capita initially rose across countries, urban inequality rose; but as income per capita rose above \$2,000, urban inequality declined. Rosen and Resnick (1980) also demonstrate that urban inequality can be consistently measured using both the size distribution of cities and a variety of measures of primacy.

### **3.4. Comparisons of Regional and Urban Economic Structures**

When we compare urban specialization with regional specialization, there seems to be considerable evidence that urban development is fundamentally linked to regional development. There is considerable evidence that cities are highly specialized in a few identifiable industries which form their export base (Alexandersson (1959); Bergsman et. al (1975)). Based on cluster analysis using 229 U.S. industries in 1970, Henderson (1988) finds evidence for specialized cities in automobile, textiles, food processing, aircraft, apparel, steel, leather, industrial machinery, and other industries. More recently, Black and Henderson (2003) classify city specialization by 2-digit U.S. industries in 1992. While about 65% of the local labor force is typically engaged in 'non-traded' good activity, the remaining labor force is specialized into 55 distinct clusters, but large cities which form market centers are more diverse.

Moreover, cities within a region were more likely to be specialized in the same set of industries. For example, Henderson's (1988) 12 automobile cities were all located in the East North Central region and the 6 textile cities were in the Southern states. Using data for the earlier industrial period in the U.S. between 1880 and 1920, Kim (2000) finds that industrial cities within a particular region were specialized in the same set of industries suggesting strong regional geographic ties for cities. In any given region, however, the largest cities were more

diversified and seem to possess a disproportionate share of employment in transaction services, indicating their role as regional (and national) centers of markets for financial services and trade.

### **3.5. Long-run Trends in Regional and Urban Spatial Inequality**

How does the level of spatial inequality evolve over time with economic development?

While the information is based on small cross-national samples, there seems to be some evidence of a spatial Kuznets curve: as economies develop, regional spatial inequalities increase but as they continue to grow and mature, regional spatial inequalities diminish and decline over time. Moreover, there also seems to be some evidence of an inverted U-pattern of urban spatial inequality and development. For regions, Williamson (1965) finds that regional income inequality rises from low to middle income countries but then falls from middle to high income countries. For cities, Wheaton and Shishido (1981) show that urban concentration peaks at around 20 million in population as income per capita rises up to \$2,000 (in 1976 dollars) but that urban deconcentration starts as income rises beyond that level. Using a much larger panel data of countries, Henderson (2002) estimates that urban primacy increases up to \$5,300, the approximate mean in world GDP per capita for 1990, and then it declines thereafter.

However, studies based on the size distribution of cities seem to suggest that growth and development often occur with little changes in urban inequality (Gabaix and Ioannides (2004)). Eaton and Eckstein (1997) study the size distribution of cities in France and Japan during the period when these nations experienced the industrial revolution. Despite the great increase in urbanization during industrialization, they find that the rank-size distribution of cities in both countries remained surprisingly stable. Since cities of all sizes seem to grow in parallel, they argue that the driving forces of industrialization seem to be present in cities in proportion to their initial populations. Dobkins and Ioannides (2000) report similar findings for the United States

between 1900 and 1990 (also see Black and Henderson (2003)). Unfortunately, similar studies for developing countries do not seem to exist at this point.

### **3.6. Evidence on Trade and Spatial Inequality**

The evidence on the impact of foreign trade on domestic regional and urban inequality is mixed. While much more evidence is needed, there seems to be some evidence that trade openness contributes to increasing regional inequality. For China, Kanbur and Zhang (2005) find that the recent sharp increase in inequality may be partly due to growth in trade; for Mexico, Rodriguez-Pose and Sanchez-Reaza (2005) find similar evidence for Mexico. Thus, the benefits of globalization for many developing countries may sharply increase their spatial inequality.

Based on their survey of evidence of over 50 developing nations, Kanbur and Venables (2005a, 2005b) argue that the uneven spatial impact of trade and globalization played a major role in the increase in regional and urban spatial inequalities in developing countries in recent years. Moreover, they argue that, in addition to geographic remoteness, the backward regions and rural areas suffered from an inequitable distribution of infrastructure, public services and policies that constrained the free migration of peoples from backward places.

Numerous scholars believe that development in Africa is significantly constrained by its geography of remoteness. Because many of the economies are landlocked, isolated, possess rugged terrain, and face high transportation costs, African geography hinders trade and productive activities. However, the recent work by Nunn and Puga (2007) suggests an important historical reason for why the African population may have concentrated in remote areas. Because remoteness and ruggedness provided protection against slave raids, societies in rugged areas may have derived a historical indirect positive effect on their incomes. Yet, the historical benefits of

rugged terrain may have increased Africa's costs of development in the long-run by encouraging population concentration in rugged areas.

On the other hand, there seems to be some evidence that openness to trade lowers urban inequality at least measured by urban primacy. Based on a cross-section of 85 countries and five case studies, Ades and Glaeser (1995) find that a shift in a nation's workforce away from agriculture to industry increases urban primacy but as predicted by Krugman and Livas (1992), openness to trade and development of transportation networks lowers primacy. Henderson (2002), using a panel data of 85 countries over four decades between 1960 to 1990, also finds that primacy is negatively correlated with openness to trade and transportation and communication infrastructure networks (waterway, road and telephone densities).

### **3.7 Evidence on Institutions and Spatial Inequality**

The empirical studies on the evidence of the importance of institutions for regional and urban inequality is small, but growing. In the United States, spatial inequalities, especially between the North and South, rose between 1840 and 1920 and then declined significantly between 1920 and 2000 (Kim and Margo (2004)). While the rise of the North-South core-periphery regions is often seen as a consequence of economic factors (Krugman (1991a,b)), many scholars believe that institutional factors played a major role in the divergence and convergence of the U.S. North and South (Acemoglu et. al (2004)). Even though the roots of regional divergence date back to the colonial period (Kim (2007b)), Mitchner and McLean (2003) find that institutional impediments in states associated with slavery had a persistent pernicious effect on productivity levels well into the twentieth century. Moreover, the convergence of political institutions between the North and South brought on by a costly Civil

War and major federal interventions likely contributed to the economic convergence between these regions.

Institutions from the colonial era seem to continue to exert considerable influence within regions in developing countries. Banerjee and Iyer (2005) argue that the British colonial institutions played a major role in the divergence of agricultural productivity between the historically landlord (zamindari) and non-landlord (ryotwari) areas in India between 1960 and 1990.<sup>18</sup> Kapur and Kim (2006) suggests that the British land tax institutions may have contributed to the divergence of India's regional economies during the British colonial period as well. For a sample of eight countries in the Americas, Bruhn and Gallego (2007) find that regions that possessed colonial extractive industries such as mining and sugar cultivation have 18% lower GDP per capita today because they were more likely to possess extractive institutions (Sokoloff and Engerman (1997)).

There is some evidence that decentralized federalism promoted regional and urban equality. In general, developed nations are more likely to have a decentralized federalist system as compared with developing nations. Henderson (2002) finds that developed countries are more politically decentralized than developing countries. Fiscal decentralization is also positively correlated with population size and land area, but is negatively correlated with percent of population that is Muslim (also see Oats (1985) and Epple and Nechyba (2004)). The nature of the federalist system is likely to depend greatly on the nature of tax systems. Sokoloff and Zolt

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<sup>18</sup> When the British colonized and annexed various parts of India between the eighteenth and the nineteenth centuries, it implemented two major land tax systems: zamindari (landlord) and ryotwari (non-landlord). In the zamindari areas of Bengal, Bihar, Orissa, Central Province, and some parts of Madras, land taxes and property rights were assigned to landlords. In these areas, non-resident landlords often owned rights to numerous villages and developed extensive bureaucratic organizations and policing forces to manage and employ local villagers to farm the land under sharecropping or wage contracts. By contrast, in the ryotwari areas, land taxes and property rights were assigned to individual villagers in most of Madras, Bombay, and Assam or to an entire village under the mahalwari system in the areas of Punjab. In these areas, local resident landowners either farmed their own land or employed low caste village laborers under sharecropping or wage contracts.

(2006) show that tax systems vary greatly between developed and developing nations and that developing nations are much more likely to impose taxes at the national rather than at the state and local levels.

In China, the strong political power at the provincial level may have contributed to excessive spatial equality. China's politics of localism, strong provincial governments, severe migration restrictions (hukou system), and administrative spatial hierarchy played a major role in determining regional and urban spatial inequality (Fujita et. al (2004), Henderson (1988)). Because of these existing political institutions, most economists believe that China's spatial inequality suffers from too little rather than too much inequality. Moreover, policies which restrict urban growth such as immigration restrictions and national urban planning have contributed to an under-sized distribution of cities in China. Relative to most developing and developed nations, the cities in China are small and are more equally distributed (Fujita et. al (2004)). In the United States, a decentralized federalist system may have contributed to greater spatial and urban equality but to a much lesser extent than in China (Kim (2008)).

In Latin America, the generally strong federal and weak local governments may have contributed to excessive regional and urban inequality. The empirical evidence on urban primacy suggests that political factors may be the dominant cause of primacy. Ades and Glaeser (1995) find that dictatorships and political instability cause a significant increase in the concentration of population in the primate city. More recently, Henderson (2002) finds that primacy is positively correlated with the capital city status and central government consumption. He also finds that countries in Asia, Latin America and Sub-Saharan countries had significantly higher shares of population in primate cities suggesting the important impact of political institutions on the urban concentration in these countries.

### **3.8 Household Income Inequality**

Despite the fact that income inequality is a major focus of development economics, there is little systematic evidence on the relationship between household income inequality and spatial inequality (Ray (1998)). Superficially, the Kuznets' (1958) inverted-U pattern of household income inequality seems to be related to Williamson's (1965) inverted-U pattern of regional income inequality. However, with the construction of Deininger and Squire's (1998) large cross country data on income inequality, the existence of Kuznets' curve has come into question in recent years.<sup>19</sup> Indeed, some scholars such as Persson and Tabellini (1994) and Alesina and Rodrik (1994) believe that the causality is reversed - inequality is likely to hamper economic growth due to political economy considerations (Ferreira (1999)). Further research is clearly needed to clarify the relationship between income inequality and spatial inequality.

### **4. Policy Lessons on Spatial Inequality**

This section examines the policy implications which emerge from the review of the recent contributions on spatial inequality presented above. While the literature does not provide a guide on defining a list of specific policy recommendations for reducing "excessive" spatial inequality or increasing "beneficial" spatial inequality, the literature does provide some general guidelines and lessons.

First, it may be possible to identify the proximate causes of spatial inequality by studying the trends in regional industrial economy. One of the most consistent empirical findings in the

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<sup>19</sup> Banerjee and Duflo (2003) present a cautionary critique of the existing literature on income inequality and development which may also be relevant for works on spatial inequality. While most cross-sectional OLS estimates using cross-country data typically show negative correlation between household income inequality and growth, those using panel data with fixed-effects show a positive correlation. In addition, most studies on inequality assume a linear structure. However, Banerjee and Duflo find that the relationship between inequality and growth is likely to be non-linear and that the reason for the variations of the results between OLS, fixed-effects and random-effects may be due to the differing structural explanations of the reduced-form results.

literature on spatial inequality is the industrial patterns of localization and dispersion, especially based on the study of developed countries. For these nations, there seems to be a fairly robust and consistent industrial pattern of spatial agglomerations or spatial inequality. Consistent with this finding is the idea that industry localization economies (within-industry spillovers) are generally more important than urbanization economies (across-industry spillovers). Thus, at least in principle, policy makers may be able to influence spatial inequality by targeting industry-specific subsidies or infrastructural investments.

From the broad sectoral perspective, the most geographically concentrated industries tend to be extractive industries, such as agriculture and mining, followed by manufacturing, and then services, which tends to be most dispersed. Within the manufacturing sector, studies on industry localization of the U.S., U.K., France, and the E.U., as well as many developing countries, suggest that traditional industries such as textiles and apparel are much more likely to be spatially localized whereas the medium- to high-tech industries are much more likely to be dispersed. Numerous studies also find that localization rather than urbanization economies seem more significant for both developed as well as developing countries (Henderson (1988, 2003), Rosenthal and Strange (2003), Wheaton and Lewis (2002)).<sup>20</sup>

However, since there is little general consensus on which source of agglomeration economies is most important, the literature provides less of a guide to policy makers as to which type of specific policies might be most effective in fostering or reducing spatial inequality. If technological spillovers or labor matching economies are important, then policy makers may

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<sup>20</sup> Evidence for localization economies are presented by Henderson (1988) for most 2-digit industries in Brazil, Chen (1996) for machinery and food industries in China, Henderson and Kuncoro (1996) for apparel (including textiles), non-metallic minerals, and machinery industries in Indonesia, Henderson et. al (2001) for traditional, heavy, transport and machinery industries in Korea, and Lee and Zang (1998) for 19 industries in Korea. Evidence of urbanization economies are presented by Mitra (2000) for 11 of 17 industries in India; by Lall et. al (2003) for food processing, textiles, leather, paper, chemical, basic metals, mechanical machinery, and electrical machinery industries in India, and by Henderson et. al (2001) for high-tech industries in Korea. See Rosenthal and Strange (2004) and Overman and Venables (2005) for excellent summaries of the literature.

pursue policies which encourage information exchanges in ideas or jobs. On the other hand, if market size is important, then it may be more effective to implement policies which foster the growth of markets. A review of the literature suggests that a wide variety of agglomeration economies may be at work in generating spatial inequalities. Despite the recent advances in empirical work in economic geography, scholars have not converged on which source of agglomeration economies are most important (Rosenthal and Strange (2004) and Overman and Venables (2005)).<sup>21</sup>

While the nature of the evidence varies somewhat, there seems to be strong reasons to believe that agglomeration economies are temporally persistent and dynamic. Thus, policies, if successful, may have persistent influences over time. For the U.S., Glaeser and Mare (2001) find that the urban wage premium is higher for long-time urban residents and Henderson (2003) finds that U.S. high-tech firms benefit from the scale of past activity. For Japan, Dekle (2002) finds that dynamic externalities measured using total factor productivity growth at the prefecture-level exist for the finance, services and wholesale and retail trade industries but not for the manufacturing industries between 1975 and 1995.

Second, the patterns of spatial inequality is likely to change over time. While the evidence is not substantial, there is some evidence of an inverted U-pattern of regional and urban

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<sup>21</sup> With advances in theory, combined with a decline in computing costs and innovations in econometric methods, the quantity and quality of empirical research on economic geography have increased substantially in recent years. Empirical advances have come at many levels, both intensive and extensive. In the intensive direction, numerous studies have moved beyond the analysis of aggregate industry and city/county/state/regional level data to the firm/plant-level data using finer geographic locations such as zip-codes or post-codes. In the extensive direction, studies have mushroomed to include an ever-increasing number of countries around the world. Indeed, from studies dominated by U.S. regions and cities, there has been a major shift in empirical works on Europe and Japan but also toward numerous developing nations. Evidence ranges from natural advantage (Kim (1995, 1999), Ellison and Glaeser (1999)), technological spillovers (Jaffe et. al (1993)), labor market pooling (Dumais, Ellison and Glaeser (1997)), input linkages (Holmes (1999), Amiti and Cameron (2007)), market size (Hanson (1997, 2005)), amenities (Tabuchi and Yoshida (2000)) and rent seeking (Ades and Glaeser (1995)). Because agglomeration economies seem to attenuate rapidly by distance, the influence of policies is likely to be geographically localized (Rosenthal and Strange (2003)). In addition, because agglomeration economies seem to vary by firm births and deaths, industry plant sizes, and the level of competition, policy makers also need to consider the industrial organization of industries (Dumais, Ellison and Glaeser (1997), Rosenthal and Strange (2003)).

inequality. Thus, spatial inequality seems to rise and then fall with development. The data on industrial localization suggests a partial explanation. In the early phase of development, countries tend to specialize in extractive and low-skilled industries such as textiles and apparel which are geographically concentrated; however, with continued development, the economy shifts toward high-tech manufacturing and services which are geographically more dispersed. Nevertheless, there is no generally accepted theory of the inverted-U pattern of spatial inequality. The explanations proposed by Kuznets (1955), Williamson (1965) and Kim (1995) are ad hoc. While Krugman and Venables' (1995) theory based on declining transportation costs is elegant, there is no evidence that the long-run trends in spatial inequality is consistent with their model.

Third, globalization and foreign trade can significantly influence domestic regional and urban inequality. However, neither theory nor empirics provide a good guide on the direction of impact. From the perspective of theory, foreign trade, like domestic trade, can increase or reduce spatial inequality. Empirical evidence presented above finds instances of both. Since openness to trade is likely to be an important component of development for many developing countries, a careful analysis of the impact of foreign trade on domestic inequality will be necessary.

Fourth, political institutions can play a significant role in determining regional and urban inequality. Differences in regional institutions may cause divergence in regional economies. Dictatorships, political weakness, and centralized power seem to contribute to a centralized urban population. In general, the distribution of political and fiscal power between federal, state and local governments can significantly influence regional as well as urban spatial inequality. Different jurisdictions of government have different political incentives and are likely to prefer different levels of public goods that impact spatial inequality. Empirical evidence suggests that

countries with strong state and local governments may have greater spatial equality as compared with countries that have a relatively strong federal government.

Fifth, there seems to be some evidence that transportation and communications infrastructural investments are associated with a decline in spatial inequality. Several studies suggest that inter-regional infrastructure investments may contribute to the reduction of urban concentration (Henderson et. al (2001). Gallup et. al (1999) point to the importance of the historical investments in national navigable waterways, Rosen and Resnick (1978) to rail investments, and Henderson (2002) to the national road and highway investments. Baum-Snow (2007) shows that the introduction of interstate highways in the United States reduced central city population growth by at least 8% between 1950 and 1990.

Finally, there seem to be few successful policy outcomes. The recent attempts to reduce spatial inequality among the nations in the European Union present a cautionary tale. By most accounts, the EU policies implemented to reduce EU regional inequality have proved ineffective (Puga (2002)). The policy objectives were to promote the development of lagging regions, to support areas facing structural difficulties, and to develop systems of education, training and employment. Between 2000-2006, the EU devoted €195,000 million (in 1999 prices), representing over 30% of total EU spending, and the Cohesion Fund added another €18,000 million to meet these objectives. Yet, despite the allocation of massive resources, regional inequalities have not narrowed and by some accounts have even widened.

The recent Korean policy of deconcentration has been seen as a rare success story in combating the ills of excessive concentration. As Korea began to industrialize in the 1960s, the population became increasingly concentrated in Seoul, and by 1970, it contained 41% of Korea's urban population; however, between 1970 and 1990, the trend reversed as Seoul's share fell to

33% (Lee (1997)). The deconcentration of the population in Seoul was, in part, caused by the massive dispersal of manufacturing industries from Seoul to outlying areas. Henderson et. al (2001) and Henderson (2002) argue that the deconcentration was due to two major factors: economic liberalization which reduced the importance of locating in Seoul for access to political bureaucracy (Kwon (1985)) and massive investments in roads and communications which blanketed Korea and provided important transportation and communications infrastructures. However, it is important to note that Seoul remains one of the most dense cities in the world, more dense than Tokyo and twice as dense as New York, and that the deconcentration to satellite cities was mainly in manufacturing branch plants.

## **5. Conclusion**

This paper surveys the recent developments in theoretical and empirical works on spatial inequality to better understand the benefits and costs of spatial inequality and to draw inferences concerning appropriate policy responses for dealing with spatial inequality. This section concludes with a summary perspective and suggestions for further inquiry.

Why do spatial inequalities arise? The survey of the literature highlights two classes of explanations based on first and second natures of geography. The neoclassical model emphasizes the role of first nature such as resource endowments and geographic proximity to rivers and ports. The increasing returns model emphasizes the role of second nature created by the density of human interactions. Because economic development allows regions to take advantage of first and second natures of geography, an increase in spatial inequality may be beneficial as productivity is increased. However, because congestion costs may not be internalized by

individuals, spatial inequality in the form of excessive urban concentration or urban primacy may be harmful. Thus, theory suggests that there is an optimal level of spatial inequality.

There are many reasons for why policy makers may be concerned with spatial inequality. From an efficiency standpoint, policy makers want to obtain the optimal level of spatial inequality. Because most of the second nature explanations imply market imperfections and inefficient levels of agglomeration, policy makers may want to adopt policies to correct these failures. From an equity or an egalitarian standpoint, even when spatial inequality is beneficial, policy makers may want to reduce the effects of uneven spatial development. Finally, policy makers may be concerned that sharp regional divergence in economic fortunes of different regions may contribute to deep political divisions which may impose significant social costs.

Yet, implementing effective policies in fostering or reducing spatial inequality is likely to be much more challenging than suggested by the standard literature. Economic development often involves major shifts in economic and social structures of societies. A successful shift from a traditional agricultural based society to modern manufacturing and service based society is likely to involve a successful transition from a traditional small scale society based on personal exchanges to a modern society based in impersonal exchanges. Because the developmental transition tears at the fabric of society held together by traditional family and inheritance institutions as well as traditional gender roles, making a successful transition is significantly more challenging than suggested by the models surveyed in this paper.

More importantly, political elites in many developing nations may not possess the incentives to treat problems associated with too little or too much spatial inequality. In China, local political elites have little incentive to remove the restrictions on the mobility of workers. Likewise, the political elites in Asia and Latin America may possess little incentive to reduce

problems associated with urban primacy if they benefit from politics of corruption and patronage. Thus, if spatial disparity is fundamentally driven by political institutions, then implementing difficult political reforms may be a necessary first step toward addressing problems associated with spatial inequality.

Finally, what remains to be done? Despite the enormous advances in our understanding of the determinants of economic geography in recent years, our knowledge is still inadequate in many respects, especially for understanding the nature of spatial inequality in developing countries.

From an empirical standpoint, as noted by Overman and Venables (2005), we clearly need more empirical evidence on regional and urban inequalities of developing nations. While evidence from developed nations may be useful, the patterns of development of many developing nations seem to differ from that of the historically developed countries. For example, in many developing nations, the informal service sector accounts for a significant share of urban activity, yet we have little evidence on the nature of their agglomeration economies. In addition, while most models predict market failure in cities, it has been extremely difficult to estimate optimal city sizes. While estimates provided by Au and Henderson (2004) for China are useful, it remains to be seen whether these estimates can be generalized to other developing nations.

From a theoretical standpoint, the causes of the long-run inverted U-pattern of spatial inequality, to the extent that it exists, are still not well understood. Most theories of the inverted U-pattern of spatial inequality, with the exception of Krugman and Venables (1995), are ad hoc and most models of economic geography are not closely linked to the long-run process of development. In addition, we need a better understanding of the link between household income inequality and spatial income inequality. We also need a better understanding of the interaction

between regions and cities. Regions may affect their local urban development because of their resources or the size of their markets; but, cities may also impact their regional development as they provide financial and transaction services which reduce regional costs of capital and trade. An understanding of their interactions is likely to provide a more coherent approach to reducing costs associated with spatial inequality.

Finally, from a political institutional perspective, we need a better understanding of the institutional and political histories of developing nations. As noted by Benabou (2000), economic inequality and policies may be jointly determined, suggesting that policy instruments cannot be treated as completely exogenous. If a society chooses an equilibrium path where high inequality and low redistribution are mutually reinforcing, then attempts to introduce policies of equality may be futile. While Benabou's (2000) analysis occurs in a democratic setting, policy constraints may be even more important in non-democratic societies. While the process of economic development and growth may contain general common factors, each nation possesses differing geographic, institutional, and political conditions which may ultimately determine the set of possible policies available for solving problems associated with spatial inequality.

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