



for Cities

# **The Changing Dynamics of Urban America**

*March 30, 2004*

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## **PREFACE AND ACKNOWLEDGEMENTS**

CEOs for Cities, a national leadership organization whose mission is to advance the economic competitiveness of cities, conceived this project to examine the changing drivers of urban economic success. The organization's members discussed the project design at its outset, and subsequently reviewed and provided interpretative comments on the project's findings at their most recent national meeting. We are very grateful to CEOs for Cities, and all of its members and staff, for their active support, participation and guidance throughout the project. CEOs for Cities members Mayor Ed Garza, Larry Glasscock, Paul Levy, Sylvia Manning, Robert Milbourne and Joe Roman provided insightful comments on the draft Executive Preview prepared for the national meeting. Likewise, CEOs staff and consultants, including Executive Director Ann Lang, Jim Rooney, Peter Armato, Claire Dowd, Marilyn Katz and Michael Krauss provided invaluable assistance in shaping the Executive Preview, presentation and discussion.

Very helpful comments, at critical stages of the work, were also provided by Bruce Katz, of the Brookings Institution Center on Metropolitan and Urban Affairs, and by Joseph Cortright, of Impresa, Inc. We benefited enormously from the work of an outstanding research team -- Riccardo Bodini, Martha Caswell and Jack Kaplan -- and of an exceptional database manager, Paul Sill. Riccardo Bodini also moved on from the research team to play a major role in drafting this Report.

The project began by building one of the most comprehensive, diverse databases of variables bearing on the economic performance of cities and metropolitan areas. Many people generously shared previously assembled and specialized data. We are particularly indebted to Janet Rothenberg Pack, Richard Voith, Stephen Malpezzi, Robert Atkinson, Saurav Dev Bhatta, Reid Ewing, Rolf Pendall, Don Chen and Ned Hill for contributing to the database.

The project next proceeded to build econometric models to replicate, and apply to the most recent period, important earlier work on urban economies, including the work of Glaeser, Scheinkman and Shleifer (1995); of Drennan (2002); and of Pack (2002). We are of course indebted to innumerable other scholars, researchers and practitioners in the field as well, many of whom are referenced in this Report.

The New Dynamics of Urban America project received lead funding from the Rockefeller Foundation and sustaining support from the John D. and Catherine T. MacArthur Foundation and the John S. and James L. Knight Foundation, as well as local community foundations. CEOs for Cities and its project team are particularly grateful to these farsighted investors in the future of urban America.

***Please note that a separately bound Executive Preview of this Report  
is available at <[ceosforcities.org](http://ceosforcities.org)>.***

## **INTRODUCTION**

In an earlier Report, CEOs for Cities undertook a “Data Scan”<sup>1</sup> on the role of cities in the regional and national economies. The scan documented that, in myriad ways, urban areas contain the nucleus of the U.S. economy. Cities disproportionately house the nation’s assets, and play key roles as drivers and hubs of economic growth. This critical importance of cities raised a next set of questions: how are cities doing? Can the factors that account for success be identified? What are their policy and practical economic development implications? The current study was undertaken to begin the analysis necessary to understand and strengthen city economic performance.

The project was thus conceived to move from description to analysis to policy. As “applied research,” it focuses particularly on factors affecting urban economic performance that appear to be (a) new, changing or especially significant; and (b) subject to intervention. In other words, the project was designed by and for the members of CEOs for Cities to assist Mayors and policy, business, academic and other leaders working on strengthening their cities. Considering the unusually broad scope of the project goals, and the need for ongoing and tailored analysis by CEOs for Cities members, the project was conceived with a secondary goal as well: to begin creating a baseline foundation of data and analytic tools for the organization to continue undertaking applied research to assist its members.

The project examined five key dimensions of change in America’s cities: Knowledge Economy, Business Composition, Demographics, Urban Growth Form, and Regionalism. After providing a brief theoretical framework, Section I below explains each of these dimensions, and describes the project methodology. With respect to each dimension, the project collected data on dozens of variables, and examined changing patterns between 1990 and 2000. The project then proceeded to build econometric models to identify the variables that contributed to city and metropolitan performance. The project focused in particular on two aspects of performance: population change and income growth.

Section II explores developments with respect to these dependent variables. The analysis revealed significant changes in the dynamics of urban economies: for the first time, income growth is occurring independently of population growth, and there is evidence of increasing divergence between wealthier and poorer cities.

Section III then provides the core findings of the project, examining the results of the regression models. The section is organized into five subsections, one for each of the dimensions. Each subsection provides detailed discussion of the characteristics and issues concerning its dimension, descriptive findings about changes in the 1990s, analytic findings about which variables most accounted for economic success, interpretation and discussion of implications for policy and practice. Among the critical factors that accounted for economic growth in American cities in the 1990s, higher education proved to have the greatest positive impact, as knowledge-based activities are increasingly important across all industry sectors. Business diversification appears to favor economic growth, while specialization requires more caution: only certain specializations drive

growth, and economic specialization generally may be shifting from industry sectors to business functions and occupations. Income inequality and racial segregation had small negative effects on economic growth. Detailed findings are discussed on issues ranging from the effects of the population's age to the relationship of city and suburban growth.

Section IV – “The Changing Dynamics of Urban Economies” – begins pulling these diverse findings together. Returning to the theoretical framework (sec. IA), it offers some observations on how key components of urban economies are changing, and on the implications of these changes for cities. Cities appear to be more important than ever to the economic performance of the nation. However, few simple prescriptions emerge: the ingredients of economic success are changing as urban populations become more diverse, and as knowledge factors become increasingly important to success across all economic sectors. The recipes for success are also changing, as the very nature of cities shifts, making different types of economic specialization important, and factors like urban growth form, regional interdependence and quality of life more relevant to economic performance.

Considering the great variation among different types of urban economies, Section V begins by offering some observations and tools for taking the next steps – localized analysis and implementation. There are many paths to economic success, and making good strategic choices at the local level is more important than ever. The project provides preliminary tools for individual cities. A taxonomy of cities is described, differentiating and grouping urban areas based on key economic characteristics. The taxonomy, along with the database and models created by the project, provide a foundation for customized assessments leading to economic development strategies tailored to the unique economic mix of individual cities. The Report concludes with policy and research implications.



## **I. PROJECT BACKGROUND: FRAMEWORK, FOCUS, METHODOLOGY**

### **A. Framework: The Economics of Cities**

Cities are the driving force of the national economy: 75 to 90% of the nation's economic assets and drivers are found in metropolitan areas.<sup>2</sup> The economic performance of cities has major repercussions on the wellbeing of the American population (80% of which resides in metropolitan areas) and on the economic growth of the nation as a whole. Given the importance of cities, it is not surprising that researchers have devoted a great deal of energy to surveying and exploring the state and evolution of metropolitan areas.

Over the past few years, in particular, the release of the Census 2000 data has fueled a major wave of new publications. This literature describes what happened to American cities over the 1990s, suggesting that tantalizing and important changes have occurred:<sup>3</sup> the characteristics of the population are changing, the economic base of metropolitan areas is shifting, and the very role of urban regions in the national and global economy may be undergoing important transformations.

As the nature, dynamics, and roles of urban regions are changing, new challenges and major opportunities arise for urban development policy. Yet, while there is no shortage of descriptive work providing useful snapshots on the state of American cities, much remains to be done in order to understand the dynamic picture: what might explain these changes in urban economies? What are the main factors that influence the economic performance of cities? How might urban leaders and policy makers influence success?

#### **1. The Elements of Economies**

In order to understand how the fundamental aspects of urban economies are changing - the “changing dynamics of urban America” - it is useful to first establish a simple framework for examining the components that make up the economy, and how they interact and operate. This provides a basic reference map to help focus, organize, and interpret the results of the research.

The economy is of course a complex system, susceptible to being dissected in many ways. For purposes of this project, it proved useful to break out a few key components of the economic system. Since the project is primarily concerned with the factors driving economic success, the components of the economy can be viewed as the elements and processes that contribute to the production of goods and services and to the creation of economic value. From this vantage point, it is possible to highlight three main elements that compose the economic system: the *factors*, or inputs, of production; the *organization* of those factors into wealth creation through institutions that engage in production and define the marketplace; and the *environment* in which production and exchange occur. In effect, these three components are the raw material out of which wealth is created; the systems for converting it to wealth; and the external factors that shape those systems.

The factors of production include inputs such as labor, capital, natural resources, technology, and knowledge. These are the “raw materials” that are acted upon in order to produce goods and services and generate revenue. Take a bakery, for example: the factors of production in this case are the baker (labor), the ingredients used to make bread (raw material), the oven (technology), the recipe (knowledge), and so forth. Each factor plays a specific role in the production process, and brings its own contribution to productivity. Economists have created different classifications for these fundamental assets of the economy. Information and knowledge have only recently been added to the list, but economists increasingly focus on these inputs as major contributors to value creation. The changing dynamics of urban economies depend in part on changes in the roles, prevalence, and characteristics of the various factors of production. The changing characteristics of labor due to the impact of immigration, for example, is likely to change employment patterns and affect the productivity of urban economies.

The ways in which the factors of production are processed, elaborated and sold (and thus converted to economic activity and wealth) constitute the organization of production and markets.<sup>4</sup> The main elements here are the firm, the processes within the firm, the relationship between firms, and the relationship between firms and consumers. To continue with the example of the bakery, the organization of production is the process through which the bakery acquires its inputs from suppliers, turns flour, water and salt into bread, and sells its products to clients (either other firms or individual customers). This component is particularly complex, as it involves different elements. A first element has to do with the processes *within* the firm: these include the organizational structure of the firm (e.g. how different functions such as management, back and front office, production, etc. are assigned to different departments or staff within the firm) as well as the production routine that converts the inputs into products. A second element has to do with the processes that occur outside of the firm: how the firm relates to other firms in order to get its supplies and services (business to business relationships), and how the firm relates to consumers in order to sell its products (marketing, distribution channels, etc.). Consequently, changes in the organization of production affect the structure of the firm, the production process, and the relationships between firms, impacting the optimal economic organization of urban areas, and ultimately defining their role and performance. Issues ranging from the relative benefits of industry specialization or diversification, to the jobs-housing mismatch, to the impacts of increasing information inputs into production, all concern the organization of production.

The environment of production and market exchange includes the external elements that can influence the process but are not part of it. These elements include the institutions that enable and regulate economic activity (government, regulatory agencies, etc.), as well as the physical infrastructure, such as roads, power lines, and telecommunication systems. The environment also includes the ways in which the components of the economy are distributed across space and organized across political units such as city and suburbs. These external factors shape the market in several ways. For example, the government can provide incentives for a given industry (e.g. through tax incentives, or by granting free use of public land), which lower the cost of production and the price to the consumers, possibly spurring an expansion of that market. In contrast, an inefficient

infrastructure can raise the costs of production, increasing the price and causing the market to shrink. The environment of production also includes nature, or the physical environment in which economic activity takes place. Changes in the environment of production entail changes in the relationships between firms and government units like cities and suburbs, and in the spatial arrangement of the components of the economy. The debate around the issues of sprawl and smart growth, discussed later in the report, illustrates the increasing importance of the environment in determining the physical and economic growth of urban areas.

The three components of the economy are closely interconnected. Any change in one of the components will necessarily have repercussions on the other two. In the bakery example, a change in the environment (a meager wheat crop or a government tax on flour, for example) could force the baker to use different ingredients. This in turn would cause a change in the recipe and in the production process. Similarly, the introduction of new technology (a change in the inputs) could bring about a change in the production process, by requiring the firm to hire new and specialized personnel, by lowering the cost of production, or by increasing the pace at which new products can be released on the market. At the same time, new technology can have an influence on the environment, by requiring significant infrastructure changes, as in the case of the Internet. The diffusion of information technology and the advent of the knowledge economy is one of the most striking examples of how technological innovation can have repercussions on the entire economic system, as discussed in the knowledge economy section of the report.

## 2. The Geography of Economies

The “map” of components and operation of the economy outlined above shows, in a very simplified way, how economic value is created, but does not address the role of cities. In order to capture this crucial element, it is important to consider the relevance of geography: economic activity has a spatial location, and takes place primarily in metropolitan areas. Indeed, cities can be defined as dense nodes of economic activity: they arise because people and businesses choose to locate, live and work in a particular place. For this reason, the analysis of urban areas lies at the intersection between economics and geography.<sup>5</sup> This means that in order to understand how changes in the factors, organization, and environment of production can affect cities, it is important to understand not only the structure and the elements of the economy, but also where economic activity occurs and why.

From an economic standpoint, the main reason for the existence of cities is what economists call “agglomeration economies.”<sup>6</sup> This term broadly refers to the synergies, savings, and increased productivity that arise when people and firms locate near each other. Agglomeration economies can arise due to several different factors. The first factor is a reduction in transportation costs: geographic proximity allows firms and consumers to save on transportation, making it convenient for them to locate in the same area.

The second element is shared inputs: firms located in urban areas can draw upon common pools of labor, supplies, and services in order to fulfill temporary or variable needs. If a particular input does not play a permanent role in the production process, it might be more convenient for the firm to acquire it from outside sources, rather than housing it within the firm. Similarly, the suppliers of these “part-time inputs” can afford to provide them because they are servicing a number of different firms at the same time.<sup>7</sup> For example, a firm might not need a permanent information technology (IT) staff, but still need computer assistance from time to time. In this case, it would be more convenient to hire a contractor whenever the need for his services arises. At the same time, the IT contractor can stay in business because there is more than one firm nearby requiring his services.

A third factor is knowledge spillovers (sometimes referred to as “communication economies”): knowledge spillovers are a voluntary or involuntary leakage of useful information (concerning production techniques and technologies) among different firms.<sup>8</sup> The agglomeration of firms in the same area facilitates knowledge spillovers and generates new ideas and forms of production, thereby increasing productivity and spurring economic growth.

An additional factor is economies of scale: a wide array of services and public goods (ranging from parks to theaters to sport stadiums) can only be provided for large numbers of users, and densely populated places offer the concentration of demand that is necessary to sustain the production of these goods. Finally, agglomeration economies depend on a reduction in the transaction costs embedded in the labor market: the concentration of economic activity in an urban area reduces the search costs of workers with differentiated skills and employers with differentiated demands for labor.<sup>9</sup>

Many of these factors may operate differently depending on the nature of the concentration of firms, giving rise to the important distinction between two types of agglomeration economies: *localization economies* and *urbanization economies*. Localization economies arise when firms locate near other firms that operate in the same industry, or in closely related industries. Silicon Valley is a good example of firms that operate in the same industry sector and benefit from locating near each other. These benefits might arise, for instance, from sharing the same suppliers of microchips, or a common pool of specialized programmers. Urbanization economies, on the other hand, depend on the aggregate level of economic activity in a given area, and as such benefit all firms, regardless of their industry.<sup>10</sup> In this case, firms might benefit from the cross-fertilization of knowledge and ideas, or from shared pools of less specialized labor. The distinction between localization and urbanization economies is at the origin of an important debate in economics, centered on the relative benefits of diversification versus specialization in the economic base of urban areas. This topic is analyzed and explained in more depth in the Business Composition section of the report.

Given all the benefits that arise from agglomeration, one could wonder why economic activity does not all occur in the same place. In other words, why don't we have just one giant city? In many ways, the same factors that determine the economic origin of cities

also contribute to limiting their size. If the physical growth of urban areas is not managed well, transportation costs become a great burden as cities start sprawling too much; the negative externalities related to crowding (environmental issues, quality of life, etc.) outweigh the economies of scale mentioned above; and as city size increases, the economic activity becomes more spread out, and agglomeration benefits decrease.

If cities are formed and shaped by the spatial relationship between the components of the economy, any change in those components will obviously have deep effects on urban areas. If the processes of production and the organization of markets change over time, the nature of agglomeration economies will change as well, since what agglomerates and how will not be the same. At the same time, changes in the nature of agglomeration economies will affect the organization and the environment of production, since the optimal distribution of the components of the economy will vary to take advantage of new agglomeration effects.

As new factors of production become more important, the dynamics of economic growth might change as well. For instance, New Growth theory (which will be further discussed below) suggests that knowledge factors might be becoming more important in the production process, and that this shift could have major implications for the nature of economic growth. In particular, this theory suggests that the organization of production and the arrangement of the components of the economy across space might change to take advantage of the particular agglomeration effects that knowledge produces. At the same time, physical size may become less relevant or necessary, as economies grow by accumulating new knowledge, instead of new labor or capital.

Ultimately, changes in the structure and importance of the components of the economy will have a deep impact on the very role of urban areas. For instance, the dissemination of information technology could reduce the need for face-to-face interaction, or it could increase the need for and amplify the benefits of density because people are communicating even more, or face-to-face communication becomes more important.<sup>11</sup> Similarly, the increased mobility of labor and firms could determine a dispersion of economic activity and reduce the importance of cities, or it could just change which characteristics of cities make them competitive for business. In short, both the structure and the role of cities in the economic landscape are changing over time. The research findings presented in this paper attempt to shed some light on these changes.

## **B. Five Dimensions of Change**

The project was structured along five main dimensions of urban change: Knowledge Economy, Business Composition, Demographics, Urban Growth Form, and Regionalism. These five dimensions are not meant to be an exhaustive classification: some factors might not fit neatly within this framework, and other categorizations are possible. Rather, these dimensions are based on CEOs for Cities' and the authors' identification of major issues in the economic development field, and were selected to reflect the predominant themes in the debate around cities and economic prosperity. The dimensions also provide a basic structure that helped organize the process of literature

review, data collection, and model design. Each dimension is briefly described below, and more fully analyzed in Section III.

<b>Dimensions and Illustrative Variables</b>	
<b>Knowledge Economy</b>	Educational Levels; Information Sector Jobs; Internet Access; Patents; Educational Institutions; High Tech Jobs
<b>Business Composition</b>	Sector Specializations (e.g. manufacturing, financial services); Occupational Concentrations; Industry Diversification
<b>Demographics</b>	Immigration; Age Structure; Ethnic Composition; Income Inequality; Racial Segregation
<b>Urban Growth Form</b>	Commuting Times; Population Density; Land Use; Use of Public Transit; Sprawl Indices
<b>Regionalism</b>	City/Suburb Income & Property Value Ratios; Poverty Disparities; Government Fragmentation

Figure 1

**Knowledge Economy** refers to the role of information and knowledge as factors of production and the impact of the changing role on the optimal organization of economic activity. The diffusion of information technology and its use in all aspects of the economy have caused a shift in the relative importance of the inputs of production (with information and knowledge resources playing a much more critical role than in the past), and in the organization and structure of the production process as well as the marketplace. As discussed later in the report, this shift has profound implications for the role and economic performance of urban areas, affecting the inputs, organization, and environment of production.

**Business Composition** refers to the specific mix of industries, functions, and occupations that make up urban economies. This dimension is concerned with the impact of specialization and diversification across industry sectors, and with the effect that specific functional and occupational concentrations have on economic growth. More broadly, business composition examines the various synergies and agglomeration effects that arise from the interaction of different firms and businesses, and reflects changes in the organization of production.

**Demographics** include the social and economic characteristics of the population of urban areas: this dimension examines the effects of factors such as ethnicity, age, immigration, as well as poverty and inequality, income, and unemployment. As the baby boomers age and international migration flows intensify, urban populations are becoming older and more diverse. Demographic changes such as these affect urban economies primarily because they affect the supply and characteristics of labor, which is a major input of production.

**Urban Growth Form** and **Regionalism** both examine the effect of changes in the environment of production. Growth Form refers to the geographic growth and physical arrangement of the components of the economy, and to the set of phenomena popularly referred to as “sprawl.” Since Urban Growth Form is partly a function of how the components of the economy are organized across space, this dimension is concerned with changes in the organization of production as well. Regionalism, on the other hand, refers to the political (as opposed to the physical) arrangement of the economy, examining the relationships between city and suburbs, and so also the relationship of political and governmental structures to economic performance. In many ways, Regionalism cuts across all of the other dimensions, since any change in the components of the economies of metropolitan areas (inputs, organization, and environment) can be examined with respect to its political dimension.

### **C. Methodology**

In order to identify and define the key dimensions described above, the research team performed an extensive review of the literature on economic growth and cities, identifying common themes and broad areas of interest.<sup>12</sup> For each of the dimensions, dozens of variables were identified to help measure specific aspects of the dimension, and extensive data was obtained to measure the variables. For example, if age was considered an important aspect of demographic change, age composition of the population was identified as an independent variable to examine, and the relevant data obtained. Throughout the initial stages of the project, the research team assembled a comprehensive database, encompassing thousands of variables for every city and metropolitan area in the country.<sup>13</sup> The database draws on many different data sources, combining data issued by the Census Bureau with a number of more specialized datasets assembled by other organizations and researchers.<sup>14</sup> A detailed description of the database is offered in Appendix A.

For each important variable, the Report below first simply describes changes with respect to that variable during the 1990s. For this work, the project generally examined the largest 100 cities, and (unless otherwise noted) the descriptive results reported below refer to this group of urban areas.

The project then proceeded to build econometric models to identify which variables influenced city and metropolitan performance. The sample used in estimating the models consists of the largest 250 Metropolitan Statistical Areas (MSAs) and their central cities. Consequently, the analysis produced two sets of results, one pertaining to the central city, and one pertaining to the entire metropolitan area. The discussion of the findings will specify whether they apply to the entire MSA or to the central city alone.<sup>15</sup> The models used four dependent variables as indicators of economic success, over the period 1990 to 2000: change<sup>16</sup> in city per capita income; change in city population; change in MSA per capita income; and change in MSA average wage.<sup>17</sup> In interpreting the results of the analysis, the emphasis will be on income and wage growth, which more

directly measure aspects of economic prosperity than population growth. However, “economic success” is a complex notion subject to definitional issues.

While income and wage growth are generally accepted measures associated with economic success, it should be noted that in certain circumstances income and wages could grow without economic growth. An increase in per capita income or in average wages is generally indicative of the growth of an urban area’s economy and of the increased well-being of its inhabitants. However, since per capita income is the ratio of total income to population, per capita income growth could also be the result of population shifts. For instance, if lower income people disproportionately leave the city, it would result in per capita income growth, though it might not be considered economic growth.<sup>18</sup>

Wage growth, on the other hand, is less sensitive to these demographic effects, since it depends on available jobs and productivity. Still, an increase in average wage could be due not to an increase in productivity (which would result in economic growth) but to a loss of low-paying jobs and a rise in unemployment. The research design included both income growth and wage growth in the model as separate dependent variables to make it more likely – if the income and wage effects were consistent, as they generally were – that the effects reflect actual economic growth rather than these other factors.<sup>19</sup>

With respect to the independent variables (used to indicate aspects of each of the five dimensions), the research aimed at measuring their impact on economic growth through a series of regression models. To increase the likelihood that the project was identifying causal effects, the models examined how conditions with respect to each of the independent variables in 1990 related to growth in population, income, and wages between 1990 and 2000.<sup>20</sup> The findings below about which factors affect economic performance generally report the evidence from these models. For example, the statement that “having college graduates is good for economic growth” reports that the effect of college graduates in 1990 on growth in income or wages (as specified in the findings) between 1990 and 2000 was positively significant in the underlying regression model.

The econometric models were developed in two stages. First, the project developed a “base model” for each dependent variable. The base model includes a set of core explanatory variables derived largely from prior studies of urban growth. These base models are intended to identify – based on previous theoretical and empirical research, as well as analysis of the 1990-2000 data – the key independent variables that should be included in any growth regression. These variables, included in the base model and in all the subsequent regressions, capture economic characteristics (income per capita, unemployment rate, percentage of employment in manufacturing), demographic characteristics (population in 1990, population growth between 1980 and 1990, percentage of adults with a college degree or higher), and physical characteristics (change in land area) of cities and metropolitan areas, as well as idiosyncratic characteristics associated with each of the Northeastern, Midwestern, Southern and Western regions of the United States.



The second stage of model development sequentially added new variables from each of the five study dimensions to the base model. For instance, in analyzing the effect of race on population growth, race variables were added to the base model for population growth; in considering the effects of industry composition on wage growth, industry composition variables were added to the base model for wage growth, and so forth. The more technical methodological details are discussed in Appendix B, which describes the creation of the base model for each of the four dependent variables, and gives an example of how the extension models were developed. Appendix B also contains the complete set of regression tables, along with descriptive tables for all of the variables used in the analysis.

## II. RESULTS, PART 1: THE BIG PICTURE (DEPENDENT VARIABLES)

Before analyzing what accounts for growth in the 1990s, the pattern of the growth itself bears examination. Indeed, describing and then analyzing the changes in the 1990s with respect to income and population growth reveals some of the most significant findings of the project: the “big picture” of how urban areas are growing is changing.

### A. Urban Growth in The 1990s

Overall, American cities are growing in population and income, getting bigger and wealthier. Between 1990 and 2000, median income growth was 10.2%,<sup>21</sup> and median population growth was 7.7%. However, a comparative look at urban performance over the 1990s reveals a highly uneven picture: income growth in the largest 100 cities ranged from the 27% growth of San Francisco to a 14.4% decline in Anaheim. Log change in population had an even wider range, spanning from 62% growth in Las Vegas to 13% decline in Saint Louis, MO.

<b>Income and Population Growth (1990-2000)</b>			
<b>Income</b>		<b>Population</b>	
1. San Francisco	27%	1. Las Vegas	62%
2. Austin	23%	2. Bakersfield	35%
3. Atlanta	23%	3. Austin	34%
4. Seattle	21%	4. Mesa	32%
5. Tampa	21%	5. Charlotte	31%
6. San Antonio	18%	6. Phoenix	30%
7. Charlotte	18%	7. Raleigh	28%
8. Cincinnati	17%	8. Colorado Springs	25%
9. Colorado Springs	16%	9. Arlington	24%
10. San Jose	16%	10. Aurora	22%
...		...	
91. Yonkers	-3%	91. Jackson	-6%
92. Fresno	-3%	92. Detroit	-8%
93. Anchorage	-4%	93. Birmingham	-9%
94. Los Angeles	-5%	94. Dayton	-9%
95. Riverside	-6%	95. Cincinnati	-9%
96. Bakersfield	-7%	96. Pittsburgh	-10%
97. Glendale	-8%	97. Norfolk	-11%
98. Long Beach	-10%	98. Buffalo	-11%
99. Santa Ana	-10%	99. Baltimore	-12%
100. Anaheim	-14%	100. St. Louis	-13%

[See Appendix C for Complete Lists.]

Figure 2

Looking at the table above, it is remarkable how little the lists of the top 10 cities for income and population growth overlap: Colorado Springs, Austin and Charlotte are the only cities that appear in both. The lists of the 10 most declining cities in income and population are even more different, not having a single city in common. On the other hand, it is not uncommon for cities that have high income growth to be declining in population and vice versa. Note that Bakersfield is in the top 10 for population growth, even though it is in the bottom 10 for income growth. Conversely, Cincinnati is in the top 10 for income growth, but bottom 10 for population growth. This is indicative of a

generalized pattern of divergence between population and income growth discussed in the next section.

Population growth varied greatly by region. Consistent with long-term trends, the West grew the fastest (47%), followed by the South (21.8%). The Midwest and the Northeast, on the other hand, experienced an overall decline in population, at -0.6% and -1.6% respectively.

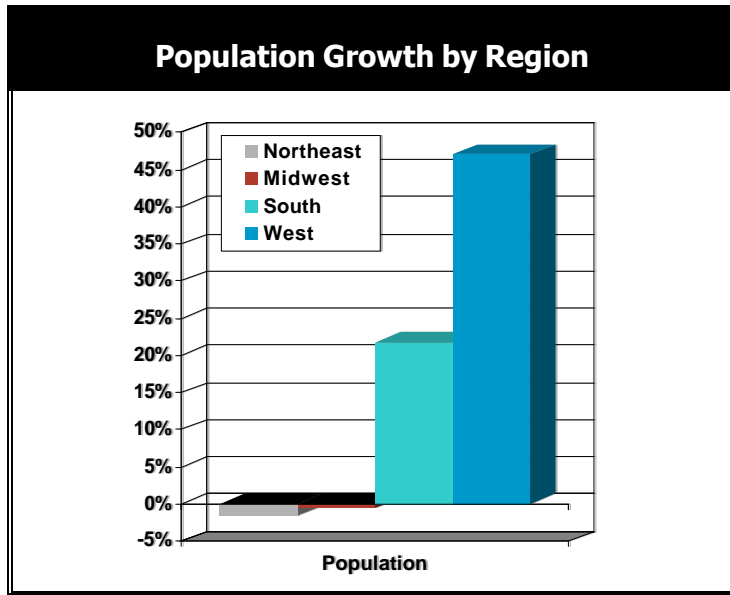


Figure 3

Income growth was much more evenly distributed across regions: the South grew in income on average by 22%, followed by the Northeast at 18.6%, the West at 15.9%, and the Midwest at 13.8%.

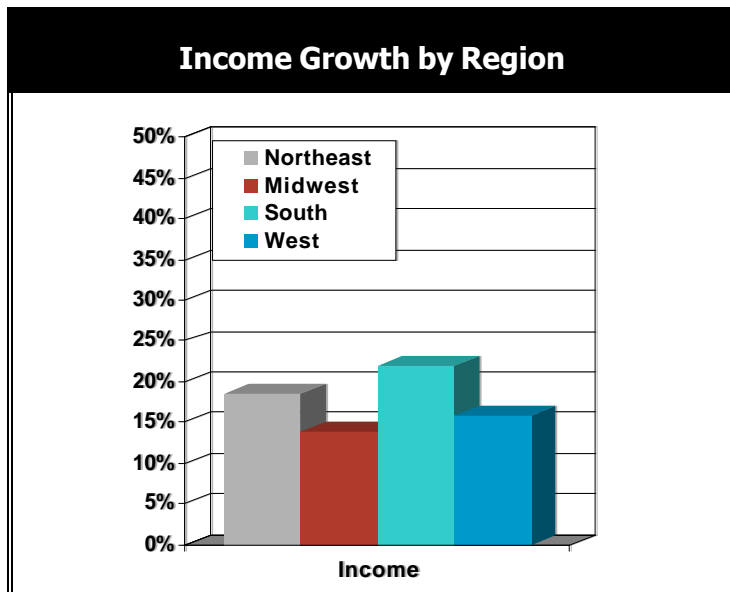


Figure 4

## B. The First Divergence: Population and Income Growth

Traditionally, the common measure of an urban area's success has been its population growth: many people think of a city as doing well if it is growing in its number of inhabitants. Population growth was a good measure of success and economic prosperity because growth in population historically has correlated closely with growth in income, wages, outputs and other more direct measures of economic performance. In a study of the drivers of urban economic growth between 1960 and 1990, Glaeser, Scheinkman and Shleifer<sup>22</sup> found that income and population growth moved together, and were both good indicators of the economic growth of urban areas.

Analysis of the correlation of income and population growth over the past 40 years, however, shows that things have changed significantly during the 1990s.

Figure 5 examines the correlation between income and population growth in 10-year moving windows. Historically, the correlation has never been very high, and in recent decades the correlation has been consistently declining, but the two remained positively correlated. However, the correlation broke down for the first time between the late 1980s and the early 1990s, and has not been significant since. It is not a coincidence that only three cities (Austin, Colorado Springs, and Charlotte) were leaders in both income and population growth over the 1990s. The regional trends mentioned in the previous section confirm this finding: the South and the West generally grew more than other regions in population, but less in income. Sacramento, for example, had 10% population growth, but 1% income decline.

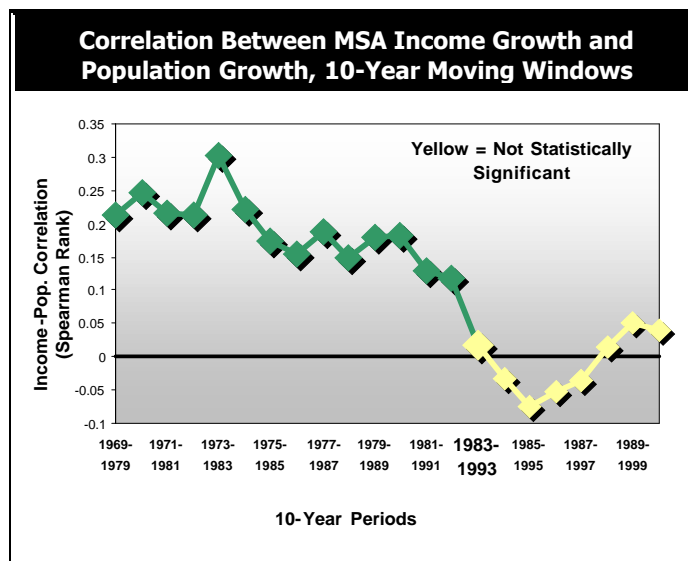


Figure 5

There are several possible explanations for this shift. Factors of production like labor (associated with population growth) might be less important than they used to be. A change in the types of industries that make up urban economies could also create a hiatus between growth in population and growth in income. For instance, if the economy is indeed shifting from labor-intensive to knowledge-intensive industries, it is possible that the increases in productivity that account for income growth might be due to the accumulation of new knowledge, and not to increases in population. Examination of what variables are driving growth (in Section III) will shed some light on likely explanations, and the Report will return (in Section IV) to examining this very significant divergence.

Regardless of its causes, the new disconnect between income and population has significant implications for urban development strategy. First, it calls into question the conventional wisdom on urban success: that attracting population is a key goal of urban development. **Cities do not need to grow big to grow wealthy, and growing big will not necessarily lead to wealth.** This finding implies that different decisions and priorities might productively inform urban policy. Cities need not, for example, suffer the effects of sprawl resulting from expanding population if their goal is prosperity. Strategies that aim at increasing productivity, and raising income and wages without increasing population, could be more effective ways to foster economic growth and healthy communities. *In sum, leaders may choose to focus less on size, and instead aim for prosperity over population growth.*

## THE EFFECTS OF WEATHER?

A theme that is closely related to the relationship between income and population growth is the role of weather in securing economic prosperity: Sunbelt cities are commonly considered extremely successful because they are able to attract large numbers of people due to their mild climate. Cities in the Midwest and in the Northeast, on the other hand, which have been constantly declining in population, are regarded as cases of economic recession. Interestingly, the model results for weather are quite different than commonly presumed, and are instead consistent with the divergence of population and income growth discussed above.

As would be expected, warm weather is good for population growth, while precipitation is bad. The average July temperature, used as an indicator of good weather, proved positive and significant for city population growth, while average annual precipitation had a negative effect. However, with respect to income growth, the opposite is true. The model revealed that average July temperature had a negative effect, while average annual precipitation had a positive and significant effect on income growth. This means that, **overall, cities with more rain and colder weather in 1990 had higher income growth in the ensuing decade.**

These findings are confirmed by examining the effect of weather on just the college-educated population, which is a critical driver of income growth, as discussed later in the report. The project modeled the effect of average July temperature and average annual precipitation on growth in college educated population, and found that while better weather attracts population overall, **college graduates tend to go to places with worse weather.**<sup>23</sup> Cities like Cleveland and Cincinnati, for example, though declining in population, were growing in college graduates and experiencing income growth in the 1990s: in Cleveland, the number of people with a college degree or higher rose from 25,532 in 1990 to 33,949 in 2000 (28% growth), but the population declined 5.5%. Similarly, Cincinnati had 9.6% growth in college educated population, but 9.4% population decline.

The point, of course, is not that bad weather attracts people or is good for growth, but rather that things are more complicated than commonly presumed, and that *sunshine and good weather are not a likely explanation for prosperity*. Figure 6 exemplifies this point by showing how the top 20 cities for average January temperature (another indicator of good weather) fared in terms of growth in population, income, and college graduates. While overall these cities had a higher than average population growth (12% versus 9%), they had a lower than average income growth (3% versus 8%) and a lower than average growth in college educated population (13.2% versus 15.9%).

Top 20 Cities (out of 100), Average January Temperature	Population Growth 1990-2000	Income Growth 1990-2000	Pct Change in Pct Pop w BA or Higher
Honolulu, HI	0.02	-0.03	12.3
Miami, FL	0.01	0.14	26.6
Hialeah, FL	0.19	0.04	42.5
St. Petersburg, FL	0.04	0.11	22.6
Tampa, FL	0.08	0.21	35.8
Los Angeles, CA	0.06	-0.05	10.9
San Diego, CA	0.10	0.07	17.4
Anaheim, CA	0.21	-0.14	04.3
Santa Ana, CA	0.14	-0.10	-13.2
Long Beach, CA	0.07	-0.10	0.3
Huntington Beach, CA	0.04	0.01	12.1
Corpus Christi, TX	0.07	0.10	10.1
Glendale, CA	0.08	-0.08	12.2
Riverside, CA	0.12	-0.06	-0.1
Phoenix, AZ	0.29	0.05	14.1
Mesa, AZ	0.32	0.08	02.9
Jacksonville, FL	0.15	0.10	17.9
Houston, TX	0.18	0.05	07.6
Tucson, AZ	0.18	0.08	10.6
New Orleans, LA	-0.02	0.12	15.2
<b>Average (Top 10)</b>	<b>0.12</b>	<b>0.03</b>	<b>13.2</b>
<b>Average (Top 100)</b>	<b>0.09</b>	<b>0.08</b>	<b>15.9</b>
<b>Median (Top 100)</b>	<b>0.08</b>	<b>0.10</b>	<b>16.5</b>

Figure 6

### C. The Second Divergence: The Rich Get Richer

Historically, economic performance has tended to converge across geographies over time – poorer places have tended to catch up as labor and capital moved to less developed markets. This observation, which was first developed in the context of international markets and applied to national economies, used to be just as valid for urban areas. Cities that had less developed local economies were able to offer cheaper land, labor, and capital, and consequently attract more investment. As investors and companies flocked to these places, their economies would grow faster and eventually catch up with wealthier cities. Figure 7 shows a typical historical pattern of convergence, where cities with higher wages in 1970 had less wage growth than those cities that began with lower wages.

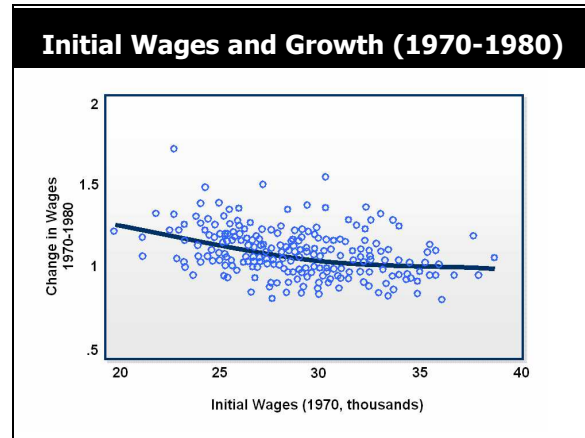


Figure 7

This pattern of convergence appears to be changing, giving way to a pattern of divergence: cities like San Jose, San Francisco and New York (represented by the circles in the upper right of the chart in Figure 8) had high wages in 1990, and also led in wage growth in the ensuing decade. This indicates that, at least for some high performance levels, **success now tends to breed more success**. In other words, initial advantages may now tend to create further advantages in particular cities, “locking in” paths to success.

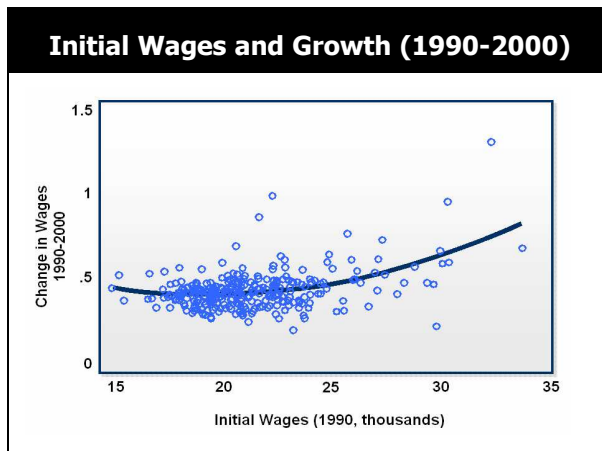


Figure 8

The discussion on convergence is one of the hottest debates in this area of economics. The results of past analyses have tended to favor convergence, although there is some debate as to whether divergence began in the mid-1980s.<sup>24</sup> The argument for convergence is grounded in neoclassical economic theory and is based on the assumption of perfect mobility of labor and capital: workers and investments will move freely from places with low wages and low returns to places that offer higher wages and higher returns.

Those who favor divergence, on the other hand, argue that the factors of production are not so mobile, and tend to concentrate in places that can capitalize on particular advantages, such as size and high levels of human capital.<sup>25</sup> New Growth theory<sup>26</sup> in

particular is consistent with the divergence argument, since one of the distinguishing features of this theory is its prediction of divergence caused by the increasing returns of knowledge factors. If knowledge-based factors of production (ranging from information technology to business networks) are increasingly important, and tend to build more upon themselves and be less mobile, richer regions may lock in an initial advantage and outpace poorer regions permanently.

With respect to this debate, the project results show a very interesting, and novel as far as the authors know, pattern for the 1990s: nonlinear path dependence. Essentially, convergence continues with respect to the lowest performing cities. These tended to grow a little faster, converging in performance with cities that were doing a little better at the beginning of the study period. However, the highest performing cities tended to grow a lot faster than the average city in the sample, “pulling away” from the rest of the group in a typical pattern of divergence.

Interestingly, the scatter plot above reveals that the great majority of cities in the sample are concentrated towards the middle of the chart. More precisely, the divergent growth effects seem to kick in only past a certain level of economic performance. In other words, although for high performing cities success breeds success, the good news is that failure does not necessarily breed failure. Cities that are at the bottom of the distribution still tend to catch up with the cities in the middle. This pattern of divergence compared to prior decades also reinforces that urban dynamics are changing generally, and different components and factors are likely driving economic performance.

This nonlinear relationship between past and present performance is confirmed by the results of the base model for income growth. Per capita income in 1990 had a negative and significant effect on income growth between 1990 and 2000, while the quadratic income term in the base model (income per capita squared) had a positive and significant effect on income growth, both at the city and at the MSA level.<sup>27</sup> This suggests that the relationship between initial income and income growth is also nonlinear, exhibiting the same U-shaped pattern observed in the case of initial wages and wage growth: poorer cities tended to grow in income faster than the median, but wealthier cities did too, increasing their lead over the rest of the sample.<sup>28</sup>

As in the case of the divergence between income and population growth, the findings illustrated in this section have important implications for urban policymakers. If cities naturally tended to converge towards an average level of prosperity, public intervention for economic development would be much less important, as market forces level the field. The findings presented in this section, though, point in a different direction: in an economic landscape where divergence prevails, initial advantages tend to breed further success. In this unforgiving environment, economic development policies can make a huge difference, and *making the right strategic decisions is more important than ever*.



### **III. RESULTS, PART 2: THE DRIVERS**

#### **(INDEPENDENT VARIABLES, BY DIMENSION)**

This section presents the main descriptive and analytic findings of the research with respect to each of the dimensions of urban change and their effects on growth. Each subsection addresses one of the five dimensions, and is organized as follows:

- (1) *Definition* : discussion of subject and scope of the dimension;
- (2) *Importance* : brief review of literature and key development issues concerning the dimension;
- (3) *Methodology* : identification of variables used to measure the varied aspects of the dimension, and additional notes about design of the models;
- (4) *Descriptive Findings* : how cities changed with respect to the dimension during the 1990s;
- (5) *Analytic Findings* : model results identifying how aspects of the dimension affected economic growth over the 1990s;
- (6) *Interpretation* : explanation of the model results;
- (7) *Implications* : suggestions for policy and practice.

#### **A. KNOWLEDGE ECONOMY**

##### **1. Definition**

Over the past ten years, few economic development issues have been discussed more than the growth of the knowledge economy. From academic journals to newspaper columns to Internet chat rooms, gallons of ink and millions of bytes have been used to describe the phenomena associated with the “new economy” and their policy implications. Economists, urban planners, policymakers, and business leaders have all been engaged in this debate, reflecting the complex and multidimensional nature of this phenomenon.

While the advent of the knowledge economy is clearly a major dimension of change, the meaning of the phrase and the ways in which this change is taking place have been less clear. The term knowledge economy is sometimes used to refer to the emergence of the Internet and to the booming expansion of Internet companies over the 1990s. This view has led some analysts to conclude that the knowledge economy was a temporary phenomenon that either came to an end or was drastically curtailed with the burst of the “dot-com bubble.”

Yet another definition identifies the knowledge economy with the rise of certain sectors of the economy. This view has sometimes focused narrowly on the Information Technology (IT) sector. Those who define the knowledge economy in these terms often think of Silicon Valley as the prototypical example of what the new economy entails: clusters of high tech firms focusing on the production of computers, software, microchips, and so forth. This idea of the knowledge economy is also exemplified, in many respects, by companies like Apple or Microsoft, which built their fortunes around

the diffusion of information technology products. A more expansive version of this definition, while still focused on the growth of certain sectors of the economy, defines information sectors more broadly, including other industries (such as entertainment) whose process and output are highly information intensive.

A different (and still broader) view of this dimension stems from the observation that information and knowledge are now playing a much greater role throughout the entire economy. Analysts have observed that knowledge and information now constitute a much greater proportion of the value added across all industries, and overall in the nation's output. Alan Greenspan, for example, cites Federal Reserve Board calculations showing that while the U.S. Gross National Product quintupled in the last 50 years, its *weight* barely increased.<sup>29</sup> In this view, the knowledge economy refers to the increasing importance of information and knowledge resources as inputs to production, in the production and market process, and as products and services.

Finally, some advocates of the knowledge economy emphasize an arguably increased pace of innovation over the past decades. Others argue that the drivers of innovation may be different in the new economy, specifically as more products and services incorporate innovative ideas and technology.<sup>30</sup> A similar view revolves around the idea that innovation plays a more important role in the knowledge economy, placing a premium on creativity and innovative networks of people and firms.

In order to sort through this confusing range of definitions, it is useful to take a step back and identify common threads and themes that recur in the knowledge economy debates. The term "Knowledge Economy" appears to refer to three distinct (though interconnected) phenomena: (1) the significance of ideas and *innovation*; (2) the importance of *the information sector* as a component of the economy; and (3) the increasing importance of *information and knowledge* (and their enabling technologies) not just in the information sector, but across all sectors of the economy. These three topics are briefly defined below.

Ideas and *innovation* have always been considered a key driver of economic growth. In fact, from an economic standpoint, innovation is the only driver of long-term growth, since the quantity and the quality of the goods the economy produces can only be increased through innovation.<sup>31</sup> While the importance of ideas and innovation is not related to the advent of the knowledge economy, it is possible that the knowledge economy changes discussed in this section might be accelerating the pace at which innovation is occurring. Moreover, as the factors and organization of production change and are more driven by knowledge and information, the synergies that lead to innovation and the ways to capitalize on innovation might be changing as well.

As noted above, the *information sector* itself presents further definitional issues. Sometimes it is described narrowly as being composed of information technology producers (e.g. Silicon Valley) and Internet companies (e.g. dot-coms). However, the project uses the broader definition, referring to a set of industries that are heavily dependent on information and information functions.<sup>32</sup> In particular, the information

sector is defined as the sum of three industry groups: financial producer services; other producer services and advanced consumer services. More details on the definition of information sector and on the exact composition of these industry groups are given in subsection IIIA3 (“Methodology”).

*Information and knowledge* are becoming more important in every area of the economy – from auto plants to consulting firms. Take manufacturing for example: although manufacturing is not usually associated with the knowledge economy, its process of value creation has changed dramatically as a result of knowledge inputs and processes like computer assisted design and just-in-time inventory controls. The increasing importance of knowledge and information in value creation throughout the economy represents the biggest transformation and has major implications for all of the other dimensions of change in urban economies.

The phrase “knowledge economy,” as used here, encompasses all of these observations, but emphasizes the third. It is used to broadly refer to the idea that knowledge has become an increasingly important factor of production, and that wealth creation increasingly depends on the combination of knowledge and technology. This is due primarily to the fact that recent innovations in information technology (most notably the invention of the microchip) drastically reduced the cost of gathering and storing data, and of processing customized and refined information flows. These advances in technology in turn allow firms to more rapidly and efficiently respond to new demand and market needs, and reward more flexible and customized production processes.

The transformation of the automotive industry is indicative of this shift. Cars, like many other goods, used to be mass-produced with limited variation within lines. Now, due to the massive reduction in the cost of obtaining and processing information, it is possible to develop much more detailed, segmented and timely market information, and to more flexibly produce more customized vehicles. The market moved from a “product-push” to a “consumer-pull” model of production: for the most part cars are made tailored to the buyer’s desires for an exact model, color and accessories. The assembly of the car also became a much more knowledge-intensive process, revolving around the use of techniques like computer-assisted design and manufacturing (CAD-CAM) and just-in-time inventory control. Finally, there is much more information technology embedded in the car itself: it is not unusual for cars now to have more computing power than the average PC.

This is only one example of the dramatically increasing role of information and information technology throughout the economy. Emerging areas of change include the relative value of various inputs to production (information, technology, human capital), as well as the benefits of a different organization of the production process (e.g. flexible production within and between firms, and innovation networks). Some of the possible implications of these changes for the economies of urban areas are explored in the following section.

## 2. Importance

The theories of change concerning the knowledge economy are as varied and diverse as the individuals and organizations contributing to this debate.<sup>33</sup> Depending on the theory, the implications for urban areas vary considerably. For instance, the advances in communication technology have prompted some analysts and practitioners to declare that cities will soon become obsolete, as the use of e-mail and the Web arguably reduce the need for face-to-face contact. Some researchers, on the other hand, say that cities will become even more important, since information and communication technologies will increase the number of interactions among people and place a special premium on the value of in-person contact.<sup>34</sup>

With respect to urban economic development, some claim that the new economy calls for clusters of high tech firms, and encourage urban areas to strive to become the next Silicon Valley. Others say that in order to be successful, cities need creative knowledge workers, and that the priority for cities should be to attract this demographic through tolerant environments and high quality of life.<sup>35</sup> The impact of information technology on the inputs and the organization of production might indirectly affect cities as well. Firms can now more easily separate key functions and relocate them across the U.S. and abroad, changing the composition of the urban economic base.<sup>36</sup>

Examination of the wide range of theories around the knowledge economy suggests five main aspects that might have important implications for the economies of urban areas: flexibility, human capital, clusters and networks, divergence, and quality of life.<sup>37</sup>

Flexibility: the low cost of data processing allows for unprecedented flexibility in the production process. Flexibility enhances the productivity of labor and capital by integrating different functions and eliminating layers of middle management, allowing for the production of more customized goods, and reducing inventory costs. The automotive industry case above is indicative of this shift. As discussed in the Business Composition section (IIIB) of the Report, these changes might affect the composition and optimal organization of the economic base of urban areas and have significant effects on economic development strategies.

Human capital: information and communication technology investments are complementary with investment in human resources and skills. As the production process shifts from labor-intensive to knowledge-intensive activities, the relevant skills and competencies of the workforce change, and skilled labor inputs could become more crucial.<sup>38</sup> If this is the case, for example, having a more highly educated population might contribute significantly to the economic growth of urban areas.

Clusters and networks: innovation depends critically on inter-firm interactions and knowledge spillovers. Networks and clusters allow firms to share costs and reduce the risks associated with innovation, while facilitating the exchange of knowledge and information.<sup>39</sup> Moreover, it is possible that the increased importance of information and, more generally, of intangible assets throughout the production process, might make face-

to-face interactions even more important than they used to be. This means that the role of urban areas in the nation's economy might be changing: since cities provide a unique concentration of knowledge and economic activity, they could establish themselves as crucial nodes of creativity and innovation.

Divergence: economists have observed that knowledge-based economic growth seems inherently different from traditional growth. In particular, as discussed above, New Growth theory predicts that the increasing returns associated with new knowledge will cause more advanced economies to grow even faster, while less developed areas will be left behind. This view, which is consistent with our findings on divergence described in Section II, will be analyzed in more depth later in the report.

Quality of life: an additional issue, cutting across several dimensions, is the increasing importance of quality of life as a driver of economic growth. Many of the researchers that analyzed the implications of the knowledge economy mention that quality of life might be becoming a more important factor in economic development.<sup>40</sup> The underlying theory is that two trends are simultaneously taking place: on the one hand, high skilled workers are becoming a more important element of productivity and competitive advantage; on the other, firms are becoming more mobile, due to the advances in communication technology and to the changes in the organization of production. As a result, the dynamics of business attraction might be shifting: it is argued that, while in the past the workers chased firms and employment opportunities, firms now tend to chase qualified knowledge workers. Cities, according to this view, should thus focus on creating vibrant urban environments and a high quality of life in order to attract and retain the high skilled workforce that firms are seeking.

This brief description of aspects and issues of the knowledge economy suggests the possibility of profound changes in the structure of the economy, that are likely to have a major impact on American cities and regions: on the one hand, the shift in the importance in the inputs of production might determine a change in the factors that account for urban economic success. On the other hand, the very role of cities might be changing, as networks and spatial concentrations of different kinds of economic activity become more important. The project sought to measure the nature and extent of some of these changes, and to examine their impact on economic growth over the 1990s.

### 3. Methodology

The project examined a broad range of variables to get at this dimension, consistent with the multiple distinct phenomena and broad scope of change implied by the knowledge economy. While all of the variables mentioned below are included in the database and were examined during the descriptive phase of the analysis, not all of them were included in the regression models. For many knowledge economy variables, data was not systematically collected until the late 1990s. As a result, these variables could not be included as initial conditions in the regressions, but were the object of a simpler analysis based on their correlation with the indicators of economic growth.<sup>41</sup>

A first set of variables was used to capture the presence of the information sector in the local economy. In the narrow sense of information technology and Internet companies, the presence of the information sector was tracked using variables such as the number of dot-com domains and the percentage of high tech jobs. More attention, though, was paid to the broader definition of information sector, following the approach and the definitions outlined by Matthew Drennan.<sup>42</sup>

Drennan looks at traded (or exported) goods and services, since these are the industries accounting for economic growth, and classifies them into six groups: primary production, manufacturing, distribution, financial producer services, other producer services, and advanced consumer services. The first three groups compose the Goods Production and Distribution sector, while the remaining three groups, all of which include knowledge-intensive industries, compose the Information Sector. In particular, financial producer services include banking, securities, insurance, and real estate. Other producer services include communication, business, professional and legal services. Advanced consumer services includes high-level services to consumers, such as private education, health care, entertainment, professional sports, and museums. The percentage of total earnings in each of these three industry groups is one measure of the concentration of information sector activities in the local economy. The aggregate percentage of total earnings in all three Information Sector groups was also included in the models.

A number of variables were included in the models aimed at measuring the role of education. Some variables capture the education level of the adult population:<sup>43</sup> the percentage of adults with no high school degree; with high school but no college; with some college but no degree; with an associate degree; with a bachelor's degree; and with an advanced degree. The "Education Score"<sup>44</sup> of each city was also included: this variable does not measure the education level of the population, but the quality and availability of education opportunities.<sup>45</sup>

Other measures were identified to examine the overall extent of participation in the "digital economy," i.e. the use of the Web and of information technology across all economic activities. These measures include the percentage of adults online, computer usage in schools, Internet access, and the number of broadband providers in a given urban area. Moreover, the project looked at some basic measures of the capacity of cities to generate technological innovation, such as the number of patents and R&D expenditures at colleges and universities. The concentration of knowledge-intensive professions and occupations was also taken into account, measured by the percentage of professional and managerial occupations.

Finally, the project included a rough measure of quality of life: the Art Score. The Art Score is based on the number of cultural institutions, such as museums, fine arts and public radio stations, public television stations, universities offering a degree or degrees in the arts, symphony orchestras, theatres, opera companies, dance companies, and public libraries.<sup>46</sup>

In order to measure the impact of the various knowledge economy factors, four different sets of models were estimated – one for each dependent variable (population growth and income growth at the city level, and income growth and wage growth at the MSA level). Each set included four different regressions: one for the effects of the education variables; one for the effects of various occupations (professional and managerial in particular); one for the effects of the different information sector industries; and one for the effects of the quality of life indicators.<sup>47</sup>

#### 4. Descriptive Findings

Education levels in cities increased substantially over the 1990s: the average percentage of adults with college degree or higher rose from 22.8% in 1990 to 26.3% in 2000.

However, there is a great range of variation: in the most educated city (Arlington, VA) 60% of adults had at least a college degree, while in the least educated city (Newark, NJ) only 8% did.

Interestingly, although even the least educated cities experienced growth in college graduates in the 1990s, the growth among the most educated cities was especially impressive. All but two of the ten most educated cities increased the percentage of college graduates by over 5%.

The growth in Fremont, CA, Seattle, WA, and San Francisco, CA -- where the percentage of college graduates increased respectively by 13, 10 and 9 percentage points -- is particularly stunning. In other words, **there was divergence among cities with respect to education, with the most educated cities in 1990 increasing their level of education most over the decade: the smart got smarter in the 1990s.**

10 Most Educated Cities*		
1.	Arlington, VA	60%
2.	Madison, WI	48%
3.	Seattle, WA	47%
4.	San Francisco, CA	45%
5.	Raleigh, NC	44%
6.	Fremont, CA	43%
7.	Austin, TX	40%
8.	Washington, DC	39%
9.	Minneapolis, MN	37%
10.	Charlotte, NC	36%
<b>Median</b> (for top 100) =		<b>25%</b>
* % of adults w/ BA or higher		

Figure 9

Despite the increase in the percentage of college graduates, this category still remains a

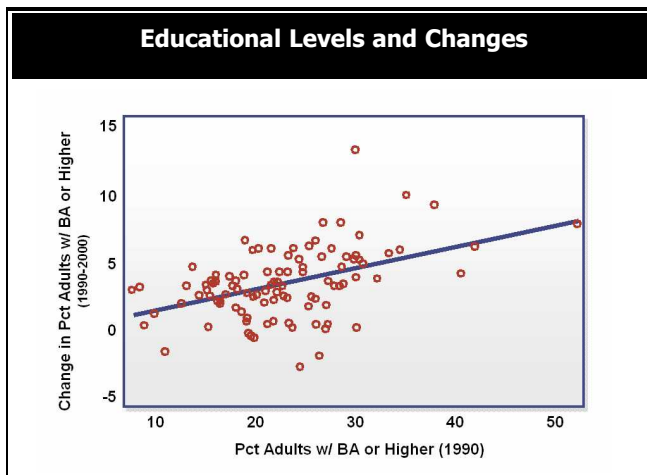


Figure 10

distinct minority in nearly every city: Arlington, VA is the only city in which a majority of adults had a college degree. Among the adults without a college degree, a surprising number have completed some college. *Indeed, in 39 of the top 100 cities, the number of adults with some college but no degree actually exceeds the number of college graduates.*

The number of adults who did not complete high school is also striking: in 36 of the top 100 cities, the number of people who did not complete high school was higher than the number of college graduates.

10 Most College Incompletes	
1.	Mesa, AZ
2.	Anchorage, AK
3.	Virginia Beach, VA
4.	Aurora, CO
5.	Huntington Beach, CA
6.	Newport News, VA
7.	Tacoma, WA
8.	Tucson, AZ
9.	Arlington, TX
10.	Spokane, WA

Figure 11

Moving on to the other knowledge economy factors, the data revealed that, by virtually all measures, information and knowledge (and their enabling technologies) have continued to become more important to the economies of cities between 1990 and 2000. This proved true of many variables, but the trend is most easily summarized by looking at the information sector indicators. An analysis of the earnings in different economic sectors

at the MSA level reveals that the economy has shifted from goods production to more information intensive industries. Between 1990 and 2000 the information sector's share of total earnings increased by 4.4%, while goods and distribution decreased by 3.9%.

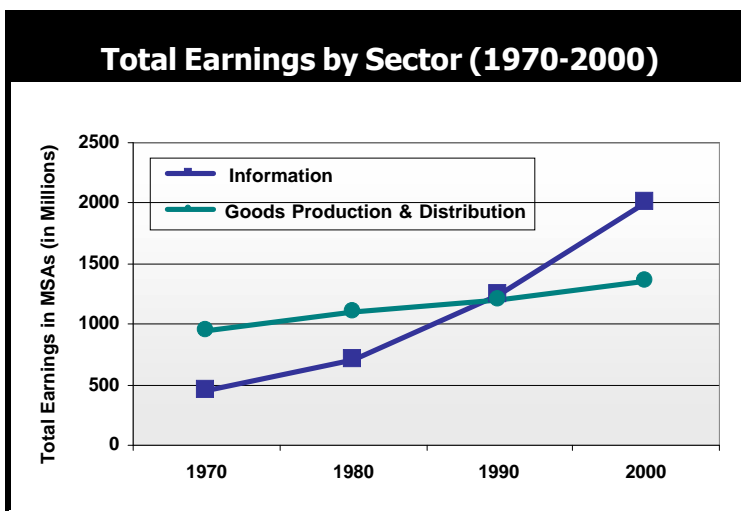


Figure 12

As a result, the composition of metropolitan earnings now shows a marked prevalence of information sector activities (61% compared to 29% in goods production and distribution).

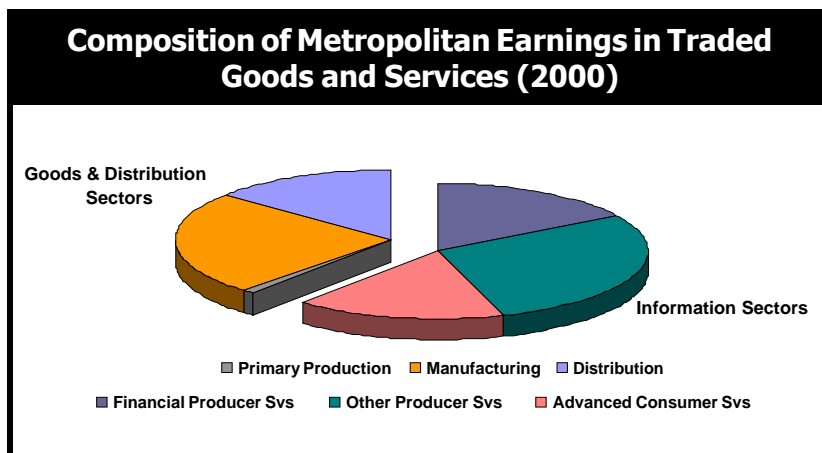


Figure 13



Leading researchers show that the growth of knowledge economy factors goes well beyond the information sector findings described here.<sup>48</sup> Some of the findings discussed in the Business Composition section of this report, pertaining to changes in functional and occupational concentrations, reinforce this view and further illustrate the impact of the knowledge economy on urban areas.

## 5. Analytic Findings

**The Importance of Education:** The regression analysis revealed that, of all the variables examined, **over the 1990s, educational levels were the single biggest driver of economic growth.** In particular, the percentage of adults with college degrees proved to be highly positive and significant for population, income, and wage growth, both at the city and at the MSA level. This means that cities and metropolitan areas with a more highly educated population experienced a much higher level of economic growth. The effect of education was by far the largest revealed by the standardized coefficients of the project's models. The regression coefficient indicates that, roughly, for each 2% growth in the proportion of college graduates, income growth increased by about 1%.<sup>49</sup>

On the other hand, a higher proportion of the population having a high school degree without completing college has a much smaller impact: a 2% increase in high school graduates yields only a 0.2% increase in income growth. Interestingly, population with associate degrees had no impact at all, while the percentage of adults with a graduate or professional degree was not significant for income growth, and might even have a negative effect on population and wage growth. This result could be driven by small college towns that have a high percentage of professors and researchers, but whose economies are not particularly thriving. Also, the impact of graduate degrees likely varies depending on the characteristics of the local economy, on the nature of the degrees and on how people with advanced degrees are deployed in the local job market.

**The Information Sector:** Other knowledge economy factors, besides education, also proved to have a positive impact on economic performance. The percentage of total earnings in the information sector had a positive and significant effect on wage growth,<sup>50</sup> which is consistent with the descriptive findings about the growth of this sector of the economy over the 1990s. More detailed effects of different specializations within the information sector are discussed in the Business Composition section of the Report.

**New Economy Index:** With respect to the variables included in the New Economy Index (see footnote 15), the project examined in particular the degree of correlation between the digital economy indicators (Internet access, broadband providers, computer use, etc.) and income and wage growth at the MSA level. While it was not useful to model these results due to lack of data prior to 1987,<sup>51</sup> a simple analysis suggests that digital economy factors are highly correlated to economic growth. The graph below illustrates how cities with a higher presence of digital economy factors consistently had higher income growth. The same is true, though not as strongly, for other components of the Index.

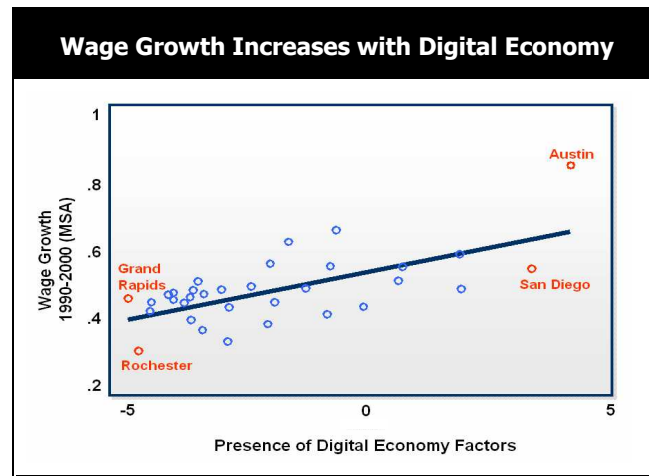


Figure 14

**Quality of life:** Finally, the model outcomes provide some evidence of the impact of quality of life on economic growth, but the results are far from conclusive. The Art Score proved to have a very small but significant positive effect on wage growth.

**Other Measures:** The evidence of the impact of other knowledge economy factors is even more elusive as a result of data limitations. The analysis of patent data, used as a proxy for the capacity of urban areas to produce innovation, did not reveal any significant effect. However, this could be ascribed to the nature of the data, and to the fact that the number of patents issued in any given city is not a very good indicator of the pace of technological innovation in that city: patents do not lead to economic growth unless they are commercialized, and the commercialization of new products does not necessarily occur where those products were invented and patented. Other measures (such as venture capital and R&D investment), getting not only at the pace of innovation, but also at the commercialization of new knowledge, would be more revealing. Unfortunately, this kind of data was available only for a very small sample and could not be included in the models. Considering the apparent overall importance of the knowledge economy dimension, refining and improving the data sources with which to further analyze this dimension deserves attention.

**Table 1: Knowledge Economy – Summary of Model Results**

Independent Variables	Dependent Variables			
	City		MSA	
	Population	Income	Income	Wage
Pct High School Degree Only	-	+	ns	ns
Pct College Degree Only	+	+	+	+
Pct Grad/Professional Degree	-	ns	ns	-
Pct Associates Degree	ns	ns	ns	ns
Pct Some College, No Degree	ns	-	ns	ns
Arts & Culture Score, Places Rated	-	ns	ns	+
Education Score, Places Rated	ns	ns	+	ns
Information Sector as % Total Payroll (Drennan)	ns	ns	ns	+
Goods Production & Distribution as % Total Payroll	ns	ns	ns	ns

This is the first of a series of tables presenting a simplified synopsis of the model results. The table shows the effects of the independent variables listed on the left on each of the four dependent variables. The effects are reported as follows: + (positive and significant effect); - (negative and significant effect); ns (non-significant effect). Similar tables throughout the report present the results of the models pertaining to each dimension. See Appendix B for complete model results.

## 6. Interpretation

The knowledge economy and the findings presented above have far-reaching consequences that will become clearer only after the other four dimensions have also been explored. For present purposes, this section addresses just a few of the narrower implications of particular findings.

*Having college graduates is highly significant to economic growth, while having people with a high school degree without completing college is not very significant any more.* The descriptive results concerning low college completion rates thus both are striking and present an opportunity. In Chicago, for example, in 1990, 17% of the adult population, or 300,000 people, had some college but no degree. Hypothetically,<sup>52</sup> if one third of those people had finished college, Chicago’s predicted income growth would have increased by 4% - an increase of \$1,000 per person, or \$2.8 billion!

The results with respect to the quality of life indicator suggest that quality of life may be a significant factor. However, other results and analysis also suggest *caution with respect to overemphasis on quality of life as an economic development strategy*. First, the

estimated impact of the quality of life indicator was very small, suggesting that quality of life alone would not be a very effective driver of economic growth. Second, as will be further evident from the findings below, other factors are at least as important to economic success.<sup>53</sup> The availability of a good mix of employment opportunities is likely to play a major role in attracting workers, while a good business climate and an efficient infrastructure may be just as important as the presence of a qualified workforce in determining business location decisions. Finally, too narrow an emphasis on quality of life sometimes has the characteristics of a zero-sum game, where cities compete to attract certain kinds of workers from each other. By focusing on education, knowledge infrastructure, commercialization of ideas, and the other factors that lead to innovation and economic growth, cities can be just as successful, while contributing at the same time to the growth of the national economy as a whole.

In general, the project findings confirm the shift towards knowledge and information as key inputs of production. The critical impact of education demonstrates the importance of human capital in today's knowledge intensive production process. That having people with a high school degree barely matters, while having college education makes a critical difference, provides further evidence that productivity now requires a higher level of skill and competencies.

The rise of the information sector also leaves few doubts about the prevalence of knowledge and information intensive industries in the economy of urban areas. This has important implications not only for the inputs of production (human capital and technology), but also for the organization of production, particularly with respect to flexibility and the importance of clusters and networks. These points will be elaborated in the Business Composition section, and in Section IV, below.

The findings are also consistent with the New Growth theory prediction of divergence between best and worse performing cities. The importance of knowledge could account for increasing returns in those cities that start off with a higher concentration of human and technological capital, since knowledge factors may build upon themselves and increase competitive advantage over time. The divergence in education levels (the fact that more educated cities increased in number of college graduates over the 1990s) might reinforce this trend as well. Divergence is another recurring issue that will be addressed in more depth later in the report.

## 7. Implications

The full extent of the implications of the knowledge economy findings will become apparent only at the end of this report, once all of the five dimensions are discussed, and the overarching themes and interactions among them are examined. For present purposes, it is possible to draw a few broad conclusions and policy implications.

First, the importance of education (and higher education in particular) cannot be overstated. It is critical for cities to have a clear picture of their education level and of the trends with respect to their college educated population. In this respect, it would be

particularly helpful to track where college graduates are coming from, where they are going, and why, as well as to better understand the reasons behind college incompleteness rates. Also, each city could identify the key factors in attracting and retaining high skilled workers, highlighting areas that need the intervention of local policymakers.

At a more general level, it is safe to say that ensuring high levels of matriculation from high school to college and greater college completion rates would have a great impact. This suggests a focus on high schools and both two and four year colleges: policies in this area could aim at developing new scholarship and fellowship programs, facilitating paid internships and other applied learning opportunities, and increasing available work-study funding and positions.

Producing more college graduates, though, is not enough. Retaining and attracting the college-educated population is also extremely important. Paul Gottlieb suggests that, in order to assess the effectiveness of urban areas in retaining their college educated population, it is necessary to take into account both the supply of college graduates (i.e. how many people graduate from local universities) and the demand for their services (i.e. what kind of jobs are available in the area).<sup>54</sup> Universities are critical players on both sides of this equation, since they educate and provide employment opportunities at the same time.<sup>55</sup> The retention of college graduates could also be improved through policies such as loan forgiveness programs for graduates that choose to remain in the region and strategic partnerships with universities and local business communities aimed at increasing the number of college graduates that are employed locally.

Second, the importance of knowledge factors in general suggests a focus not only on education, but also on the knowledge infrastructure of urban areas.<sup>56</sup> This could entail expanding internet access and broadband capability,<sup>57</sup> perhaps by maximizing competition among providers and lowering the costs to the user; improving Internet and network security, for example by allowing companies to share information about network threats and security breaches, and by protecting the privacy of Internet users.

Knowledge infrastructure now must also extend beyond the hardware to the “soft” infrastructures that allows efficient knowledge transfer, innovation and commercialization. As knowledge and information become greater parts of value-added across the economy, policies that aim at enhancing concentrations and exchange of knowledge, networks of specialists and practitioners, and similar vehicles spurring and facilitating innovation could have a great effect on the economic growth of urban areas. Such policies might include investing in research (universities and R&D facilities), R&D tax credits, and regulation and enforcement of intellectual property rights.<sup>58</sup> In order to effectively contribute to the growth of the local economy, though, innovation needs to be converted into viable commercial products and enterprises. Local policy makers can favor the commercialization of knowledge by focusing on venture capital, local entrepreneurship, and business networks. University-industry technology transfers are particularly important in this process, and can be facilitated through business incubators and incentives for start-up companies, as well as through incentives for academic

investors.<sup>59</sup> The expanded use of e-commerce, especially for small businesses, can also be beneficial.

Finally, government – not only as a regulator, but also as a critical source of information, investor and partner with respect to economic activity -- itself should strive to become more agile and responsive.<sup>60</sup> Local administrators need to be open and innovative, collaborate with other organizations (networks of companies, universities, and nonprofits) and rely on information technology to improve the responsiveness of government institutions.

## **B. Business Composition**

### 1. Definition

“Business composition” refers to the specific mix of industries, economic functions, and occupations that make up the local economy. With respect to the “map” of elements of economies described in Section IA1, this dimension is primarily concerned with the organization of production – both within the firm and between firms. By examining the various synergies and agglomeration effects that arise from different compositions of business activity, this dimension considers what mixes of economic activity seem to have the greatest impact on the growth of urban areas.

### 2. Importance

Policymakers, economic development practitioners, and academics broadly agree that the business composition of a local economy is a key dimension both determining and reflecting its performance. However, there is much less agreement on which types of business composition are most beneficial for economic growth.

The question at the core of this dimension is what components of the production process benefit more from being located near each other, and why. It could be that agglomeration economies arise most when firms that operate in the same industry locate in the same area. On the other hand, firms may benefit more from being located near other firms operating in different industries that might share the same inputs or offer more cross-fertilization. It is also possible that agglomeration effects are becoming less related to industry sectors and depend more on the concentration of production functions, like headquarters or production plants, or even on occupational or knowledge concentrations (regardless of industry concentration). Four possibilities are discussed: industry specialization, industry diversification, clusters of firms, and functional concentration.

One of the hottest debates within this dimension concerns whether industry diversification or specialization is more beneficial for economic growth. Should cities try to specialize in one or two industrial sectors, or should they pursue a more balanced and diversified industry mix in their local economy? Compelling arguments and empirical evidence have been presented in support of both views.

Specialization in cities refers to concentration of economic interactions within a given industrial sector. This concentration of interactions gives rise to “localization economies,” efficiency benefits for a firm that locates in the same area as other firms that operate in the same sector. For over a century now, economists such as Marshall, Schumpeter, and Romer have argued that specialization favors economic growth. Most of the advantages of specialization arise from what economists call “knowledge spillovers.” This term refers to the fact that technical knowledge can more easily circulate among firms that operate in the same economic and geographic space.<sup>61</sup> Spatial proximity allows people working on similar issues to talk and share ideas, advancing technical knowledge and innovation, generating a higher volume of economic activity, and thereby helping the growth of the industry and the economy of the city where the industry is located.<sup>62</sup>

Specialization can also bring other benefits: firms that operate in the same sector may share many of the elements of production, such as specialized transportation infrastructure, labor pools or suppliers, thus making the production process more efficient. Economic development practitioners often make another, less technical, argument in favor of specialization: it may be more feasible to focus policy, develop deep expertise and otherwise invest in one sector, instead of spreading their resources too thin.

While specialization focuses on economic interactions within a given sector, diversification in cities refers to economic interactions across sectors (often called “urbanization economies”). Jane Jacobs, a leading proponent of the theory that diversification increases productivity, argues that having a diverse mix of people and businesses can favor innovation.<sup>63</sup> According to this theory, innovation arises from cross-fertilization among people that engage in different types of activities and have a varied range of expertise, rather than from a concentration of people that operate in the same industry sector. Feldman and Audretsch recently presented empirical evidence in support of this view, since they found that innovation occurs disproportionately in metropolitan areas, and that it tends to be driven by diversification across industries.<sup>64</sup> Additionally, Glaeser, Kallal, Scheinkman, and Shleifer analyzed employment growth patterns in U.S. cities, and found that diversification and local competition foster urban employment growth, whereas specialization tends to have the opposite effect.<sup>65</sup>

As in the case of specialization, some practitioners in this field have other, and perhaps more practical, reasons to favor diversification. Policymakers and economic development practitioners often make the argument that the more diversified a local economy is, the less its fate is tied to that of a particular industry. Investors tend to build diversified portfolios in order to hedge their risks: for the same reasons, it might be easier for cities to sustain long-term economic growth if the local economy relies on a broad and diversified industry base.

In recent years, the notion of clusters, which has become increasingly popular among policymakers and practitioners, has added a new perspective to the debate between specialization and diversification.<sup>66</sup> While the concept of clusters is often used

interchangeably with the notion of specialization, it refers to something quite different. Clusters can be broadly (if somewhat tautologically) defined as a concentration of businesses whose competitiveness is enhanced by their spatial proximity to each other (usually as a result of the higher density of business transactions between firms within the cluster).<sup>67</sup> While in practice clusters are often defined in terms of industry sector (hence the confusion with specialization), it is important to note that clusters are not necessarily made up of one industry. Rather, the enhanced competitiveness of the firms located within the cluster flows from factors that often cut across different industries, such as buyer-supplier relationships, shared technologies, common distribution channels, or shared labor pools.

Despite the great popularity of this idea, there is still little empirical evidence of the influence of clusters on local economies. This is probably due in part to the fact that clusters are a relatively recent concept, and in part to the fact that there are many different and inconsistent definitions. In general, while the idea of clusters is a useful heuristic when talking about development policies, there are still too many definitional issues and too little data available to implement a meaningful quantitative analysis of their economic significance.<sup>68</sup> While focusing economic development work on particular “clusters” of firms is undoubtedly good for the firms within the cluster, the impact of this strategy on the overall growth of the local economy deserves further analysis.

A final element that contributes to the complexity of this dimension is the idea that specialization is occurring with respect to economic functions, rather than sectors. Duranton and Puga elaborated this concept two years ago, by observing that over the last few decades there has been a shift in the main dimension along which cities specialize.<sup>69</sup> The authors present convincing evidence that American cities are increasingly distinguished by functional, rather than by sectoral, specialization.

The idea of functional specialization refers to the separation between different economic functions (e.g. management and production, front office and back office, etc.) within the same firm, and depends on underlying changes in the organization of production. It is possible that the benefits of agglomeration might now depend more on functions and less on sectors: agglomeration economies might arise from the proximity of facilities that perform the same functions for different firms (e.g. management, production, back office, etc.) rather than from the proximity of firms that operate in the same industry. At the same time, the information technology innovations associated with the knowledge economy reduce the cost of sharing, managing, and communicating information across disparate geographies, allowing firms to separate functions that previously had to be located in the same place.

As a result of the combination of these two factors (increased benefits of concentrating functions and decreased costs of locating different parts of the same business in different places), firms previously organized as a single unit may now tend to become multi-unit organizations. This separation usually happens along functional lines because units performing different functions tend to locate in places where those functions are best supported. Specifically, Duranton and Puga maintain that firms tend to locate their



headquarters in places that offer a wide array of business services, while production plants are moved to more sector-specialized cities. An example of this trend is provided by the decision of the Boeing Company to move its corporate headquarters to Chicago, while its primary production facilities remain in Seattle. The result of many firms making similar location decisions is a shift in the employment patterns in cities. This in turn is likely to change what cities specialize in: economic functions, rather than industry sectors.

The debates around this dimension makes it clear that business composition is critical for economic growth, and provide interesting insights and perspectives. At the same time, though, they raise a series of very important questions for urban leaders: what were the main trends in the business composition of American cities over the 1990s? Is specialization or diversification more beneficial for economic growth? What are the implications of functional specialization for urban areas?

### 3. Methodology

The project looked at business composition using numerous measures, mostly based on the percentage of earnings in various industry groups and on the percentage of jobs in different occupation categories. Different measures of specialization by sector and diversification were also included, as well as broad measures of occupational concentration that partially capture the degree of specialization by function.

The project focused particularly on the six broad sectors defined in Drennan's recent work.<sup>70</sup> As described in the knowledge economy section of the Report, the models included the percentage of earnings in manufacturing, distribution, and the three information sector industry groups. In addition to the Drennan groups, the project also included the percentage of earnings in government jobs, in order to measure the proportion of the local economy that is concentrated in the public sector.

In addition to the percentage of earnings in each group, the project looked at whether metropolitan areas could be considered specialized in any of these industries. The presence of specialization was determined by comparing the share of earnings in each industry group in a particular metropolitan area to the average share of earnings in that industry in the sample.<sup>71</sup> For example, if the average share of earnings in manufacturing is 20%, a metropolitan area that has a percentage of earnings in manufacturing higher than 30% (one standard deviation above the mean) is considered specialized in this industry sector. A set of indicator variables measured the effect of each specialization on economic growth.

Based on the definition of specialization adopted by the project, it is possible for urban areas to have more than one different specialization.<sup>72</sup> In order to test whether having more than one specialization could have an effect on economic growth, the number of specializations for central cities and MSAs (up to a maximum of 3) was included in the model as well.

The variables discussed so far are all based on earnings. In order to go beyond industry sectors, and to get at the broader concepts of economic functions and occupations, the project examined a set of variables based on the proportion of different types of jobs. The first broad cut was the distinction between professional and production occupations, which can be considered a rough measure of functional specialization: cities specializing in management functions are likely to have a higher percentage of professional jobs, while cities specializing in production will obviously have more production jobs.

A second, and more detailed, set of occupation variables measured various occupational concentrations,<sup>73</sup> based on the percentage of the workforce employed in each of eleven employment categories identified by the Census Bureau: executive, administrative, and managerial occupations; professional, specialty and technical occupations; sales occupations; clerical and administrative support occupations; precision production and skilled crafts occupations; machine operators, assemblers, and inspectors; transportation equipment operators; material handlers, equipment cleaners, helpers, and labor; service occupations, except for private household; private household service occupations; and farming, forestry, and fishing occupations.<sup>74</sup>

The diversification of the industry base of each urban area was measured based on employment data. The Herfindahl Index of industry fragmentation, which measures the degree of diversification, is calculated based on the share of employment by city industry. Higher scores on the index indicate more diversification.

Finally, the project looked at the percentage of total income accounted for by export sales, in order to see which urban areas had particularly high concentrations of international export business, and could be considered hubs of international transport.

The effects of business composition on the economic performance of urban areas were tested using two separate models: one model included all of the earnings variables, while a second model included the occupation variables. Consequently, the first model measured the effects of different specializations, as well as the effects of each industry sector on economic growth. The second model measured the effect of different occupational concentrations, as well as the effect of the overall degree of diversification of the local economy. One business composition variable, the percentage of earnings in the manufacturing sector, was included in the base model as well.

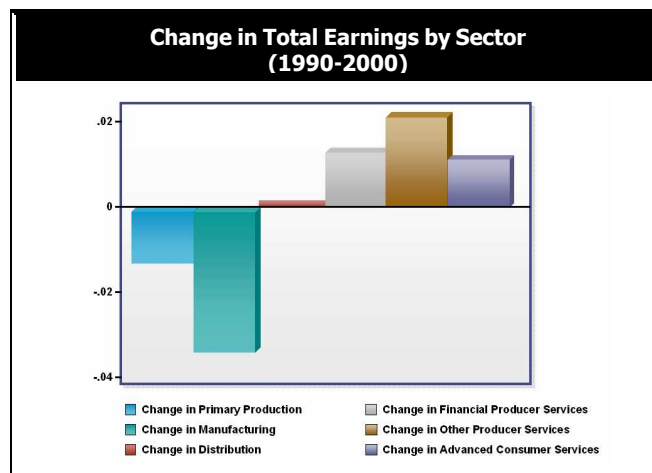


Figure 15

#### 4. Descriptive Findings

Overall, the economies of urban areas grew significantly over the 1990s. The median growth rate in total earnings between 1990 and 2000 was 23%, up from 21% between 1980 and 1990. As discussed in the knowledge economy section, the rise of the information sector (41% growth in total earnings) accounts for most of this growth, but the goods production and distribution sector grew as well, and significantly faster than in the previous decade: the median growth rate in this sector over the 1990s was 8.1%, which was much higher than the 2.3% growth experienced between 1980 and 1990.

The bar chart above shows the change in the share of total earnings in each industry group. While other producer services had the largest expansion, manufacturing recorded the largest decrease in its share of metropolitan earnings. However, as shown in Figure 16, manufacturing is still the second largest group, at 24% of the total metropolitan earnings.

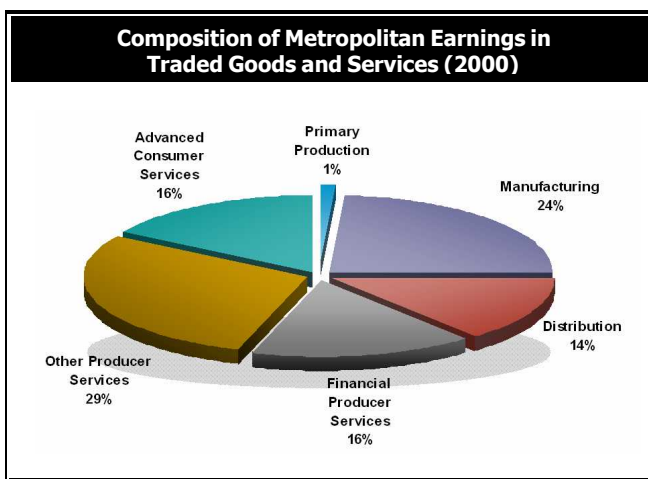


Figure 16

Surprisingly, while real earnings in manufacturing decreased in 102 MSAs (including, for example, Cleveland and St. Louis), they actually increased in 169 urban areas (led by Austin and Boise) between 1990 and 2000. This means that while individual cities continued to suffer from the deterioration of their manufacturing base, this was not a nationwide trend. More precisely, the Northeast was the only region where the average MSA had a declining manufacturing base, while the West recorded the largest

increases in manufacturing. In fact, a look at the cities with the most gains in manufacturing over the 1990s reveals that 7 out of the top 10 are located in the West.

An analysis of the specialization trends of American cities reveals that while the metropolitan economy in general has shifted towards the information sector, most of the cities that were specialized in goods production and distribution in 1990 remained so in 2000.

Of 56 MSAs specialized in goods production and distribution in 1990, only two were specialized in information in 2000, while 32 maintained the same specialization and 22 were no longer specialized. Moreover, there is a high degree of correlation between specialization in information sector and city size: the largest urban areas uniformly have unusually high

1.	Austin-San Marcos, TX	153.9%
2.	Boise City, ID	147.2%
3.	Las Vegas, NV-AZ	95.3%
4.	San Francisco-Oakland-San Jose, CA	88.4%
5.	Reno, NV	84.3%
6.	Corvallis, OR	80.6%
7.	Sacramento-Yolo, CA	71.0%
8.	Fort Collins-Loveland, CO	69.9%
9.	Raleigh-Durham-Chapel Hill, NC.	69.4%
10.	Houma, LA	66.1%

Figure 17

concentrations of economic activity in the information sector. This is consistent with the findings of Duranton and Puga on functional specialization: these two authors show that larger metropolitan areas tend to specialize in management and professional occupations, and to have a higher concentration of financial and other producer services (information sector industries), while smaller cities are more likely to specialize in goods production.

### 5. Analytic Findings

The number of specializations in the region had no effect on income growth, either at the city or at the MSA level. Indeed, 9 of the 10 fastest growing cities – and 9 of the 10 slowest growing cities – had at least one specialization.

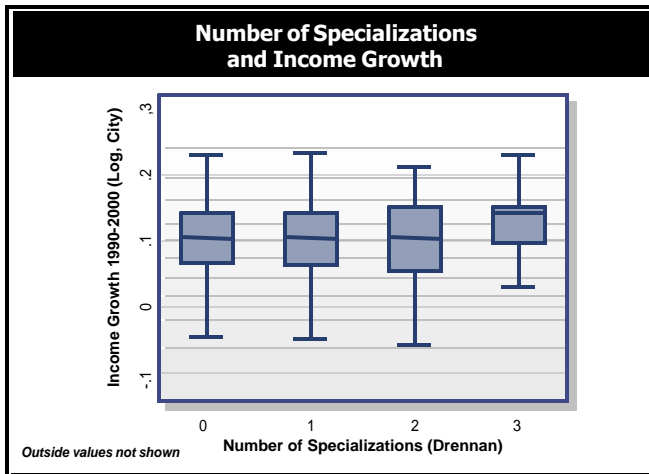


Figure 18

Figure 18 illustrates this finding by showing how little difference in income growth there was between cities with different numbers of specializations. Only having three specializations seems to have a small (and not statistically significant) effect.

The results on wage growth are a little different: being specialized had a positive effect on wage growth, no matter what the number of specializations was, and the

magnitude of the effect increased with the number of specializations.<sup>76</sup> This means that being specialized in general was good for wage growth, but it also means that cities that had two or three specializations (i.e. whose economy was, in this way, more diversified) grew faster than cities that had only one specialization.

The difference between the effects of specialization on income growth and on wage growth could be due to a negative correlation between specialization and labor force participation, and warrants further investigation. Perhaps urban economies that have more specializations tend to have higher productivity, leading to higher levels of wage growth without adding new jobs. It is also possible that the cities that can support several specializations are larger cities where labor force participation is lower.

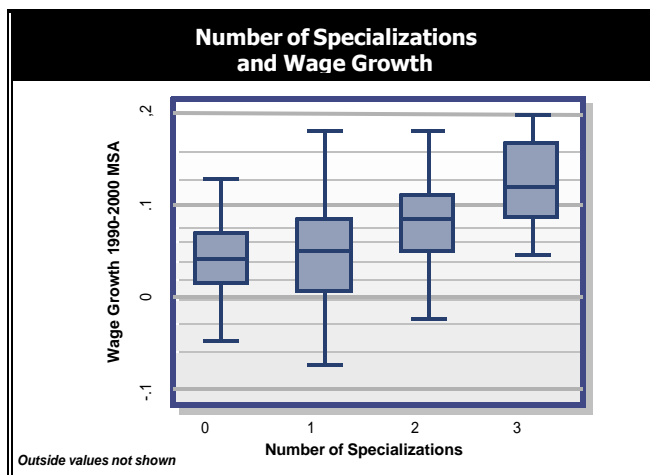


Figure 19

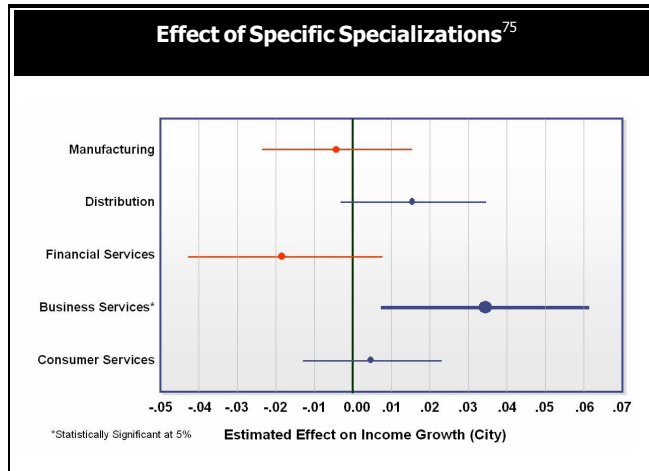


Figure 20

Atlanta, Seattle and Tampa. Urban areas specialized in the distribution industry group also experienced faster income and wage growth. Notably, specialization in manufacturing was not significant, and did not impair (nor contribute to) economic growth.

The percentage of earnings in manufacturing, on the other hand, had a positive and highly significant effect on income and wage growth at the MSA level between 1990 and 2000. This variable was also included in the base model, with the same result. That manufacturing proved to be positive for MSA income and wage growth in both regression equations reinforces the robustness of this finding. This is an important shift: previous research showed that in earlier time periods (1960-90) manufacturing was negatively correlated with growth.<sup>78</sup> However, as indicated by the descriptive findings, the manufacturing comeback varied greatly by city and by region.

Besides manufacturing, the percentage of earnings in the goods distribution and other producer services industries proved positive for economic growth: both variables had a significant positive effect on wage growth, and goods distribution proved to be positive and significant for city income growth as well. This finding is consistent with the specialization results, since specializing in these two sectors had a positive effect on economic growth. The percentage of income earned in export sales also had a positive and significant effect on city income and wage growth, indicating that cities that have a high concentration of international export activities (like Portland or Miami) tended to grow faster. However, across the whole sample the impact of this indicator was small.

Both broad occupational concentrations (professional and production) proved to be positive and significant for economic growth: the percentage of professional occupations had a positive effect on city income growth, while the percentage of production occupations was positive for MSA income and wage growth. This finding is not surprising, and in fact reinforces the findings on the effect of industry earnings presented above: most manufacturing plants are now located in the suburbs, while most business and financial services are located in the central city. Accordingly, the presence of manufacturing and the percentage of production jobs favor growth at the MSA (particularly suburban) level, while the percentage of professional occupations and the

While specialization per se was not necessarily good for income growth, specific types of specialization proved to have a positive effect. Overall, cities specialized in other producer services (which include legal and communications as well as more conventional business services) grew in income about 3% faster. Among the 100 largest cities, all of the top five in income growth specialized in other producer services, and had over 20% income growth – San Francisco, Austin,

percentage of earnings in the other producer services industries boost income growth in the central city.

Among the specific occupational concentrations, a surprisingly high number proved positive for MSA income growth: with the exception of primary production, transportation equipment, and household services, all of the occupation categories had a positive and significant effect. Interestingly, the two occupations with the highest effect were very different from each other. The chart below shows the effect of the different occupations, with 90% confidence intervals. Note that professional and machine operator occupations are the ones that had the greatest effect, followed (not closely) by managerial, clerical, and non-household services.<sup>79</sup>

The only direct measure of diversification included in the model, the index of industry fragmentation, had no significant effect on growth. Indirect evidence of the importance of diversification can be inferred from the other findings presented so far: that having more specializations

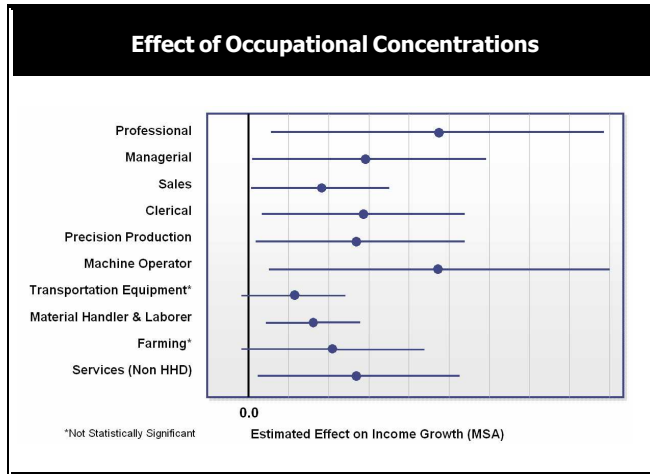


Figure 21

proved positive for growth suggests a somewhat diversified economic base is beneficial. This is also consistent with recent research by the Milken Institute: a common characteristic among the top 20 best performing cities of 2003 was the diversity of their economic base.<sup>80</sup>

**Table 3: Business Composition – Summary of Model Results**

Independent Variables	Dependent Variables			
	City		MSA	
	Population	Income	Income	Wage
Number of MSA Specializations = 1	ns	ns	ns	+
Number of MSA Specializations = 2	ns	ns	ns	+
Number of MSA Specializations = 3	ns	ns	ns	+
Number of City Specializations = 1	-	ns	+	+
Number of City Specializations = 2	ns	+	+	ns

<u>Specialization Dummies (MSA):</u>				
Manufacturing	ns	ns	ns	ns
Distribution	ns	ns	+	+
Financial Producer Services	ns	ns	ns	ns
Other Producer Services	ns	+	ns	+
Advanced Consumer Services	ns	ns	ns	ns
<u>Share of MSA Total Earnings in:</u>				
Manufacturing	ns	ns	+	+
Distribution	ns	+	ns	+
Financial Producer Services	ns	ns	ns	ns
Other Producer Services	ns	ns	ns	+
Advanced Consumer Services	-	ns	ns	ns
<u>Broad Occupational Concentrations</u>				
Professional Jobs as % All Jobs	ns	+	ns	ns
Production Jobs as % All Jobs	ns	ns	+	+
<u>Specific Occupational Concentrations:</u>				
Professional, Specialty & Technical	ns	ns	+	ns
Executive, Managerial & Administrative	ns	ns	+	ns
Sales	ns	ns	+	ns
Precision Production & Skilled Crafts	ns	ns	+	ns
Machine Operators	ns	ns	+	ns
Transportation Equipment Operators	ns	ns	ns	ns
Material Handler and Laborers	ns	ns	+	ns
Farming	ns	ns	ns	ns
Non-Household Services	ns	ns	+	ns
High Tech Jobs as % All Jobs	ns	ns	ns	ns
Index of Industry Fragmentation (MSA)	ns	ns	ns	ns
Export Sales as % Total Personal Income (MSA)	ns	+	ns	+

---

## 6. Interpretation

With respect to the debate on the benefits of specialization versus diversification, the results suggest that the importance of specialization may be far more subtle than its current popular appeal. *Cities do not need to specialize to grow. Diversification offers an alternative, equally viable, path to economic success.* Specialization and diversification each offer distinct advantages and disadvantages. While specialization offers stronger localization economies, due to the proximity of closely related producers, it may result in less innovation and more exposure to risk as the fortunes of specific sectors and technologies rise or fall. Ultimately, both specialization and diversification might be needed in the national economy, with different types of cities playing very different roles over time. Indeed, as discussed below, Duranton and Puga suggest that new firms (and innovation) tend to be created in cities with diversified economies, while relocating firms tend to move to specialized cities.<sup>81</sup>

For cities that specialize, the results also make clear that not all specializations are equally beneficial. It is not whether a city is specialized, but what it is specialized in that matters. Furthermore, whether specialization will be beneficial in a particular local economy and, if so, what specialization would be best, depend in part on how the specialization fits with other activities and conditions in the local economy. In other words, even where specialization might be a better strategy than diversification, different specializations may be appropriate in different places. Every place should not choose bio-tech or business services. *If urban policy makers decide to pursue specialization strategies, it is important to choose carefully.*

Moreover, in considering the benefits of specialization, it is important to look beyond industry sectors. The findings on the effect of different occupations show that urban areas can benefit from the concentration of specific occupations and economic functions, and not only from the concentration of different industries. More generally, while the project findings do not show directly the new importance of functional concentration,<sup>82</sup> they are certainly consistent with this framework.

Indeed, this shift may be one of the most interesting phenomena of the 1990s. If a key reason for the existence of cities is the economic benefits of concentrated and shared resources, labor, networks and spillovers, *what* is best concentrated for a particular city may be changing. That the number of stand-alone headquarters rose by 79%, and employment in headquarters facilities rose by 69 %, between 1958 and 1987<sup>83</sup> is revealing of the shift that is taking place. Back office or call center functions similarly are now more often separated from headquarters and production plants. As different functions concentrate in different places, it may be that, for at least certain cities, appropriate functional concentrations, or occupational concentrations, are more important to success than industrial specializations.



There appear to be some interesting connections between types of industry sector specialization and of functional concentrations. Duranton and Puga observe that larger cities concentrate in management functions and professional occupations, and focus on creating new ideas and new products. These are mostly the same cities that tend to specialize in information sector industries such as business and financial services, which help support corporate headquarters. At the same time, these are the cities that are more likely to benefit from diversification, considering the positive effect that diversification has on innovation. Other (and often smaller) cities, on the other hand, tend to specialize in goods production and distribution. These cities benefit from a different set of occupational concentrations, more suited to the production process. Whereas the former city type benefits from diversification, the latter is more likely to benefit from specialization, since localization economies such as shared labor pools, infrastructures, and supply chains can be particularly valuable to production plants.<sup>84</sup>

Finally, the model results with respect to manufacturing seem to contradict starkly the conventional wisdom about the crisis and decline of the manufacturing sector in the United States. There are three factors that might help explain this: first, this result stems from a nationwide sample of 250 metropolitan areas. What is true for the aggregate sample need not be true for all of the individual cities within the sample. In fact, the descriptive results show a pattern of regional variation that is more consistent with the traditional idea of the manufacturing crisis: some, but not all, formerly thriving manufacturing centers in the Rust Belt are indeed experiencing a decline in their economic base. Nevertheless, at the same time, new manufacturing centers are emerging in the West and in the South.

The second factor has to do with a definitional issue: manufacturing is an extremely diverse economic sector, which lumps together very different industries, ranging from furniture, to textiles, to microchips, to biotech. It is possible that the thriving manufacturing centers driving these results are the ones that focus on “high tech” manufacturing, as opposed to traditional products, and that these centers are located disproportionately in the West and in the South of the country, explaining the regional variation mentioned above. For instance, manufacturing is an important component of the economic base of some of the fastest growing urban areas in the West, such as Austin and San Jose, which are leaders in the production of IT components and other high tech products.

A third factor that might account for the positive impact of manufacturing has to do, once again, with the knowledge economy. The increasing role of knowledge factors across all industries is particularly evident in manufacturing, whose process of value creation has dramatically changed as a result of knowledge inputs ranging from computer assisted design and manufacturing (CAD-CAM) to just-in-time inventory controls. These changes may help account for the increased productivity and contribution of the manufacturing sector (and also for its earnings growth, even as jobs are lost).

## 7. Implications

Since both diversification and specialization can be effective drivers of economic growth, and since concentrations of functions and occupations are becoming increasingly important, a top priority for urban leaders is to understand what kind of industry or functional concentrations characterize the local economy, and what industries, functions, and occupations the local economic base is most suited for. In this respect, the main policy implication in this dimension is the importance of developing accurate analysis of each individual urban economy. When it comes to determining the best industry mix for a local economy, one size does not fit all. Consequently, it is extremely important for each city to seek the kind of business composition that makes sense based on the characteristics of its economic environment.

Making informed decisions in this respect requires careful analysis of the economic base of individual metropolitan areas. Considering that specialization carries risks as well as benefits, and that the nature of specialization appears to be changing, localized analysis would first determine the extent and nature of current specialization: is the economy concentrated in certain sectors? In particular functions (such as back office, distribution, data processing, R&D, finance, management)? Particular occupations or professions?<sup>85</sup>

This analysis will help identify promising specializations or concentrations, if any are present in the local economy. Once promising specializations are identified, tax, fiscal, zoning and other policies can be tailored to strengthen them. Investment, R&D, infrastructure development or workforce training can be targeted to the identified plans and needs of connected firms and functions. At the other extreme, places that are very narrowly specialized will be better able to anticipate and plan to mitigate the risks of specialization, adopting policies such as business insurance and workforce transition programs.

On the other hand, specializing is not the only way to grow: diversification is an equally good path to prosperity. Larger cities in particular are well positioned to attract and sustain a diversified economic base, with benefits ranging from increased long term stability to a faster pace of innovation. Diversification of the economic base can be attained by growing and attracting new businesses through strengthening the fundamentals of the business environment: qualified labor force, infrastructure, tax and regulatory policy, and so forth; and well as through targeted incentives. Finally, whether cities pursue specialization or diversification, they will benefit from encouraging the creation of business leadership organizations and informal business networks to strengthen the connections between firms within and across sectors (facilitating agglomeration effects and knowledge spillovers).

## C. Demographics

### 1. Definition

This dimension examines the demographic characteristics of urban areas. At the individual level, these include the race and ethnicity, country of origin, age and income of urban residents. At the aggregate level, these individual demographic characteristics compose large scale phenomena that have major impacts on urban areas: the combination of individuals of different races and ethnicities determines the overall degree of urban diversity and segregation; individuals from different countries of origin compose the major immigration flows experienced by American cities over the past decade; and the difference in individual income levels gives rise to issues of poverty and inequality.

### 2. Importance

This dimension is critical for economic performance, since demographics affect both the supply and the demand side of urban economies. On the supply side, demographic factors characterize the labor force, which is a critical input of production. The characteristics of the labor force affect the productivity of a city economy, and consequently impact its economic growth. On the demand side, demographic characteristics influence the consumption of goods and services: the income of the population determines the level of consumption (i.e. how many products and services people can afford to buy), while other demographic characteristics, such as age and ethnicity, can determine the preferences and tastes of the population (i.e. what kinds of products and services people choose to buy).<sup>86</sup> As the characteristics of the American population change due to immigration, income disparities, racial segregation, and so forth, the effects on the economic performance of urban areas are likely to be significant.

Considering the central role of demographics, it is not surprising that, since the publication of the Census 2000 data, researchers have produced a large volume of literature on the demographic shifts affecting American cities. Dozens of studies published over the past three years have described trends and changes in issues such as immigration, poverty, segregation and diversity over the 1990s.

The issues of poverty and inequality have often been front and center in the policy debate, and have consequently been extensively investigated. For instance, the Brookings Institution recently published a report that documents a sharp decline of concentrated poverty. According to this report, the number of people living in high poverty neighborhoods<sup>87</sup> declined by 24%, or 2.5 million people, over the 1990s.<sup>88</sup> Interestingly, this decline seems to have taken place mostly in central cities and rural areas, while a number of older suburbs around major metropolitan areas actually experienced an increase in poverty rates over the decade.

There are reasons to believe that poverty and inequality might have economic, as well as moral, implications. In the past, poverty rates were negatively related to economic growth, while income inequality was positively related.<sup>89</sup> Saurav Dev Bhatta, for

instance, found that per capita income between 1980 and 1990 grew more slowly in metropolitan areas that had higher poverty rates in 1980, but that more inequitable cities experienced higher growth rates over the same period.<sup>90</sup> A critical question for city policymakers is whether this relationship held true over the 1990s, or whether the dynamics of poverty and inequality and their effects on economic growth have changed in the past decade.

Diversity and segregation have also received much attention in the ever-growing body of literature on the demographic trends of American cities.<sup>91</sup> An analysis of the latest Census data by Edward Glaeser and Jacob Vigdor reveals that the 1990s continued a trend towards decreasing racial segregation in the United States. As a result, the level of segregation of African Americans is now the lowest it has been in the past thirty years. The study also shows that there is still a good deal of variation among different regions, since the levels of segregation in the Northeast and the Midwest remain fairly high, while the West and the South are the most integrated parts of the country.<sup>92</sup> At the same time, several studies highlight an increase in the ethnic diversity of the population of urban areas. In a study of the composition of American households, Martha Farnsworth Riche shows how diversity has increased over the 1990s, due to the fact that the nation's minority population has grown significantly in recent years.<sup>93</sup>

This increase in diversity seems do be due in part to immigration, another issue widely discussed by demographers. In a report published by the Milken Institute, William Frey and Ross DeVol describe how the pace of immigration, especially from Latin America and Asia, has increased dramatically over the 1990s, due to changes in immigration laws and global economic forces.<sup>94</sup> At the same time, a Census report on the profile of the immigrant population in the U.S. reveals that the immigrant population is concentrated in the largest metropolitan areas and in their central cities.<sup>95</sup> This means that cities are particularly affected by international migration patterns: changes in the size and characteristics of the immigrant population are likely to have a considerable effect on economic growth, since these changes entail an influx of consumers with different tastes and workers with different skill sets.

The changes in the age structure of the population are as significant as the changes in its ethnic composition. As the baby boomers age, the size of the 55-64 year old group is increasing dramatically, and will keep increasing over the next few years.<sup>96</sup> The latest State of the Cities report estimates that there will be 70 million seniors in 2030, comprising 20 percent of the total US population.<sup>97</sup> The aging of the population is likely to pose several challenges to national and local policy makers, ranging from a strain on Medicare, Social Security, and other federal policies, to shifts in housing preferences, to the possible migration of future cohorts of retirees towards high amenity and good weather locations.

With few exceptions, the studies published since the release of the Census 2000 describe the demographic trends of American cities, but do not undertake formal analysis of the impact of these changes on economic performance. For urban leaders, the key task now is to understand how these phenomena are affecting urban economies: which of these

factors matter, and in what economies? More specifically, how are inequality and segregation related to economic growth? What are the effects of immigration? And what is the impact of different age groups?

### 3. Methodology

The project examined numerous variables covering the main demographic characteristics of urban areas: population, income, inequality, ethnic composition, diversity and segregation, age structure and immigration. For all of these variables, the project analyzed data for the central city, for the suburbs, and for the metropolitan statistical area as a whole.

The economic wellbeing of the population was measured using per capita income and average wage, poverty rates, unemployment rates, and labor force participation rates. A great deal of attention was also paid to the issue of income inequality. In order to capture the level of income inequality across cities and metropolitan areas, the project adopted two distinct measures: the Gini coefficient, and the mean-to-median income ratio. The Gini coefficient is an indicator of income inequality ranging between 0 and 1.<sup>98</sup> The coefficient has a value of 0 in case of perfect equality (i.e. everybody has exactly the same income) and a value of 1 when one person has all of the available income and everybody else has none (a case of perfect inequality).<sup>99</sup> The mean-to-median income ratio shows how skewed the distribution of income is: the greater the ratio, the higher the level of income inequality, according to this metric.

The ethnic composition of the population was measured by the percentage of people in each of the major ethnic groups (White, Black, Hispanic, Asian, as well as American Indian and Pacific Islander). In order to measure the overall level of diversity of the population, the project adopted the ethnic fractionalization index, a measure commonly used in the literature. This index is based on the probability that two randomly selected residents belong to two different ethnic groups.<sup>100</sup>

In addition to ethnic diversity, the project also examined the level of segregation of the Black and Hispanic populations. Diversity and segregation are two distinct concepts that warrant a brief clarification. Diversity is an aggregate measure that looks at the urban area as a whole and measures how ethnically heterogeneous its population is. Diversity does not speak to the spatial distribution of the different ethnic groups, and to whether they tend to mingle or to be totally separated. Segregation, on the other hand, gets precisely at the issue of how the ethnic groups are distributed geographically within the urban area, and depends on where individuals of different ethnicities decide to live. For the purposes of this research, segregation was calculated using the index of dissimilarity, which measures the proportion of Black people (or Hispanics) that would have to move across census tracts in order to have an even proportion of Black (or Hispanic) residents across the entire urban area.<sup>101</sup>

In order to capture the age structure of the population, the project measured the percentage of urban residents in each of seven age groups: under 18, from 18 to 24 years

old, from 25 to 34, from 35 to 44, from 45 to 54, from 55 to 64, and over 65. Finally, the levels of immigration were measured by the percentage of residents that were born outside of the United States. The growth in foreign (and native) born population between 1980 and 1990 was also taken into account.

The effect of these demographic variables on income, wage, and population growth were estimated through five different sets of models. The base model contained demographic variables such as per capita income, unemployment, population in 1990 and population growth between 1980 and 1990. A second set of models measured the effect of race, using the variables on the percent of population in each ethnic group as well as the diversity and segregation indices. A third set captured the impact of income inequality and included both the Gini coefficient and the mean to median income ratio. Another model was used to measure the effect of different age groups, while the last set of models measured the impact of immigration.

#### 4. Descriptive Findings

For the first time, the population of the top 100 cities is majority non-white: in 1990, 30 of the top 100 cities had a majority of non-white inhabitants; in 2000, this number rose to 43. The number of majority Black cities grew from 10 to 13 between 1990 and 2000, while the number of cities (6) with a majority of Hispanics remained the same in both years.<sup>102</sup> However, Hispanics are now the largest minority, comprising 12.5% of the US population. Interestingly, over the 1990s the suburban Hispanic population grew faster (71%) than the Hispanic population in the central city, and as a result most Hispanics now live in the suburbs.<sup>103</sup>

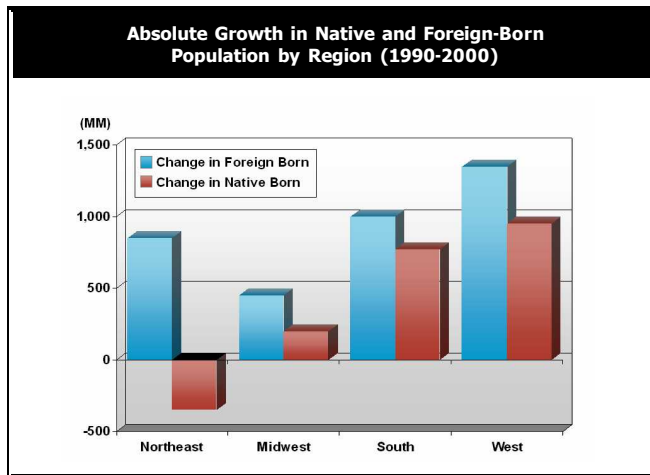


Figure 22

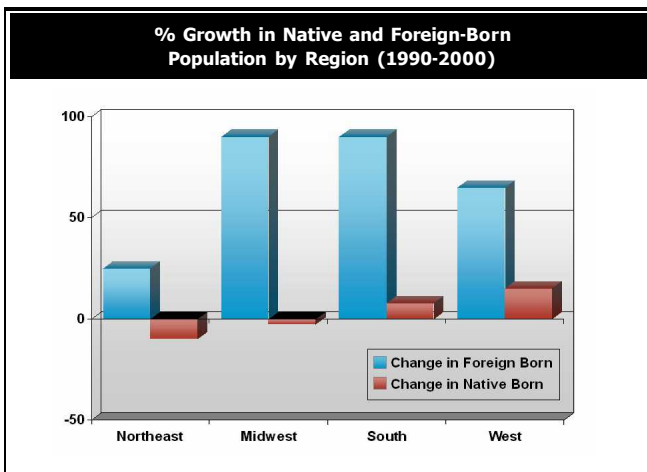


Figure 23

The big story behind urban population growth in the 1990s was immigration. The largest 100 cities added a total of 4.7 million in population over the decade. Of that total, 3.5 million, or 75%, was due to growth in the foreign born population, compared to a growth of only 1.2 million in native born population.

The percentage growth figures are even more stunning: the average percentage growth in foreign born population for the top 100 cities was 83%, while the average growth in native born population was 4.3%. The absolute figures for immigrant and native-born population growth show a great deal of variation among regions (see bar chart above), while the percentage figures for foreign-born population growth were slightly more consistent.

The Northeast lagged in both native born and foreign-born growth rates. The Midwest, on the other hand, while starting off with the lowest immigration levels in 1990, had the second highest percentage growth rate in foreign-born population (approximately 90%) over the decade.

When compared across cities, rather than across regions, the two components of population growth (foreign-born and native-born) showed less variation: the percentage growth of the foreign-born population exceeded the native-born growth rate in 98 of the top 100 cities, and foreign-born growth exceeded native-born growth numerically in 63 of the top 100 cities. Sixty four of the top 100 cities experienced growth in both foreign- and native-born population, while only two cities (Buffalo, NY and New Orleans, LA) experienced declines in both foreign and native-born populations.

There were no cities in which the native-born population grew but the foreign-born population did not. In 34 cities, however, the foreign born population grew but the native born population declined. Of these 34, 19 experienced a decline in total population. In the remaining 15 cities, foreign-born growth exceeded native born declines so that total population actually grew. *In other words, 15 of the top 100 cities (including, notably, New York and Chicago) grew solely because of immigration.*

Cities that Grew Solely Because of Immigration			
CITY NAME	GROWTH	TOTAL FOREIGN	NATIVE
Des Moines, IA	5495	9637	-4142
Honolulu, HI	6385	15580	-9195
Kansas City, MO	6404	13245	-6841
Yonkers, NY	8004	13620	-5616
Grand Rapids, MI	8674	13358	-4684
Jersey City, NJ	11518	25228	-13710
Minneapolis, MN	14235	32851	-18616
Boston, MA	14858	37239	-22381
St. Paul, MN	14916	21245	-6329
Glendale, CA	14935	24767	-9832
Oakland, CA	27242	32592	-5350
Fremont, CA	30074	40730	-10656
Chicago, IL	112290	159716	-47426
San Jose, CA	112718	122716	-9998
New York, NY	685714	788101	-102387

Figure 24

The population of urban areas got a little older over the 1990s, perhaps due to the aging of the baby boomer generation. The average median age in the top 100 cities rose from 31.6 in 1990 to 32.8 in 2000. Only five cities out of 100 actually got younger over the same period. Nationally, though, the population aged more, as median age went from in 32.9 1990 to 35.3 in 2000.

10 Most Diverse Cities	
1.	Jersey City, NJ
2.	Oakland, CA
3.	Stockton, CA
4.	New York, NY
5.	Sacramento, CA
6.	Long Beach, CA
7.	San Jose, CA
8.	Chicago, IL
9.	Houston, TX
10.	Dallas, TX

Figure 25

As a result of all of these changes, urban areas are becoming more diverse, on almost all dimensions. While diversity is increasing, cities appear to be less segregated, as the index of dissimilarity nationwide is at its lowest level in over 70 years.<sup>104</sup>

## 5. Analytic Findings

Of all of the demographic factors, the age variables had the strongest relationship to economic growth. In particular, all age groups, with the notable exception of the 55-64 year olds, had a positive and significant effect on city income growth compared to the group of Under 18, which was the omitted category in the models.

Interestingly, the magnitude of this effect seems to increase with age up to a point, and then to decline: it is at its lowest at 18-24, increases slightly at 25-34, increases significantly and peaks at 35-44, then declines up to 64, but finally picks up again past 65. The group of 35-44 year olds had the greatest impact: for a 1% growth in the proportion of the 35-44 year old population, income growth

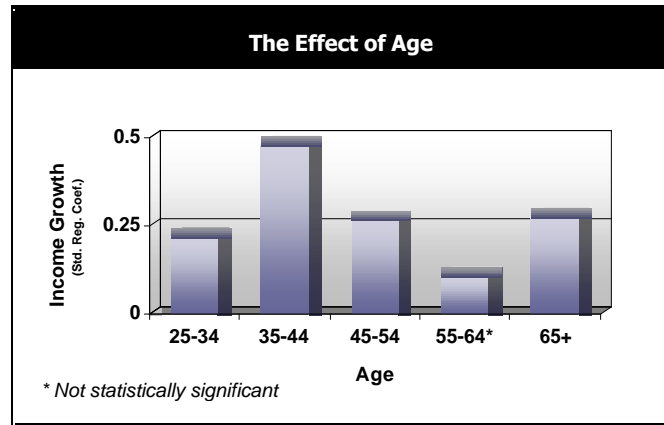


Figure 26

increased by 1.5%. Additionally, this group was the only one that had a significant impact on income growth at the MSA level as well. That the age effects were less significant at the MSA level warrants further research. Perhaps 35-44 year olds living in particularly thriving cities less often move to the suburbs. Perhaps also there is less variation in age composition across MSAs than across cities.

The base model revealed that unemployment rates had a negative effect on MSA income and wage growth. Despite its relevance, the poverty rate was not included in the final model because of its high correlation with income and unemployment.<sup>105</sup> However, exploratory analysis showed that poverty rates have a significant negative effect on income growth.<sup>106</sup> The base model also showed that population in 1990 had a positive and significant effect on population and wage growth, which means that larger cities tended to grow faster in wages and population.

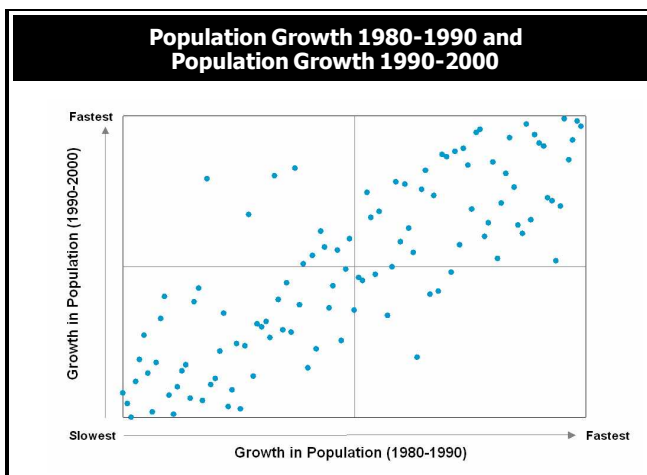


Figure 27

Population growth also depended heavily on the rate of population growth over the previous time period: for the most part, cities that were growing in population between 1980 and 1990 continued to grow between 1990 and 2000.

Generally, the proportion of the population in different ethnic groups did not have a major effect on city income growth. Only the proportion of Asians had a positive and significant effect on income and



wage growth. The proportion of Blacks, on the other hand, had a small negative effect on income growth at the MSA level, but no effect on city income growth or MSA wage growth. This can be regarded as progress compared to the past, since the proportion of minority groups has often been negatively associated with economic growth.

At the MSA level, controlling for other factors, the index of ethnic fractionalization (or diversity) had no influence on income growth, suggesting that there is no relationship (either positive or negative) between diversity and economic performance. At the city level, on the other hand, diversity appears to have a negative effect on income growth. It is important to note, though, that for the sub-sample of the largest 100 cities, the effect of diversity on economic growth was not statistically significant (which may be due to the smaller sample size). It is possible that the effect of diversity depends on city size, and that this effect is negative and significant only in smaller cities. These issues are further discussed below, in the Interpretations section.

While the proportion of the population in each ethnic group may no longer be as important to economic performance, their *segregation has a small negative impact* . In particular, segregation of Blacks and Hispanics had a negative and significant effect on city income growth, and the effect of Hispanic segregation was negative and significant at the MSA level as well.

Both measures of inequality proved to be bad for wage growth: overall, *wages grew faster in more equitable urban areas* . The ratio between mean and median income was also negative for income growth at the MSA level, suggesting that inequality can be harmful for the economic growth of metropolitan areas. For instance, Los Angeles, with high levels of income inequality, experienced extremely low income growth (-4%). Conversely, San Jose, which in 1990 had the second least income inequality in the nation, had one of the highest income growth rates at 16%. This does not mean that cities with high levels of inequality cannot succeed economically (Atlanta, for example, ranks # 2 in income inequality and #7 in income growth), but that, all other things being equal, being more equitable results in higher economic growth.

Consistent with the descriptive findings on the growth of the foreign-born population, cities with more immigrants in 1990 experienced more population growth between 1990 and 2000. At the same time, though, the percentage of foreign-born population had no impact on city income growth, and a negative impact on MSA income growth. However, there are reasons to believe that the economic impact of immigration may vary based on the characteristics of the local economy. In particular, preliminary further analysis of this factor suggests that the percentage of foreign born might be negatively associated with income growth in lower-education cities (where, in some instances, lower skilled immigrants may be competing with lower skilled workers, driving down wages), while its effects are neutral in higher-education cities. This is an important preliminary result that deserves further analysis and exploration.

**Table 4: Demographics – Summary of Model Results**

Independent Variables	Dependent Variables			
	City		MSA	
	Population	Income	Income	Wage
% White	ns	ns	ns	ns
% Black	ns	ns	-	ns
% American Indian	ns	-	-	-
% Asian/Pacific Islander	ns	+	+	+
% Hispanic	+	ns	ns	ns
% Other	+	ns	-	ns
Ethnic Fractionalization	ns	-	ns	ns
Black Segregation	ns	-	+	ns
Hispanic Segregation	ns	-	-	ns
Gini Coefficient	ns	ns	ns	-
Mean-to-Median Income Ratio	ns	ns	-	-
% Age 18-24	-	+	ns	-
25-34	ns	+	ns	+
35-44	ns	+	+	+
45-54	ns	+	ns	ns
55-64	-	ns	ns	-
65+	ns	+	ns	+
% Foreign Born 1990	+	ns	-	ns
Interaction: Foreign Born x Above Avg Education	ns	ns	ns	ns
Log Change Foreign Born 1980-90	+	-	ns	ns
Log Change Native Born 1980-90	+	ns	ns	ns

## 6. Interpretation

The population of American cities is changing: cities are older, but also more diverse and more racially mixed, due to the lower levels of segregation and to the influx of immigrants from all over the world. As expected, many demographic variables proved to have significant effects on the economic growth of urban areas, confirming the key role of this dimension.

The impact of age was particularly strong, but its interpretation is not straightforward. It might seem that age effects are the result of a simple direct relationship between certain age groups and earnings, considering that people in the younger age groups had just entered the labor force in 1990, and their earnings likely increased more rapidly over the following decade. In addition, age probably correlates with productivity, which is a major driver of economic growth. However, this would not mean that attracting a large number of young people in itself will lead to economic growth. Rather, as discussed further below, it is likely that particular industries or occupations that account for growth are also characterized by the presence of certain age groups.

For the older segment of the population (i.e. over 65), the dynamics might be different: the impact of this age group on economic growth could be due to the fact that as people retire, they also start spending the money they have saved over the course of their lives. In this respect, it is not their productivity or earning potential, but their spending power that provides a positive stimulus to the economy of the urban areas they live in. Alternatively, the impact of the “over 65s” could be due to the fact that the presence of seniors supports industries like health care, that contribute the economic growth of urban areas.<sup>107</sup>

The meaning of the findings on diversity and ethnic composition is slightly more complex. The negative effect of diversity on city income growth seems to contradict the idea of diversity as an asset, contributing to the vibrancy and the creativity of urban communities. The fact that the result was not significant for the top 100 cities seems to suggest that the impact of diversity varied based on city size, and that smaller cities are more affected by diversity than larger cities.<sup>108</sup> An alternative explanation is that the measure of diversity used in the model did not capture some of the more critical and beneficial aspects of diversity. For instance, the ethnic fractionalization index included in the model measures the overall diversity of the urban area, but does not take into account residential patterns or more subtle issues like variations in the particular types and mixes of ethnic groups.

Arguably, any benefits of diversity may be lost in a highly segregated environment. The fact that the model recorded the negative impact of segregation seems to strengthen this interpretation. The findings on segregation also confirm that this is a major issue, not only from a social, but also from an economic point of view. Moreover, it is possible that other kinds of segregation could be just as important as ethnic segregation. A study by José Lobo and David Smole indicates that segregation based not on race but on education levels might have a significant impact on economic growth. By looking at how the spatial distribution of human capital affects metropolitan productivity, the authors show that segregating people with different education levels is negatively correlated to productivity and economic growth.<sup>109</sup>

The results on the effect of immigration present measurement issues that are somewhat similar to the ones encountered for ethnic diversity, since the immigration variable used in the model (percentage foreign born) was very broad.<sup>110</sup> In interpreting the model results on immigration, it is important to keep in mind that the characteristics of the

immigrant population vary greatly, based on the year of entry in the United States, the country of origin, the education level, English proficiency, and so forth.

In part, the income effect of immigration is likely simple supply and demand: where more people are moving in between 1980-90, labor supply goes up, and wages and so income levels could go down from 1990-2000. This does not suggest that immigration is “bad,” but only the importance of anticipating the possible consequences, and of fully incorporating immigrants into the economy. In part, though, the finding on the different effect of immigration depending on the education levels of the population confirms that there are other elements that need to be taken into account: it is possible, for instance, that the influx of lower skilled immigrant populations complements the high skill jobs already present in more educated urban areas, thus enhancing the economy of these cities. At the same time, this set of immigrants might be a substitute for the unskilled labor in low education cities: in this case, immigration would increase the competition for employment and drive down income and wages. An alternative explanation is that high skill, high income immigrants tend to settle in high education cities, while low skill immigrants are attracted to a different type of urban economy. Further analysis is needed to understand, anticipate and enhance the specific impact that different kinds of immigrants can have in different places.

## 7. Implications

The findings in this dimension, like the findings in the other dimensions discussed so far, suggest the importance of local assessments and tailored policy strategies for different urban economies. The variation among cities on each of the demographic factors examined in this report (age, immigration, diversity, segregation, etc.) indicates that different demographic shifts are occurring in different places, and that their impact is likely to vary based on the characteristics of the local economy. This is particularly evident in the case of immigration, due to the diversity of the immigrant population and to the variation in its impact on economic growth. As mentioned above, immigrants present an unusually diverse pool: for example, as a whole, they are both more likely to have no high school degree *and* more likely to have a college degree than the native born population. Furthermore, their economic impact varies greatly based upon the fit between the types of immigrants and the type of local economy.

For these reasons, it is particularly important to have an accurate description of the types of immigrant locating in each city. This would allow policymakers to better understand the fit of immigrants with the local economy, how to most productively incorporate them, which to seek to attract, and how well they are being incorporated so far.

At the national level, immigration should be thought of as urban policy: immigrants disproportionately locate in cities, and the criteria that regulate immigration flows have huge effects on urban economies. A second, general policy implication is the necessity to attract and integrate into the economy immigrants that fit and complement the local labor pool and economic base. Finally, it is important to develop policies that can increase the

productivity of immigrant populations. Policies of this sort could, for example, aim at increasing school enrollment and at improving the availability of ESL classes.

On the broader issue of ethnic diversity, the key point may not be whether diversity is good or bad for the economy: rather, *demographic diversity is increasing, and the results are consistent with the view that the places that take advantage of it will do best.* This includes taking steps to reduce segregation, e.g. through regional housing policies, while at the same time paying attention to non-ethnic forms of segregation, such as segregation based on education levels.

One of the main themes that emerge from the findings in this dimension is the importance of addressing social issues such as poverty, inequality and segregation. Arguments around these issues, on both sides of the political spectrum, are often based on ethical or ideological grounds, concerning different interpretations of what can be considered equitable. When economic arguments are made, they are often based on a supposed tradeoff between equity and efficiency: redistributive policies that foster economic equality are considered harmful because they reduce efficiency and hinder economic growth.

The findings presented above suggest that inequality, poverty and segregation are not only social problems, but have direct economic implications as well. However, these findings indicate that there is no necessary tradeoff between equity and growth, but rather that the two tend to go together. Urban areas that were more segregated and had greater income disparities recorded slower growth. And if reducing inequality and segregation results in higher rates of economic growth, taking steps to curb these social ills is not only ethical: it also makes good economic sense. This implies a convergence of business and development interests around fully deploying all of the potential assets, particularly labor force assets, of a local economy. It also suggests targeted programs that build on this convergence (such as business-led training programs or regional affordable housing programs to alleviate the jobs-housing mismatch) are particularly promising. Urban policy makers also have a large stake in advocating for and employing broader measures -- such as the Earned Income Tax Credit and Individual Development Accounts -- that may bring more people into the mainstream economy as producers and consumers.

Finally, the research findings show that the age structure of the population is important to prosperity (unlike its racial composition), although the implications of these findings are likely less straightforward than may at first appear. If the effect, as is likely, reflects the nature and productivity of the jobs held by these segments, then the goal is to have an economy with these functions and jobs. In other words, simply attracting thousands of new 35-44 year olds will not in itself lead to economic growth. The productive capacity of the local economy, determining who can be employed and how, might have a larger effect on the age structure of the population than the other way around.

Nevertheless, to the extent that the nature of the labor force may affect firm location decisions (as discussed elsewhere), or that the same environmental qualities (e.g. quality of life factors) may affect both labor force and firm decisions, policy makers may want to

focus also on attracting and retaining certain age groups. While having 35-44 year olds reflects the greatest impact, affecting income growth nearly twice as much as any other segment, this group is also likely less mobile. People in this age bracket tend to have recently formed families and children attending local schools. Urban leaders might also want to target younger age groups (18-34 year olds), which tend to be much more mobile and, once settled in, of course become older. Generally, in deciding who to attract and retain, urban leaders might want to focus on several different age groups, but should be aware of their differences. For instance, different age groups tend to respond to different incentives: while 35-44 year olds are probably more interested in the quality of public schools and in the safety of urban neighborhoods, younger age groups are likely to be attracted to places with jobs and career opportunities, as well as good amenities and quality of life.<sup>111</sup>

## **D. Urban Growth Form**

### **1. Definition**

Urban Growth Form refers to the physical arrangement and growth of the economy across urban areas. This growth can follow many different patterns, depending on the way in which land is used and on the spatial organization of the components of the economy (businesses, housing, transportation infrastructure, and so forth). For instance, some cities may grow by concentrating most of the economic activity in a very dense urban core, while others grow through scattered, low-density development across a very wide area; yet other areas may develop a number of peripheral “edge cities”<sup>112</sup> surrounded by low density development or open land. Different patterns of growth often coexist within the same urban area, shaping its landscape, influencing its economic performance, and ultimately affecting the lives of its inhabitants.

### **2. Importance**

In recent years, the level of public interest in the issues related to urban growth form has increased significantly. As urban areas grow in population and economic activity, they also grow in physical size, raising a number of questions about the consequences and implications of this growth. In particular, there is a growing interest in the way in which the spatial organization of the metropolitan area affects economic growth: what is the relationship of transportation infrastructure and commuting patterns to economic growth? What are the effects of the distribution of economic assets, employment and housing? What are the quality of life effects of urban growth, and what is their relationship to economic performance?

The physical growth of urban areas raises environmental concerns as well, since it constantly brings new development to places that were previously uninhabited or used as farmland, and could thus be at odds with the preservation of natural resources. Some of the byproducts of urban growth, such as traffic and pollution, have a direct effect not only on the environment, but also on the quality of life of urban residents. Other possible

consequences of urban growth, like congestion and the crowding of public resources, can also have a negative impact on quality of life. Over the last decade, individuals and groups concerned about environmental preservation, quality of life, and economic efficiency have increasingly seen common ground related to the growth and development of cities and metropolitan areas. The “Smart Growth” and “New Urbanism” movements in particular have tried to offer a more holistic picture of how different types of physical growth affect personal, social, natural and economic vitality. Both movements, for example, suggest that scattered, low density development patterns have a negative impact on the preservation of the environment and on quality of life, and will eventually undermine cities’ economic success.<sup>113</sup>

While few people dispute the environmental implications of urban growth, there is less agreement on its economic effects. Some studies highlight the benefits of urban growth patterns that favor density, arguing that having people and firms in close quarters can foster innovation and productivity. Other research findings, though, point in the opposite direction, showing for instance that cities built for cars, and not for public transit, tend to grow faster.<sup>114</sup> This uncertainty is partly due to the fact that urban growth form is a complex area encompassing many different characteristics, making it extremely difficult to measure or develop a comprehensive approach to the study of these phenomena.

Definitional issues pose a related major obstacle, since researchers and practitioners have trouble pinning down a precise characterization of the different forms of urban growth. This is especially true for the term “sprawl,” a concept that is often used in the debate around urban growth. Even papers that set out to find good measures of sprawl often refrain from defining it. A quick survey of the literature on sprawl will reveal that the term is generally used to indicate dispersed development around and outside of core urban areas, causing land to be used up at a rate faster than the population is growing. Some definitions of sprawl go further and include its possible negative consequences, such as heavy traffic, pollution, isolation of the urban poor, and fiscal disparities among the localities in the region. In the rest of this report, the term will be used in the first, narrower meaning of the word, free of negative connotation. The potential negative economic consequences of urban growth patterns commonly referred to as sprawl will be assessed by modeling their impact on economic growth.

### 3. Methodology

Examining urban growth form requires indicators that measure urban areas on a number of different characteristics, ranging from population density, to the mix of business and housing, to transportation infrastructure.<sup>115</sup> This project looked at dozens of different variables, measuring different aspects of the physical development of urban areas. Several variables describe commuting patterns such as average commuting time, the percentage of people that drive to work alone, and the percentage of people that take public transportation to work. Commuting patterns are particularly revealing because they give an idea of both the extension of the urban area and, to a certain extent, of the proximity of jobs and housing. Other variables measure the physical growth of the urban area and the patterns of land consumption: the growth rate of the urbanized land area, loss

of open space, and the amount of land consumed for apartments and homes fall into this category.

Different measures of population density have also been taken into account. Simple average density measures like people per square mile might not be very useful because they are not sufficiently sensitive to different forms of urban growth. For instance, a city with equal levels of density throughout its area, and a city with a very dense downtown and some equally dense peripheral district, but wide tracts of open land in between, could have the same average density value despite the fact that they represent two very distinct forms of urban growth. Researchers in this field have tried to address this problem by using more sophisticated density measures.

This project used variables such as density gradients (based on the density of Census tracts, computed and then sorted in descending order) and measures of discontinuity (describing the pattern of density dispersion). The database assembled for this research also had the benefit of two sets of composite variables and associated data: the index developed by Reid Ewing, Rolf Pendall, and Don Chen for Smart Growth America,<sup>116</sup> and Stephen Malpezzi's principal component sprawl measure.<sup>117</sup> These two indices combine several variables that capture different aspects of urban growth form in one single measure, allowing the authors to rank cities based on their overall sprawl level.<sup>118</sup>

The index developed by Smart Growth America combines 22 different variables into four different factors of urban growth form.<sup>119</sup> The first factor is residential density, which measures the density and compactness of land use in metropolitan areas. This factor is based on overall population density measures as well as on other more precise variables, such as percentage of people living at suburban density (defined as less than 1,500 people per square mile), percentage of people living at urban density (more than 12,500 persons per square mile), and average lot size for single family dwellings. The second factor is the accessibility and connectedness of the street network, which is calculated based on different measures of block size, such as average block length in urbanized portions of the metro area, percentage of small blocks, and average block area. The third factor in the Smart Growth America index is the strength of activity centers and downtowns, and includes variables such as variation of population density by census tract and percentage of population living more than 10 miles from central business district. The last factor is the neighborhood mix of homes, jobs, and services, and is measured based on the percentage of people living close to business institutions, the balance of jobs to residents, the percentage of residents living close to a public elementary school, and so on. This factor was not included in our model because it was not available for 1990.

The project analyzed data on these composite measures, and not the underlying data and variables used to calculate them. A strength of the Smart Growth America index is the fact that it combines Census data with other data sources, such as the American Housing Survey, the USDA Natural Resources Inventory, and Claritas Corporation. Unfortunately, the data is available only for the top 72 MSAs, which poses some constraints on the depth of the analysis.



Stephen Malpezzi's principal component measure also combines a number of different measures of urban growth form. The authors first identify 22 possible measures of urban form, including measures of census tract density, measures of dispersion in tract densities, measures of compactness, and gravity-based measures such as the average distance of the center of each tract to any other tract. Twelve of these measures are then selected and included in the principal component analysis, and three principal components are extracted.<sup>120</sup> This project focused on two of these three components: Component 1, which measures density at the center of the MSA, and Component 3, which measures discontinuity. This choice is due to the fact that exploratory analysis revealed these two components as being the most significant.

#### 4. Descriptive and Analytic Findings

Not surprisingly, by varied measures, urban growth has occurred at a significant pace in the 1990s. Average commuting time increased in all but one of the cities examined. Since the 1950s, while the percentage of the U.S. population living in central cities has remained about the same, the percentage living in the suburbs has mushroomed, growing, in the last decade, at a rate of 21%. Moreover, in most metropolitan areas, urbanized land is growing much faster than population: among the top 250 cities, the average population growth rate between 1990 and 2000 was roughly 6%, while urbanized land area grew on average by more than 10%.<sup>121</sup> Based on these findings, it is fair to say that the level of sprawl in urban areas is increasing almost everywhere, with consequences that can vary significantly from place to place.

The overall economic impact of these phenomena appears to be limited; most of the variables examined did not have a significant effect. Furthermore, when the models did reveal significant effects, the coefficients tended to be small, often barely significant, and generally difficult to interpret. While the discussion in this section will focus primarily on the factors that proved to be significant in the final models, then, it is important to keep in mind that many indicators of urban growth form appeared to have little or no impact on economic growth.

10 Most Sprawling MSAs	
1.	Riverside-San Bernardino
2.	Greensboro-Winston
3.	Raleigh-Durham
4.	Atlanta
5.	Greenville-Spartanburg
6.	W. Palm Beach-Boca Raton
7.	Bridgeport-Stamford
8.	Knoxville
9.	Oxnard-Ventura
10.	Fort Worth-Arlington

Based on Smart Growth America Sprawl Index

Figure 28

A model of the effects of commuting patterns revealed that commuting times did not prove to be significant for income growth, while public transit (or the percentage of workers taking public transit to work) had a marginal positive effect on income growth at the city level, indicating that cities that are dense enough to support a good public transit system experienced faster economic growth.

The Smart Growth Index of urban growth form overall also had a small but significant impact on city income growth and on wage growth. Since higher values on the index mean less sprawl, this suggests that, to a certain extent, cities and MSAs that favored mixed land use and had denser, less scattered development experienced faster income and wage growth, respectively. However, of the three Smart Growth Index factors included

in the models (residential density, strength of activity centers, and street accessibility), only one turned out to have a positive effect on economic growth. The street factor, which measures the compactness and accessibility of the street network, showed a positive effect on city population and income growth, and on MSA income and wage growth. Interestingly, while the overall index and the street factor had a positive effect on the wage growth of urban areas, the density factor had a small negative effect on income growth, indicating that regions with lower population density are likely to have higher income growth.

These findings were confirmed in part by examining the relationship between sprawl and economic growth using the index developed by Malpezzi and Guo. Consistent with the findings above, the principal component sprawl index elaborated by Malpezzi and Guo proved to have a very small but significant negative effect on city income growth and on MSA wage growth. In other words, cities that had more sprawl (as measured by this index) in 1990 experienced slower economic growth between 1990 and 2000. However, the effect of the Malpezzi components is extremely small and barely significant, since the impact on city income growth is significant only at the 10% level, and the impact on wage growth is significant only for the first component, also at the 10% level. Moreover, these coefficients are particularly difficult to interpret, since the indicators fold together several distinct measures.

In an attempt to shed more light on these issues, the project looked at the effects of the two sprawl indexes on cities of different size. This analysis of the data revealed a very interesting finding: it appears that the effects of urban growth form on economic growth may be nonlinear, which means that an MSA may have to be sprawling a great deal before significant economic effects appear. Based on the Smart Growth Index, the 20 most sprawling metropolitan areas grew in income 1.5% slower than the other areas, and their central cities grew 3% slower. However, variation in the degree of sprawl among the rest of the areas seems to have little effect on income growth. In other words, the regions that sprawled the most (by this measure) had less income growth, but otherwise income growth was similar among higher and lower sprawling cities. In addition, sprawl (where it is significant) appears, in this analysis, to hurt central cities more than their regions. More research is needed to confirm and explain these possible effects.

**Table 5: Urban Growth Form – Summary of Model Results**

Independent Variables	Dependent Variables			
	City		MSA	
	Population	Income	Income	Wage
Malpezzi Principal Components (Pop Adjusted)				
Component 1	ns	-	ns	-
Component 3	ns	-	ns	ns
Smart Growth America				
Density Factor	ns	ns	-	ns
Centers Factor	ns	ns	ns	ns
Streets Factor	+	+	+	+
Overall Index	ns	+	ns	+

### 5. Interpretation

In general, these results provide modest support for the hypothesis that sprawl becomes harmful for growth, but suggest that the relationship of urban growth form to economic growth presents a complex picture, still difficult to gauge. The findings do not offer a clear pattern: some indicators of limited sprawl are significant while others are not; some have a positive effect (as in the case of the street factor) while others are insignificant or even negative for economic growth. In addition, many of the findings were barely significant. The varied indicators may be measuring quite different dimensions of sprawl, with different effects in different economies. Sorting out how the varied dimensions relate to each other in different economic circumstances deserves much more attention.

It is possible that the model results understate the effects of urban growth form because of the limited time period that has been considered by the research. Ten years (from 1990 to 2000) might be too short a time span to fully capture the effects of urban growth on the economy: for instance, if the economic impact of sprawl is due to the deterioration of quality of life, which in turn affects the location decisions of workers and firms, it might take much longer than ten years before this impact is felt. If this were the case, it may be in cities' interest to figure out how to best manage growth for their economies now, instead of discovering its costs later.

Another possible explanation for the limited impact recorded by the model is that some of the phenomena that are captured by urban growth form indicators may not, at least in the short run, be bad for economic growth, while others may not have occurred in large measure by 1990. It is also possible that some of the economic costs of sprawl in the period between 1990 and 2000 were outweighed by the short-term economic benefits

associated with growth.<sup>122</sup> Finally, of course, it is equally possible that sprawl does not, in fact, have large negative economic consequences.<sup>123</sup>

The findings presented above might become clearer by examining a few distinct potential explanations for the relationship of urban growth forms to economic performance. A critical aspect of urban growth form which most clearly affects economic performance concerns the spatial arrangement of the specific components of the economy that are directly connected. This explanation goes beyond absolute physical dispersion, or even density patterns, to focus on how interconnected input and organizational factors are arranged geographically. For example, how jobs and available housing for the labor force doing the jobs are distributed across space has a direct effect on economic efficiency and productivity. If new jobs are created in the suburbs but affordable housing is concentrated in the inner city, high transportation costs might mean that people willing to work cannot reach firms that are willing to hire them, creating inefficiencies in the job market.<sup>124</sup>

A related explanation would examine the influence of different growth forms on agglomeration effects to account for their economic impact. The benefits from agglomeration discussed in section I may decrease as city size increases and people and firms become more spread out. When economic activity is spread too thin over a wide area, the synergies, shared resources, and exchange of information among workers and firms becomes more difficult. This could result in a slower pace of innovation and a loss of productivity. On the other hand, it suggests that the impacts will vary greatly depending on what features are agglomerating and how they are arranged in each particular local economy.

Alternatively, the impact of urban growth form on economic growth could flow indirectly from its effects on transportation costs, infrastructure, and quality of life. Urban growth form may increase economic efficiency if the density of an urban area and the accessibility of its street network decrease transportation costs. In contrast, firms and consumers in low-density areas face higher transportation costs because they have to cover longer distances, traffic is heavier, and there is less public transit. Higher costs mean less disposable income for the consumers, and higher production costs for the firms, resulting in slower growth for the economy of the city.

The cost of building and maintaining an ever-expanding infrastructure may also account for slower economic growth: as the area covered by a city becomes wider, the costs of building and maintaining roads, sewers, and power lines increase dramatically. This often means that infrastructure in the city center is neglected or abandoned only to be re-built further out, resulting in inefficient use of resources.

The quality of life implications of urban growth form may have a negative effect on economic growth as well. As discussed earlier, quality of life is an increasingly significant factor in attracting firms and skilled workers.<sup>125</sup> As these elements are becoming more mobile in today's global economy, having a high quality of life might

make the difference (all else being equal) between attracting new businesses and creating new jobs, and losing existing ones.

Based on these considerations, there are reasons to believe that the impact of different growth forms may vary substantially based on the different types of local economies. Cities whose economy revolves around industries (such as information sector) that benefit more from density and close interactions or agglomeration effects might suffer more from low-density, sprawling development than cities whose economy revolves around industries that benefit from different dynamics. As we have seen, cities of different size might also be affected by sprawl in different ways, as the negative effects of urban growth could kick in only after the city reaches a “critical mass,” or grows beyond what could be considered its optimal size.<sup>126</sup>

Perhaps most importantly, some critical aspects of urban growth form could not be adequately explored by the model, since they are more difficult to measure, tend to require more localized analysis and were only partly captured by the urban growth variables and indexes. In particular, issues like jobs/housing mismatch, and more generally the spatial distribution of economic relationships, that are likely to have a large impact on the economic efficiency and well-being of a region, are not sufficiently explored by the measures available for this analysis, and would require a much more tailored and localized approach to reveal their full effect on the local economy.

## 6. Implications

Based on the results of the analysis, urban growth form appears to be a dimension that needs to be understood and addressed in highly targeted ways.<sup>127</sup> A local assessment and analysis of these issues would be able to explore in detail the distribution of the key components of the economy across the metropolitan area. It could specifically focus on whether economically interrelated components are sprawling, and then help address, for example, the nature of the existing commuting patterns (by occupation and by industry), determining whether appropriate housing is located near job centers. A closer look at a region’s economy could also reveal if the growth of the urban area is reaching a point of sprawl where particular industries or functions are affected.

The database assembled for this project already contains baseline data for this research. Regional development organizations are also increasingly gathering relevant data, and are well positioned to deepen the existing information with original data collection. A customized analysis of local urban growth form would allow policy makers to be more deliberate about how much and what kinds of growth are sought (given that physical growth is neither inherently necessary – nor inherently bad -- for prosperity). Where growth is having negative effects, or needs to be managed going forward, tax policy, infrastructure investment, zoning, land use and transportation planning can be better tailored toward more clearly defined and high impact goals.

In addition to what could emerge from a customized assessment, some general policy implications stem from the analysis presented in this section. First, the data suggest that,

regardless of what the economic impact might be, sprawl levels are increasing in most, if not all, metropolitan areas. The findings also suggest that the negative effects of urban growth might be triggered once the overall sprawl level reaches a certain threshold. In this sense, a first broad implication for urban leaders is the importance of planning ahead of time, and managing urban growth before it has negative effects on the economic growth of the region.

Second, curbing some specific aspects or consequences of sprawl might have an immediate impact on the financial circumstances of residents. Transportation is now the second largest expense for most American households, consuming on average 18 cents out of every dollar earned.<sup>128</sup> Policies which encourage denser, mixed use and more transportation friendly living environments can result in considerable savings.<sup>129</sup>

Third, it is clear that the scope of sprawl and urban growth form transcends city boundaries and involves the whole region.<sup>130</sup> Policies that address these issues, even more than policies in other dimensions, need to be elaborated and carried out on a regional scale: partnerships between suburbs and central city are essential to controlling and managing the growth patterns of the region.<sup>131</sup>

Managing growth, of course, entails federal policy as well. The literature on this dimension extensively discusses the myriad federal policies – from transportation allocations to mortgage tax deductions – that affect urban growth form. Urban policy makers clearly have a major stake in influencing those policies and can advocate for federal interventions that favor more efficient forms of urban growth.

Finally, there's another – perhaps more important – implication about urban growth form, that stems from the divergence of income and population growth discussed in chapter II. Since population growth is not necessary to income growth, *cities do not need to sprawl to have a growing economy*. In this respect, one avenue to address prospective urban growth challenges is for cities to strive to get better, not bigger.

## **E. Regionalism**

### **1. Definition**

If “urban growth form” refers to the physical, spatial relationship between the components of the economy, “regionalism” refers to the relationship of urban economies to the political boundaries of city and suburbs. This dimension considers the relationship between the different political units within the MSA,<sup>132</sup> examining whether they are economically codependent or independent from each other, and studying the nature of the ties that link central cities and their suburbs.

Regionalism differs from the other dimensions examined in this report in two respects. First, it is concerned not just with economics, but also with the relationship between economic and political units. Second, regionalism cuts across all of the other dimensions of urban change. Changes in demographics, business composition, knowledge economy,

and urban growth form all disperse across and affect both city and suburbs. In this sense, all of the findings and policy implications presented in this report can be analyzed and interpreted in a regional perspective.

## 2. Importance

The main issues within this dimension revolve around three related questions: are cities and suburbs economically connected? If so, do cities drive suburban growth or vice versa? And what is the nature of the linkages that tie together city and suburban economies? These issues have been debated at length by economists, policymakers, and economic development practitioners with contrasting visions and approaches. The main arguments and issues with respect to each of these questions are briefly illustrated below.

Some analysts, emphasizing a stark contrast between what they perceive as impoverished and crime-ridden central cities and affluent suburbs, have concluded that the suburbs are economically independent from their central cities. This view is reinforced by a vision of the central city as an essentially doomed and ungovernable unit. The reasons given for the decay of the central city range from a shrinking tax base due to the flight of the middle class to the suburbs to technological innovations that make it easier and more convenient for businesses to operate from remote locations.<sup>133</sup>

In recent times, new patterns of urbanization have given rise to a different argument in favor of the independence of cities and suburbs: the simultaneous decentralization of jobs and housing is seen as a move towards the independence of the peripheral areas of the region from its core.<sup>134</sup> This movement reaches its apex with the rise of “edge cities,”<sup>135</sup> which are defined as concentrations of office and retail space away from the urban core. According to the proponents of this idea, the rise of the edge city marks the first step towards the creation of perfectly decentralized urban areas that no longer have a core.

At the opposite end of the spectrum, the regionalist movement rejects the view of suburbs and cities as independent units and disputes the idea that central cities should be abandoned. According to the proponents of regionalism, cities and suburbs are codependent parts of a larger system, and the economic activity in urban areas is shaped by a set of ties that link local economic actors (such as individuals, businesses, and firms) to regional markets and economic structures. Regionalist theory maintains that in order to understand how urban economies work and to implement successful economic development policies, it is crucial to take into account the larger systems that encompass cities and suburbs.

The arguments in favor of a regionalist approach are varied and based on considerations about efficiency, economic competitiveness, equity, and environmental issues.<sup>136</sup> Dreier, Mollekopf, and Swanstrom argue that a regional approach is more efficient because regional planning can prevent duplication of services and wasteful competition among fragmented local governments. Similarly, regionalism could foster the economic competitiveness of metropolitan areas because it allows localities to act upon the economic and market linkages that span political boundaries. At the same time, a

regional approach is considered more equitable because it focuses on reducing the concentration of poverty in the inner city. In the regionalist framework, metropolitan areas that leave their central cities behind incur social costs that eventually hamper the growth of the whole region. Finally, the environmental argument relies on the cost of sprawl, and on the need for smart growth policies, which can only be implemented at the regional level.

Manuel Pastor, author of a recent influential book on the importance of a regional approach,<sup>137</sup> builds a case for regionalism by effectively combining the efficiency and equity arguments mentioned above: long term economic efficiency and competitiveness, Pastor says, can only be achieved through a reduction in the level of inequality across the metropolitan area. Concentrated poverty in inner city neighborhoods is an economic burden as much as a social one, since it increases the cost of doing business and it reduces the productivity of the urban labor force. Regions that work are regions whose inner cities do well, and policies that address the problem of poverty in the inner city eventually favor the economic growth of the entire region.<sup>138</sup>

A common thread underlying all of the different arguments in favor of regionalism is the assumption that cities and suburbs are tied together and share a common fate. At a basic level, this is true by definition: metropolitan areas are defined as integrated labor markets, and much of the recent work on regionalism is based on this view.<sup>139</sup> Still, researchers have presented a growing body of evidence that shows how cities and suburbs are linked and co-dependent, and that the economic performance of the region as a whole depends on the performance of its subparts.<sup>140</sup>

Haugwouth and Inman (2002) present evidence that weak central city fiscal institutions (resulting in high tax rates and low levels of public services) depress both the city and the suburb's private economies. If the city budget contributes to the productive efficiency of city firms, and if suburban residents consume the output of those firms, weak central city finances result in economic losses for suburban residents. Running regressions of city and suburban home values, population, and income for 217 metropolitan areas, Haugwouth and Inman find that each suburban family in an average metropolitan area would find it in their economic self-interest to pay \$100 to \$250 to their central city to facilitate the reform of weak central city fiscal institutions.<sup>141</sup>

Adams and Fleeter show the codependency between suburbs and central cities by examining migration patterns within and between metropolitan areas. The authors find that people tend to leave metropolitan areas with weak central cities, while they are attracted to metropolitan areas whose central cities are thriving.<sup>142</sup> Along similar lines, Simon shows that higher levels of education in the central city correlate with higher employment growth in the suburbs.<sup>143</sup>

A second debate within this dimension revolves around the question of whether central cities drive the growth of their suburbs or vice versa. Some researchers have attempted to go beyond establishing a simple correlation between cities and suburbs and have tried to demonstrate the existence of a causal relationship in which one of the two political units



is the engine that determines the growth of the other. However, this exercise has proven to be extremely challenging, and very few empirical results have been achieved.

Richard Voith may be the leading researcher to have managed to (at least partially) demonstrate the existence of a causal relationship between the economic success of the central city and the economic growth of the suburbs.<sup>144</sup> Voith provides an analysis of the relationship between central cities and suburban economies by specifying a model that relates city income growth and suburban income growth, house value appreciation, and population growth. Using census data from the last three decades, Voith shows that city income growth actually enhances the growth in income, population, and the house-price appreciation in the suburbs, only in metropolitan areas with large central cities. The author attributes this effect to the fact that large cities provide agglomeration economies that cannot be replicated in the suburbs. Smaller cities, on the other hand, do not have the same effect because their size does not enable them to perform this unique role.

The third key question refers to the nature of the linkages that hold cities and suburbs together. This question is in part addressed by the research described above, since both co-dependence and causality between urban and suburban growth depend on the nature of the linkages between central city and suburbs. Recently, however, with the differentiation of various suburban rings and a growing heterogeneity among metropolitan areas, investigators are increasingly interested in the particular commonalities and dependencies shared by cities and suburbs.<sup>145</sup>

Overall, the body of research presented here shows how the interests of cities and suburbs might coincide with the interests of the region in which they are located. It raises important issues about how different parts of the region might be related and linked in different ways, and how these linkages in effect compose the regional economy.

### 3. Methodology

The effects of regionalism were modeled using a different approach: instead of including a new set of independent variables in the models, the models examined whether changes in city or suburbs affected each other with respect to the variables analyzed for the other dimensions. In addition, the project undertook analyses of whether ratios of city and suburban characteristics were significant in accounting for MSA performance.

The project first examined a set of indicators measuring the level of codependency between central city and suburbs. The variables used for this analysis were per capita income and average housing values. In particular, the project looked at the absolute levels of per capita income and mean housing values in the suburbs and their central city, and at the growth rates in income and housing values across city and suburbs over the 1990s. In the early phase of the analysis, the authors also looked at the percentage of earnings in the traded goods sector in the central city, and at the percentage of total regional employment located within the central city limits.

A number of indicators were constructed from ratios: for each variable, the project calculated the ratio between the value for the city and the value for the suburbs, in order to capture the level of disparity across the region. The variables used for this purpose were per capita income, poverty rate, housing values, percentage of Whites, and population density. Two additional Regionalism variables considered the percentage of MSA population concentrated in the central city, and the number of governments per capita. The first variable measures the size of the central city compared to the rest of the urban area, while the second variable is a measure of the fragmentation of the political units across the region.<sup>146</sup>

To examine causation, the project conducted Granger causality tests with respect to income levels of city and suburbs. For example, to study whether there is an effect of city prosperity on suburban income growth, a model was run using 1990 city income to predict growth in suburban income between 1990 and 2000, controlling for suburban income in 1990.

#### 4. Descriptive and Analytic Findings

A general analysis of causation seems to rule out that, over the 1990s, either growth of the central city or growth in the suburbs caused the other. Specifically, the Granger causality tests showed no evidence that city income levels caused suburban income growth or vice versa.<sup>147</sup> As discussed below, if city and suburbs really house components of what is essentially one economy, one would not necessarily expect to find causation between the subparts.

With respect to codependency, the project's findings overall confirm a high degree of codependency between suburbs and central cities: the degree of correlation between city and suburban income and housing values remains positive and statistically significant. This is true both for the absolute levels and for the growth rate of per capita income and housing values. *Cities and their suburbs succeed and fail together.*

As shown in Figure 29, while the correlation in income levels remains statistically significant, it has been constantly declining over the past four decades. The Spearman correlation between city and suburban income level was 0.65 in 1959, and has declined to 0.29 in 2000. The correlation between city and suburban income growth is also at its lowest, but its pattern was different: the correlation increased during the first three decades since 1960, peaked between 1980 and 1990, and then dropped abruptly between 1990 and 2000.

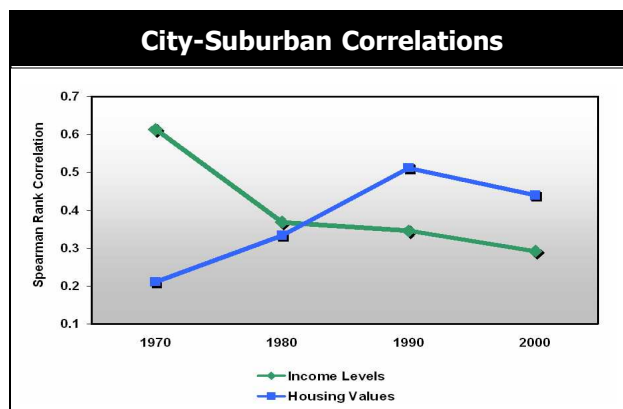


Figure 29

Interestingly, the correlations of the housing values variables exhibit very different dynamics. The correlation in the growth rates of housing values was not significantly different in the 1990s than it was between 1970 and 1980 (0.7 and 0.72 respectively), even though it was higher in the decade between 1980 and 1990. The correlation in the average housing values, on the other hand, is much higher now than it was in 1970. The graph below shows how the correlations of income levels and housing values across city and suburbs followed almost opposite patterns over the past thirty years: while the correlation in per capita income has decreased, the correlation in housing values has increased.

Many of the findings from the other dimensions have direct or indirect implications for regionalism as well. In particular, the findings presented in the Business Composition section show how different economic sectors and occupational concentrations are locating in different parts of the region, affecting the spatial distribution of the regional economic base. Manufacturing is now mostly suburbanized, while financial and other producer services tend to be located in the central city. Similarly, production jobs are mostly located in the suburbs, while professional jobs compose a higher percentage of central city employment.

Demographic shifts are also impacting cities and suburbs in different ways. A study by Alan Berube and William Frey finds that while poverty rates in central cities declined slightly over the 1990s, the poverty rate in the suburbs increased, narrowing the poverty gap<sup>148</sup> by half a percentage point.<sup>149</sup> This suggests that regions nationwide are achieving better economic balance. On the other hand, despite these advances, the poverty rate of central cities, at 18.4%, is still more than twice that in the suburbs (8.3%),<sup>150</sup> showing that urban areas in the United States are still characterized by huge income disparities between central cities and their suburbs. At the same time, ethnic shifts, such as the suburbanization of the Hispanic population, are also changing the demographic landscape of the region.<sup>151</sup>

## 5. Interpretation

The positive correlation between city and suburban income levels and housing values confirms that cities and suburbs are co-dependent, and reinforces the idea that these distinct political units are in fact subparts of larger economic systems. While these systems could be regions, states, the whole nation, or even the world economy,<sup>152</sup> there are reasons to believe that the region is in fact a critical unit of economic analysis.<sup>153</sup>

While the codependency of cities and suburbs in the context of the regional economy is confirmed by the findings illustrated above, the trend over the past thirty years suggests that something is changing. The decline in the correlation in income, for example, could indicate that the degree of co-dependence has been getting lower, which would mean that suburban economic success is more independent of city success, and vice versa. However, it may indicate that the arrangement of the factors and components of the production process between cities and suburbs is changing in ways that make income correlation a weaker indicator of their co-dependence. For example, the findings about

functional specialization suggest that higher and lower paid occupations are segregating between city and suburbs (namely, production plants locate in the suburbs, while management facilities remain in the cities) even though they remain complementary and highly co-dependent.

This interpretation is reinforced by the finding that the correlation of property values increased over the 1990s. This finding suggests that real estate markets operate across political boundaries, and that urban and suburban land are better substitutes now than in the past. Adams and Fleeter's findings on migration patterns discussed above are consistent with this view: as inner cities decline, people tend to move out of the metropolitan area, driving down the value of city and suburban housing alike. Furthermore, when inner cities do well, they act as catalysts of immigration for the whole region, and housing values rise accordingly.

If cities and suburbs are codependent parts of one regional economy, the issue of whether the city drives the suburban economy or vice versa loses its meaning. It does not make much sense to talk about causality in the city-suburb relationship when the political distinction between these two units only masks the fact that they both belong to one regional economy. Rather, the key question becomes in what ways cities and suburbs are linked, and what might cause the correlation patterns observed in this research. This question has critical practical consequences: if the economy is regional, the fates of cities and suburbs are inextricably intertwined, and regions that understand and build on these linkages will build more efficient, productive economies. In order to be effective, regional economic development strategies need to take into account and act upon the specific linkages that tie together the different parts of the regional economy.<sup>154</sup>

Keith Ihlanfeldt identifies five general sources of city influence on suburbs that help explain why the economic fates of cities and suburbs are connected.<sup>155</sup> First, outsiders' perceptions of the region are influenced by conditions prevailing in the core. This in turn could influence business location decisions and migration patterns to and from the metropolitan area. Second, because of their location and history, central cities might have amenities that are valued throughout the region and benefit urban and suburban residents alike. Third, individual central cities may provide a "sense of place" that is valued not only by their residents but also by suburbanites. Fourth, the fiscal problems endemic to a declining central city may have the effect of raising tax burden in suburban areas as well, and thereby retard the economic development of the whole region. Finally, central cities may offer unique agglomeration economies that define an important and specialized role for the central city in the regional economy, as indicated by Voith's research. Janet Rothenberg Pack adds to these factors the possible role of economies of scale in infrastructure and service provision,<sup>156</sup> which could provide a base for city-suburban collaborations and the creation of regional districts. However, Pack indicates that the evidence in the literature is inconclusive as to how significant these economies of scale really are.

From a research and analytic point of view, these factors provide a good explanation for the overall codependency of cities and suburbs. At the same time, from a practitioner's

point of view, if the goal is to identify economic linkages that can be acted upon to strengthen the regional economy, it is necessary to examine the underlying economic activities that influence codependency. Extracting from the research and the project, it is possible to identify five more specific categories of linkages that illustrate the particular operational ways in which the economic activities of cities and suburbs are linked.

A critical linkage is created through labor and real estate markets which operate across the region. This is particularly evident in the case of the labor market, considering the number of people that live in the suburbs but work in the city and vice versa.<sup>157</sup> More generally, as people are willing to travel to work across the region, and to live across the region, city and suburban jobs and real estate directly compete with each other in the same regional marketplace. The same is true of firms and commercial real estate. Furthermore, these two markets are closely interconnected, as the location decisions of firms and people take each other into account.

A second, particularly powerful linkage is constituted by a wide array of business relationships, such as corporate services, supply chains, and consumer markets. Studies of business to business relationships across city and suburbs, for example, show the extent to which companies in the suburbs rely on central city firms for a wide array of services, ranging from auditing to banking to legal services.<sup>158</sup> Consumer markets are another good example, since city residents consume the goods and the services produced by suburban firms and vice versa.

A third type of linkage is provided by the infrastructure of metropolitan areas. Roads, railroads, power grids, and utilities in general form a network that cuts across city and suburban boundaries and encompasses the whole region. Infrastructure plays a critical role in ensuring the efficiency and productivity of the regional economy.

A fourth type of linkage is related to the quality of life of urban residents: for instance, air quality and environmental resources, which are major components of quality of life, are the same for all of the inhabitants of a metropolitan area, regardless of whether they reside in the city or in the suburbs. At the same time, all of the people living in the same metropolitan area share amenities like museums and sport stadiums, which also contribute to the quality of life in the region.

A final type of linkage has to do with the role of the central city in providing critical “hub functions.” Cities house institutions and resources, such as airports and hospitals, which are used by the whole region and that benefit suburban as well as city residents.

## City-Suburban Linkages

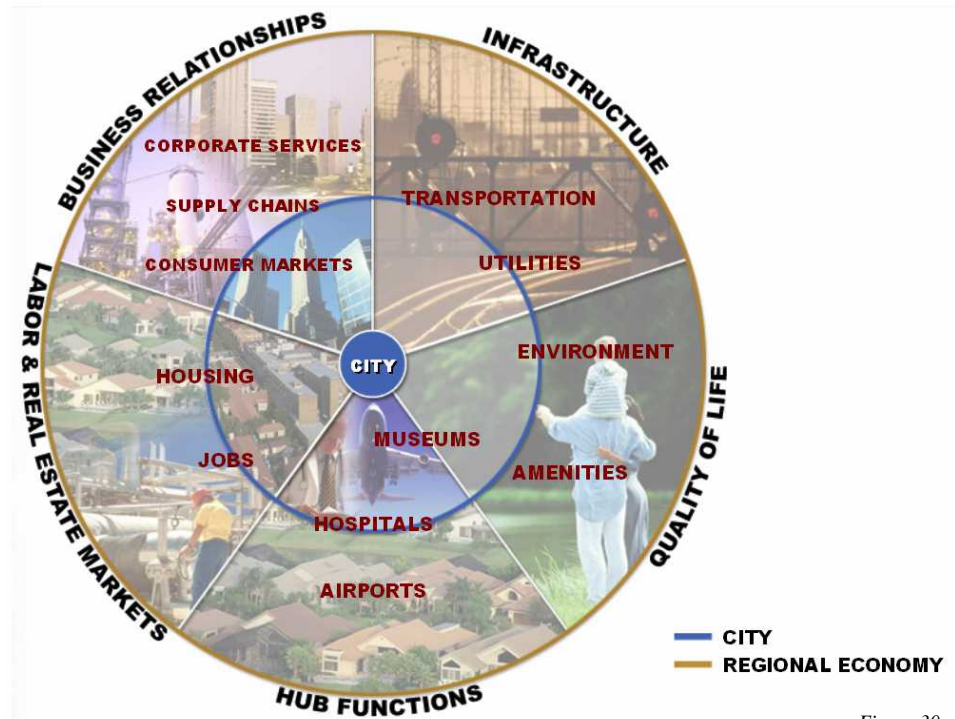


Figure 30

Shifting the focus from the general notion of codependency to particular types of linkages helps identify specific possible interventions, and also reveals that not all parts of the same region are linked in the same way. Cities and particular suburbs may be more or less heavily linked by specific labor or real estate activities, specialized functions (like financial centers) or infrastructure (such as transportation), each affecting the overall efficiency and productivity of regional economic performance. Understanding these particular operational economic linkages, and their importance to regional economic growth (and so to both cities and suburbs), highlights opportunities for more targeted interventions.

### 6. Implications

From a policy point of view, accepting the view that cities and suburbs are all part of one regional economy is only the first step towards more effective action to spur economic development. The real challenge is identifying the key linkages between the components of regional economies located in cities and suburbs. The most important focus for regional economic development may be to understand and build on the linkages particular to each local economy. Identifying these linkages would allow local governments to understand how local assets, functions, and activities are integrated into the larger economy and can best be deployed.

Understanding the particular linkages would also allow identification of specific points of interdependence between city and suburbs, and demonstrating their mutual economic benefits. City and suburban interests could be aligned across a range of possible activities, from support for specific regional business relationships to particular mutually beneficial transportation investments to targeted workforce training. For example, commuting and reverse-commuting flows link urban and suburban jobs and houses, and have an impact on how efficiently people and goods move through the region. Focusing both on reducing jobs-housing mismatch and creating an efficient transportation infrastructure is a task that requires the joint efforts of cities and suburbs, and that would benefit the economy of the whole region. The alignment of city and suburban interests around specific connections like these creates a basis for more productive and focused regional development partnerships and activities.

As regionalism cuts across all other dimensions of urban change, the findings presented in this section also have important implications for urban policy in general. Economic development policies need to be regional in scope, regardless of whether they focus on demographics, knowledge economy, or urban growth form. If markets operate at a regional level, market forces need to be leveraged in a regional context: whether the issue is labor force development, commercialization of knowledge, or smart growth,<sup>159</sup> metropolitan areas may succeed best if cities and suburbs work together.

The implications of regionalism go beyond local policy: a wide range of federal programs have had major effects on regions as well. For instance, federal tax policy, transportation investment and housing programs over the years have directly and indirectly encouraged suburbanization.<sup>160</sup> Programs such as home mortgage and property tax deduction from income taxes provide an incentive for higher income residents to move to the suburbs, leaving lower income households in the inner city.<sup>161</sup>

Considering the crucial role of metropolitan areas in the economy of the nation, federal policies that directly or indirectly increase the level of inequality across the region ultimately hurt the growth of the national, as well as the regional, economy. Such policies also make the task of local policymakers much more difficult. A regionalist policy agenda starts at the local level with city-suburban partnerships, but ultimately would productively inform the policies and activities of all levels of government.

#### IV. THE CHANGING DYNAMICS OF URBAN ECONOMIES

The myriad project results begin to fit together when viewed in the framework discussed in Section IA. Economic growth is broadly a function of the *factors or inputs* of production (such as labor, capital, natural resources, knowledge, technology), and of the *organization* of those factors into wealth creation through institutions that define the market and *environment* (like government) and that engage in production (firms). The role of cities -- indeed the reason for cities, from an economic point of view -- is to enhance production through reducing costs (especially transportation costs), and through creating “agglomeration” effects – the benefits of shared labor, ideas and other inputs resulting from synergies, spillovers, network and other effects of proximity of inputs and firms.

These components of the economy are of course interdependent, such that changes in one result in changes in others, and this dynamic affects how the economy operates. Generally, the findings suggest that different factors of production and different institutional characteristics are increasingly significant now, with resulting implications for optimal organization and for what aspects of the environment are most significant. Ultimately, since the components of the economy organize across space to take advantage of agglomeration effects, as discussed in section IA2, these transformations will have an effect on the very dynamics that account for the existence of cities, and on the role that urban areas play in the national economy. In effect, as *what* is agglomerating changes, *how* it most efficiently agglomerates, as well as the optimal environmental characteristics, all change as well.

First, which economic **inputs** are important is changing. The role of knowledge inputs as a basis of value creation has increased dramatically. This is reflected in the findings about the significance of information and knowledge embedded in people (e.g. education) and technology (e.g. digital economy indicators). These inputs are increasingly important across the economic spectrum: information sectors are growing, and information functions, services and occupations are growing in all sectors. Even in the case of manufacturing, for instance, knowledge inputs are increasingly important, and could be one of the factors accounting for the surprisingly positive effect of this sector on economic growth. Changing characteristics (age, ethnicity, immigration) of the labor force present another major change in the inputs or factors of production.

Second, as the key inputs change, the optimal **organization** of production, both within and between firms, also undergoes important transformations. Within the firm, the use of new technologies makes the production process more efficient and flexible: CAD-CAM technologies in manufacturing, for example, reduce the amount of time spent in designing and assembling new products. At the same time, information technologies that allow firms to track and manage their inventory and to customize the products to fulfill specific orders make the production process much more flexible. These changes in the production process, in turn, impact the role of the inputs: since the use of new technologies in the production process requires more qualified workers, human capital and education become increasingly important.



In addition to changing the production process, the new factors of production have important effects on the organizational structure of the firm. By lowering the cost of processing and transmitting information, new technologies make it less expensive to locate different units of the same firm in different places, and allow firms to better take advantage of the production networks and support services that different locales have to offer. As a consequence, cities are now specializing by function (such as management versus production) as well as by sector. A similar process may occur between firms, particularly with respect to supplier networks. The new factors of production also affect the efficiencies of out-sourcing, as the economics of internal production compared to procurement shift for certain functions, resulting in further changes in functional locations and concentrations.

The growing specialization by occupation or profession also likely reflects the increasing benefits of concentrating specialized knowledge and functions. More generally, knowledge inputs may be best developed and deployed through different kinds of economic organization, such as more deliberate, flexible and cross-sectoral networks of firms and knowledge institutions. In the case of knowledge-intensive industries like biotechnology, for instance, economic viability and success are critically linked to the combination of research institutions (such as universities and government agencies), local entrepreneurship, and available venture capital.<sup>162</sup>

Due to the changes in the inputs and organization of production, what is important in the **environment** of production has changed as well. As the components of the economy organize differently across space (e.g. business services and production, back-office and finance), economic activity more often happens across city and suburban boundaries. At the same time, the specific economic ties that link cities and suburbs might change: for example, functional specialization is likely to create new business relationships between corporate headquarters in the suburbs and corporate service providers in the central city. The spatial organization of production has a direct effect on urban growth form as well, since the geographic distribution of the components of the economy might be changing to take advantage of the new synergies and agglomeration economies.

Another change in the relevance of the environment may arise due to the increasing importance of human capital and skilled labor. It is possible that the importance of knowledge workers may shift the interactive dynamic between attracting firms and residents,<sup>163</sup> and that creating the right environment may be more important to attracting a good mix and fit of firms and workers. These changes have major implications for areas such as urban growth form and quality of life, since having the right combination of amenities and economic opportunities is key to attracting a productive workforce and stimulating new business activity.

These changes in the components of the economy are tied to the geography of economies as well. Due to the rise of knowledge factors and new organizations of production, *cities themselves may be more important than ever to economic prosperity.* The benefits of agglomeration that account for the concentration of economic activity in urban areas

apply particularly to knowledge inputs. Knowledge factors build upon themselves and get converted to economic value through face-to-face contacts, dense business networks and shared resources that cities particularly provide.<sup>164</sup> Since economic activity now revolves more around services that require human contact and personal exchange, there is a greater need for the proximity of people and businesses found in urban areas.

Moreover, the urban environment is extremely well suited for spurring innovation, which is favored by the diversity of ideas interconnected and integrated in urban networks. The negative effect of segregation, which limits personal contact and hampers the cross-fertilization of ideas among people with different cultural and ethnic backgrounds, can be seen in this context as a confirmation of the importance of diverse exchange in the urban environment. Ultimately, the growing demographic diversity of urban areas across race, ethnicity, income, and age could thus contribute to this innovation process and reinforce the role of cities as major engines of economic growth.

Overall, these changes have reached a point where income growth no longer correlates with population growth, and where advantages breed further advantages. As knowledge inputs are becoming a bigger factor of production, economic growth is less dependent on labor force growth. In other words, having a more educated population (better suited for high-skill, knowledge intensive occupations) and effective networks and knowledge infrastructures leads to higher income growth, while growing in population per se does not guarantee the same result.

The observation of non-linear path dependence among urban areas is another, very important consequence of the shift towards knowledge inputs and new organizations of production. As mentioned above, this trend is likely due to the fact that knowledge factors tend to build upon themselves (i.e. be characterized by increasing returns) and generate a faster pace of economic growth. Figure 8 in section IIIC confirms this view: the cities in the top right area of the chart (diverging from the rest of the group) all have knowledge-intensive economies, characterized by high concentrations of professional and managerial occupations and a very strong presence of information sector industries. Conversely, the cities at the top left and bottom right (which are converging in economic performance) have more traditional economies, centered on goods production and distribution.

An overarching theme that emerges from this report is the increasing differentiation among urban areas. The findings on divergence, along with the variety of factors that proved to have a significant effect on economic growth, suggest that there is not just one type of urban economy. Among those cities that have been succeeding economically, there is no one successful industry concentration or development strategy; rather, different cities and types of economies play different economic roles, and have varied possible paths to prosperity. For example, some economies have thrived by creating ideas, while others have prospered by using them (attracting and implementing innovations);<sup>165</sup> some have achieved efficiencies and success by concentrating business headquarters or financial functions, while others have developed sophisticated facilities and infrastructure for production.

In a way, urban economies, like markets, increasingly offer distinctive niche opportunities. Each city offers unique characteristics, which must be understood and leveraged in highly targeted and customized ways. As the factors that lead to economic growth change and vary by city, the single most important point that emerges from the results of this research is the need for localized strategies to take advantage of local development opportunities. Section V offers some immediate practical steps that urban leaders can take in this direction, and presents tools that can help analyze particular economies in more detail.

## **V. MOVING FORWARD**

While the last section addressed the broader, more conceptual implications of the project findings, this section discusses the ways in which these results can be brought to ground, suggesting a series of practical next steps. The goal is to tease out the different ways in which the findings presented above can either be applied in particular places, or help inform general policies and further research efforts. Accordingly, the first part of this section, “Towards Local Solutions,” will describe two tools (a taxonomy of cities and a metropolitan audit) that can help local policymakers understand how their city fits into the broader national economic landscape and what can be done to improve the performance of the local economy. The second part will discuss a set of general policy implications that stem from the project’s findings. Finally, the third part will identify a few ideas for further research that would lead to an improved understanding of the dynamics of urban economies.

### **A. Toward Local Solutions**

The project highlights the importance of being strategic (because success breeds success), at the same time that it reveals the extent to which cities are differentiated, and so need to develop strategies tailored to their particular assets and opportunities. In many ways, the biggest value of the project outcomes may be at this practical, local development level. The local development challenge, particularly when resources are constrained, is most often in knowing which policies are really relevant to, and will have the most impact on, particular places and economies. While there is no shortage of general policy prescriptions, each year’s laundry list of the “ten best policies for urban development” (e.g., IT infrastructure, entrepreneurship, biotech, etc.) – even if full of good ideas – is rarely sufficiently detailed, prioritized or tailored to local circumstances. Any particular city’s most important step may be to understand its unique economic opportunities, and prioritize development activities to capitalize on them.

The model results suggest that there is no silver bullet. Instead, lots of factors are important, varying by place. Furthermore, just as the ingredients for prosperity are changing, the number of recipes is increasing. The challenge now is to determine which recipe is the most appropriate for each city type. It is necessary to better understand, in each particular place, the iterative relationships between, for example, creating a rich mix of occupations, functions and firms; attracting certain age and education groups; and improving quality of life. In effect, at the local level, the opportunity is to analyze – in fact develop the capacity to continually be aware of – the unique dynamics of the particular local economy, and to then implement customized strategies.

Developing targeted strategies will require further assessing the particular conditions of a specific city and regional economy. As an initial step towards understanding the relationship of individual cities to the overall findings, the project developed a preliminary, illustrative taxonomy of urban economies. The taxonomy is useful to begin suggesting which factors deserve more attention in particular cities, sub-patterns of city

types and varying paths to success. An illustration of the taxonomy and its possible applications is provided in Section VA1.

By identifying different city types and paths to economic growth, the taxonomy can be a useful first step in identifying where to focus more customized analysis. However, this particular taxonomy, prepared for the central cities of the largest 250 metropolitan areas using key variables mostly from the models, is inherently not localized enough to fully capture the unique characteristics of a particular local economy and guide local development policies. Using the taxonomy and the model results, though, it is possible to design and undertake, in essence, a customized audit of any specific metropolitan economy, which would provide a much more detailed and in depth understanding of the issues and dynamics at play in that particular urban area. Section VA2 provides a few illustrative examples, one from each of the dimensions, of the more detailed questions and policies that would be addressed in such an assessment.

### 1. Taxonomies

The model results provide important evidence about what matters to urban economic success by looking in the aggregate across all 250 of the largest urban areas and their central cities. Yet the results also reveal that cities have great variation, and that leveraging local paths to success is increasingly important. To help begin examining the different types of cities and their paths, the project produced a taxonomy that identifies clusters of cities with similar socioeconomic characteristics.

Developing a city taxonomy can help urban leaders in two ways: first, comparing across clusters helps identify where a city fits in the general economic landscape. By looking at the cluster a city belongs to and comparing it to other clusters, urban leaders can identify the main characteristics of the city's type, as well as its strengths and weaknesses. Second, a taxonomy can facilitate peer analysis: comparing to other generally similar cities within the cluster suggests how particular differences from peers may affect economic performance.

This taxonomy was built by hierarchical clustering using primarily the factors that proved most significant to economic success in the models, and clustering the 250 cities in the sample into 15 main types. The technique used to graph the taxonomy was first developed as a DNA heat mapping application,<sup>166</sup> and it was used to examine the ways in which different groups of genes correlate with various physical traits. The same technique was applied here to group cities according to their score on 47 different variables representing various socioeconomic characteristics.

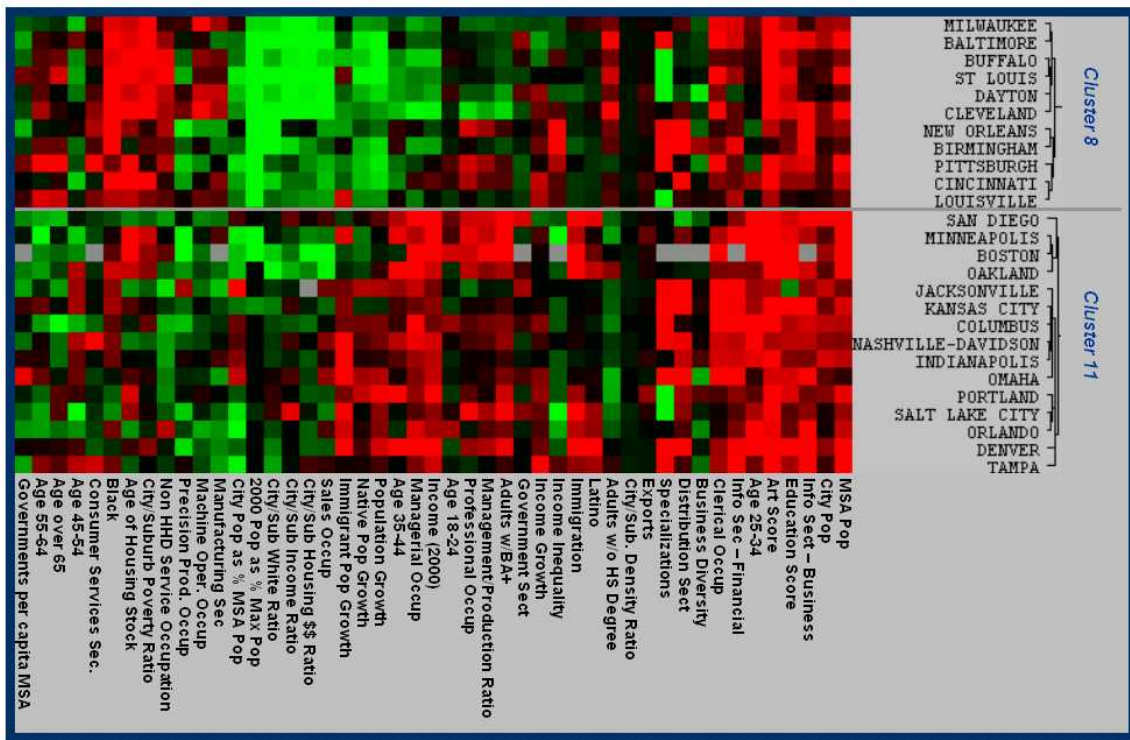


Figure 31

The graphic above shows the heat map relative to two clusters of cities (labeled cluster 8 and cluster 11).<sup>167</sup> The score of each city on the variables listed below the chart is represented by degrees of color, from light green (very low) to bright red (very high). The clusters are created by grouping together cities that tend to have similar scores on the same variables. Within each cluster, then, cities that are closer together in the chart are more similar than cities that are further apart, forming sub-clusters as indicated by the lines on the right.<sup>168</sup> The sub-clusters can prove especially helpful in identifying the peers of a particular city, and in thinking about how similarities and differences in their traits might affect their economic performance.

Analysis of particular clusters can reveal how economic dynamics are playing out differently in specific places, and help identify different ways to achieve economic growth. At this stage, with the general taxonomy built around leading economic characteristics of 250 cities, the individual clusters, and how well a particular city fits within its cluster, help identify what factors are most important to the economic dynamics of that city. As discussed below, as a further step, a customized taxonomy could be produced tailored to the factors or issues of most importance to a particular city, to identify more refined clusters specific to that city’s characteristics or interests.

The outcome pertaining to the two clusters in figure 31 provides an example of how the general taxonomy can be used to analyze different types of local economies. Clusters 8 and 11 – fairly represented by Cleveland (Cluster 8) and Portland (Cluster 11) -- generally contain cities with slightly above average income growth. While the national

average income growth was approximately 10%, the average income growth in cluster 8 was 12%, and the average income growth in cluster 11 was 13%.<sup>169</sup>

The cities in these two clusters are coming from very different starting points: they have different challenges and strengths to build on. Cities in Cluster 8 are generally smaller than cities in Cluster 11, and their population tends to be older and less educated. The cities like Cleveland are generally Midwestern cities with an older housing stock, lower absolute income, a high percentage of African Americans, and high levels of income inequality between central city and suburbs. The cities in cluster 11, on the other hand, had less income inequality, and generally had higher levels of immigration and a high percentage of Hispanics.

The economies in Cleveland's cluster are much more concentrated in manufacturing and consumer services. The population in Portland's cluster tends to be younger, more highly educated, and more likely employed in managerial and professional occupations. Interestingly, both clusters exhibit a high presence of information sector industries (particularly financial and other producer services). Cities in these two clusters also experienced very different levels of population growth: both native and immigrant population growth was very high in cluster 11, but generally very low in cluster 8. This, again, confirms that economic growth (measured in terms of income) can be achieved independently of growth in population.

In interpreting the results of the taxonomy, it is important to note that many different taxonomies are possible, since the output is contingent upon the variables that are selected. A different set of variables would group cities with respect to different characteristics, and produce a different set of clusters. Each specific taxonomy helps identify where the specified urban economies "fit" with respect to selected characteristics, and some of the varying paths to success. As a result, the potential of urban taxonomies as a tool for the analysis of local economies goes well beyond the example presented here. Taxonomies can be customized and used to identify peer cities along certain variables and not others, and to find out how urban areas cluster taking into account particular aspects of their economies. For instance, a city might be interested in identifying its peers based primarily on business composition, in order to compare its economic development policies to those of cities with a similar economic base. In this case, a taxonomy based on business composition variables, such as sectoral, functional, and occupational concentrations, could identify clusters of peer cities along this particular dimension.

Taxonomies like these might be a useful starting point for particular cities to examine where they fit in the economic landscape, and to figure out which factors of success are likely most relevant to them. It is necessary, of course, to get well beyond this starting point, and to complete a tailored analysis of those factors in order to develop customized strategies. This point is addressed in the next section, which begins to identify the components of such a customized audit for particular metropolitan economies.

## 2. Metropolitan Audit

The model results and urban taxonomy help identify priority questions to focus on, and provide a foundation, along with the database assembled for this project, to begin answering the questions in particular places. Further customized analysis could take the form of a Metropolitan Audit, a targeted examination of the key economic characteristics and dynamics of the urban area. A customized audit might look at demographic characteristics, the makeup of the economic base, the spatial distribution of the components of the local economy, the linkages between suburbs and central city, and so forth. For the selected elements, the audit would go beyond describing current static circumstances to capturing trends. Ultimately, an audit would produce a customized set of policy recommendations based on the particular features, strengths and weaknesses of the local economy. A few examples of some of the subjects (organized by dimension) that might be covered in a local audit, and their possible implications for local development policies, are provided below.

### Knowledge Economy. Example: Education

- Considering the importance of college level education, where are college graduates coming from or going to, and why? If they are produced locally and leave the area, for what reasons? If they are staying or coming to the area, what are the key factors in their decisions?
- Where (places and institutions) are the people who are starting college but not finishing? What are the reasons people drop out of college (economic hardship, job offers, perceived benefits)? Is there potential to increase college completion rates?
- Available data could address many of these questions, as well as ethnic and economic characteristics of students and graduates, migratory patterns, and details on courses of study and performance (or drop-out rates) of students at local colleges.<sup>170</sup>
- Analysis of this data could help target strategies to increase, retain and attract college graduates. These might range from focusing on problems at particular local colleges, to creating partnerships between local colleges and businesses to retain graduates. Other strategies could, for example, help with high housing costs or provide student loan forgiveness programs tied to staying in the area. The point, of course, is that the results of the analysis would determine which of these things, or others, would make the most economic sense.

### Business Composition. Example: Types of Specialization

- Considering that specialization carries risks as well as benefits, and that the nature of specialization appears to be changing, the threshold analysis would determine the extent and nature of current specialization: is the economy concentrated in certain sectors? In particular functions (such as back office, distribution, data processing, R&D, finance, management)? Particular occupations or professions?<sup>171</sup>



- Some of these questions can be readily analyzed with available data (indeed, much of the relevant baseline data is already in the database). For example, County Business Patterns and Economic Census data offer insight on the business composition and the occupational mix of every city, while PUMS data, which shows individual level records, would allow getting at the intersection between functional and sectoral specialization. The business survey, referenced below, could complete this information.
- This analysis, first, will help identify the most promising specializations (if any: remember, diversity is an equally good path to prosperity). Once promising specializations are identified, tax, fiscal, zoning and other policies can be tailored to strengthen them. Investment, R&D, infrastructure development or workforce training can be targeted to the identified plans and needs of connected firms and functions. At the other extreme, places that are very narrowly specialized will be able to better anticipate and plan to mitigate the risks of specialization, such as with business insurance and workforce transition programs.

Demographics. Example: Immigration

- Immigrants present an unusually diverse pool: for example, as a whole, they are both more likely to have no high school degree *and* more likely to have a college degree. Furthermore, their economic impact varies greatly based upon the fit between the types of immigrants and the type of local economy. While standard census data does not reveal which types are coming to a particular city, census micro-data would allow a thorough profile of the immigrant population by age, education, income, length of residence, country of origin and other characteristics. INS data also shows where immigrants find employment, what kind of occupation they tend to have and, indirectly, what industries rely more heavily on immigrant labor. This allows better understanding the fit of immigrants with the local economy, how to most productively incorporate them, which to seek to attract, and how well they are being incorporated so far.

Regionalism and Urban Growth Form. Example: Distribution of Components

- The interdependency of cities and suburbs varies by region and type of economy. Similarly, whether urban growth form is impairing or enhancing economic success (and if so, how) varies across economies. Both issues are particularly dependent on localized analysis. How are the key components of the economy distributed across city and suburbs? What are commuting patterns (by occupation and industry)? Is appropriate housing near job centers? What are the expenditure patterns of consumers and businesses? Is the distribution reaching a point of “sprawl” where particular industries or functions are affected? The point is not just to identify what the linkages are, but where: which components are most important to focus on, and which suburbs?
- Baseline data, again, is already available in the project database on many of these issues. Other more specialized data sets are available, both nationally and locally.<sup>172</sup> Increasingly, regional development organizations are gathering

relevant data, and are well positioned to deepen it with original data collection, as well as to act on it.

- With analysis of these issues, initially, policy makers can be more deliberate about how much and what kinds of growth are sought (given that growth is neither inherently necessary – nor inherently bad -- for prosperity). Where growth is having negative effects, or needs to be managed going forward, tax policy, infrastructure investment, zoning, land use and transportation planning can be better tailored toward more clearly defined goals. Similarly, understanding the particular linkages allows identifying specific points of interdependence between city and suburbs, and demonstrating their mutual economic benefits. City and suburban interests could be aligned across a range of possible activities, from support for specific regional business clusters to transportation to targeted workforce training. This creates a basis for more productive, focused regional development activities and partnerships.

Ideally, cities would develop the capacity to continually know details like these about their economies. Indeed, the capacity and results would themselves be valuable additions to the local knowledge infrastructure, facilitating and informing not only policy decisions, but also market activity. A relatively simple, but highly useful, first step in this direction would be to undertake an annual survey of people moving into and out of the area.<sup>173</sup> The survey would establish basic demographics (age, education, family situation and structure, industry and occupation), then ask where respondents are coming from or going to, and for what reasons (moving to a job? quality of life issues?). Understanding why different types of people are coming and going, when tied to the other information and models, would be enormously useful in prioritizing economic development activities. A similar routine survey could be designed for businesses, and help understand why businesses decide to locate in the area (what characteristics of the local economy they find most attractive) or for what reasons they decide to leave.

## **B. Policy Implications**

Though at its core this work highlights the importance of developing and implementing highly customized local strategies, the project results also carry some general policy implications that likely apply to all cities, and a set of strategic priorities that are within the immediate purview of city leadership. These recommendations can be organized around three main points: the need to address basic issues that are common to all urban areas, such as education, inclusion, innovation, infrastructure and quality of life; the importance of leveraging the unique strengths of the local economy; and the importance of making the economic development strategy regional in scope. While examples of particular types of policies or programs are identified below (based on other research and experience with the programs), these are far from exhaustive, and are intended to suggest the kinds of policies which bear investigation, rather than to constitute specific recommendations. This project of course did not examine the efficacy of any particular program.

## 1. Take Care of the Basics

Education: Investing in education and human capital is central to having a skilled workforce and a thriving economic base. In particular, ensuring greater matriculation from high school to college and greater college completion numbers is likely to have high impact. To achieve this goal, consider developing new scholarship and fellowship programs, facilitating paid internships and other applied learning opportunities, and increasing the availability of work-study funding and positions. Another critical task is the retention of students that complete their degrees and embark in their search for employment. Programs that may help urban areas retain their college graduates include loan forgiveness for students who choose to remain in the area, and initiatives that better connect educational activities and local employment opportunities, or facilitate networking with the local business community.<sup>174</sup>

Furthermore, the economic impact of education goes beyond simply having a more educated workforce. Rather, the importance of education depends on the broader knowledge economy shifts that place increasing importance on the combination of knowledge and technology. Consequently, sophisticated education policy needs to be integrated with analysis and strengthening of existing knowledge concentrations, commercialization of knowledge, and investments in related technology.<sup>175</sup>

Inclusion: The findings on the negative effects of inequality and segregation suggest that sound development strategies should be inclusive in all respects: do not leave resources and assets underutilized, and reduce the income and wealth gaps. For instance, wealth building initiatives that support economic activity and alleviate income disparity are directly and indirectly beneficial to the economy. Such programs range from federal initiatives like the Earned Income Tax Credit to financial tools such as Individual Development Accounts, to institutions that focus on market-based community development (e.g. community development financial institutions, or CDFIs).

Policies focused on integrating and improving the productivity of the immigrant population might also produce immediate benefits and lead to economic growth. For example, policies in this area could include supportive and educational services (such as availability of ESL classes), as well as better leveraging the immigrant skill base (job training and placement; targeted attraction and skill development strategies better linked to employer needs).

More generally, urban leaders could strive to develop an economic mix that offers widespread employment opportunities, if necessary combined with day care opportunities, job retraining and continued education. Finally, a regional affordable housing policy (removing zoning restrictions, creating tax incentives, enforcement of anti-discrimination laws) might also help address poverty, segregation, and regional economic efficiency (see discussion of urban growth form, particularly jobs-housing mismatch).

**Innovation:** Economists consider innovation the only engine of long-term economic growth. Policies that favor innovation are thus a basic. These may include investment in specific research (carried out in university or R&D facilities), or policies like R&D tax credits. They include balanced regulation and enforcement of intellectual property rights to provide a positive incentive structure for firms and universities that embark on research programs. They include supporting networks of firms, people, and institutions to facilitate cross-fertilization; and activities that favor commercialization of knowledge.<sup>176</sup> Finally, innovation can also be favored, indirectly, by creating a diverse and inclusive environment through some of the policies discussed above.

**Infrastructure:** Efficient infrastructures contribute to efficient economies. In addition to the basic infrastructure upon which the economy depends (transportation, utilities, and so forth), the knowledge and information infrastructure of an urban area can increasingly influence its economic performance, as indicated by the knowledge economy findings presented in section III. Investments in knowledge infrastructure include expanding Internet access and broadband capability, improving Internet and network security, digital government programs that can make local governments more agile and responsive, and investing in the networks and institutions that give rise to innovation.<sup>177</sup>

**Quality of life:** As we have seen, quality of life has become increasingly important in determining the economic competitiveness of urban areas. Programs that go in this direction focus on maintaining or increasing the availability of cultural and natural resources, entertainment venues and other amenities, in addition to investing in livable communities, walkable neighborhoods, good public transportation, and a quality public school system. A focus on public health is also a critical component of policies that aim at enhancing the quality of life of urban residents.

## 2. Leverage Unique Strengths in the Local Economy

Once these basic issues are addressed, cities could focus on identifying their core economic strengths, as discussed in the previous section. During this process, special attention should be paid to new dimensions, such as the concentration of particular skills and knowledge factors, occupational and functional specializations, and so forth. The next step would be to build on and invest in those concentrations, particularly by strengthening the economic relationships, business networks, and key markets associated with the sectors and functions that drive the local economy. This might be done through fiscal policies, targeted infrastructure investment and zoning that provide incentives to certain industries or functions, and that attract businesses that are complementary to the existing ones.

## 3. Make it a Regional Strategy

Finally, each city should pay attention to the economic units, not just to the political ones. Understand how the particular components of a specific economy are operating across the region. They could reveal, for example, shared business relationships, mutual workforce

issues, or common amenities. It is then possible to develop targeted programs and city-suburb partnerships that build upon the linkages underlying the regional economy.

### **C. Research implications**

The findings suggest that American cities are undergoing substantial changes. Much further work is necessary to fully understand these phenomena and the opportunities they present. Two broad directions seem likely to prove fruitful: analyzing particular economies in much more depth, as discussed in section VA; and more deeply examining each of the dimensions. This section will briefly identify some possible areas and issues of focus.

As data on knowledge economy factors becomes available for more extended periods of time, it will be possible to go beyond a simple analysis of correlation with economic growth and include these variables in the regression models. Tracking the presence of knowledge economy indicators over time would allow researchers to more accurately determine the effect of these factors on income and wage growth. In addition to including these measures in the models, it would be helpful to refine some of the indicators and to analyze in more detail which factors have a greater impact on economic growth and how they can best be leveraged. For instance, it would be helpful to refine the measures of innovation, and look not only at the number of patents issued but also at the commercialization of new products, to see which urban economies are more innovative and why. At the local level, a related study could analyze the networks of businesses and institutions that support and implement the commercialization of knowledge in a particular place, in order to devise strategies that could facilitate this process.

In the area of business composition, the idea of functional specialization has important implications for the economies of urban areas, and deserves further exploration. While Duranton and Puga presented a compelling argument and initial evidence to support this theory, and the findings presented here are consistent with their work, further research needs to be carried out in order to specify and operationalize these changes. Such research could be implemented at the national level, by developing better indicators of specialization by function and tracking them over time in order to identify trends and patterns across metropolitan areas. Alternatively, it is possible to carry out a detailed analysis of the business composition of a particular urban area, paying special attention to the functional and occupational concentrations that characterize the local economic base, and to the business relationships that define genuine clusters of firms.

Among the demographic factors, the issue of immigration and its effect on economic growth in particular deserve further exploration. The findings of this research suggest that the effects of the percentage of foreign born on economic growth may vary depending on the characteristics of the local economy. More specifically, initial analysis of this issue showed that the effect of immigration was negative in low-education cities and neutral in high-education cities. This dual effect could be further investigated by including additional variables in the models, and refining the description of the

immigrant population by adding factors such as number of years spent in the US, English proficiency, educational attainment, etc. At the local level, customized audits could investigate whether and how the immigrant population is integrated in the local economy, and what factors account for the productive deployment of foreign-born workers in local firms.

The area of urban growth form presents particularly complex issues, and consequently offers several opportunities for further work. The issues surrounding the definition and measurement of sprawl still warrant investigation, and the multifaceted nature of this phenomenon poses significant methodological challenges. Important work has been done in recent years,<sup>178</sup> but more remains to be done in order to develop accurate measures and improve the reliability of data on the physical growth of American cities and regions. More refined modeling of sprawl factors could help address some of the questions regarding their effect on economic growth. In particular, further research could verify whether the effects of sprawl on income growth are indeed nonlinear and vary with city size as suggested by the findings presented in section III, and investigate how the spatial arrangement of the inputs and organization of production influences the performance of the local economy.

Finally, the dimension of regionalism also offers important research opportunities. Further analysis is needed to identify and describe the nature of the specific economic relationships that tie together the different subparts of the regional economy. At the local level, new research could focus on how local assets and factors of production are connected to the regional economic system, and on how economic development strategies can build on these linkages to strengthen the local economy.

The project has already produced two sets of tools that could help conduct this further work, both at the national and at the local level: an extensive database, which contains thousands of variables capturing disparate characteristics of urban areas; and a baseline set of models, which create a framework for further investigating the effects of particular variables, for more readily analyzing new variables, and for forecasting the impacts of various interventions. Together, these tools serve to identify key variables, and create a framework for continuing customized analysis, both by place and by subject. Any one of these lines of research would considerably advance the knowledge of urban economies, and provide valuable insights on the factors that drive city economic success.

## **CONCLUSION**

Cities are more important than ever to the economic performance of nations as enhanced productivity increasingly flows from physical concentrations of personal, knowledge and business networks. New opportunities and paths for success are emerging, and cities have more choices as differentiation between cities leads to more varied economic roles. While there are many ways to achieve prosperity, making the right choices is both more important and more complex. The key is to be strategic – for each place to build on its unique economic mix.

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## Endnotes

<sup>1</sup> Robert Weissbourd and Christopher Berry, “Cities and Economic Prosperity,” CEOs for Cities, available at <www.CEOsforCities.org>

<sup>2</sup> See Robert Weissbourd and Christopher Berry, “Cities and Economic Prosperity,” available at <www.CEOsforCities.org>.

<sup>3</sup> See, e.g., Bruce Katz and Robert Lang, eds., Redefining Urban and Suburban America: Evidence from Census 2000, Brookings Institution Press (Washington, DC, 2003). More details on the literature and on the new findings pertaining to these changes are explored throughout this report.

<sup>4</sup> Some confusion might arise between what is called here the *organization* of production (a process involving supplier relationships, elaboration of inputs, and market sales) and the *organizations* (firms, government, etc.) that are in various ways involved in the production process. These organizations are what economists call *institutions*, and include the firm, the government, and the market itself. In our framework, these institutions fall in part under the organization, and in part under the environment of production. In particular, the firm and the market are institutions that have an active role in the production process and in determining how value is created, and as such they are part of the organization of production. The government, on the other hand, is an external entity that regulates and influences the market without being part of the production process, and is therefore included in the environment of production.

<sup>5</sup> The field of economic geography, which is primarily concerned with analyzing where economic activity occurs and why, has often been overlooked by economists, mostly due to modeling difficulties. However, over the past few years the discipline of economic geography is experiencing a period of fast growth, providing new frameworks and tools for the analysis of urban economies. See Paul Krugman, Masahisa Fujita, and Anthony Venables, The Spatial Economy: Cities, Regions, And International Trade, MIT Press (Boston, MA 1999); and Gordon Clark, Maryann Feldman, and Meric Gertler, ed., The Oxford Handbook of Economic Geography, Oxford University Press (New York, NY, 2000) for discussion.

<sup>6</sup> For a survey of the economic literature on cities and on the role of agglomeration economies see, e.g., Masahisa Fujita and Jaques-Francois Thisse, Economics of Agglomeration: Cities, Industrial Location, and Regional Growth, Cambridge University Press (Cambridge, 2002); John Quigley, “Urban Diversity and Economic Growth,” *The Journal of Economic Perspectives*, Volume 12, Issue 2 (Spring 1998); Keith Ihlanfeldt, “The Importance of the Central City to the National and Regional Economy: A Review of the Arguments and Empirical Evidence,” *Cityscape*, Vol. 1, No. 2 (June 1995); and Paul Krugman, “The Role of Geography in Development,” prepared for the Annual World Bank Conference on Development Economics (Washington, DC, April 1998).

<sup>7</sup> See Max Hall, ed., Made in New York, Harvard University Press (Cambridge, MA, 1959).

<sup>8</sup> For a discussion of knowledge spillovers see, e.g. Raymond DeBontd, “Spillovers and Innovative Activity,” *International Journal of Industrial Organization*, Issue 15 (1996), 1-28.

<sup>9</sup> See John Quigley, “Urban Diversity and Economic Growth,” *The Journal of Economic Perspectives*, Volume 12, Issue 2 (Spring 1998). For a more technical discussion of this point, see Robert Helsley and William Strange, “Matching and Agglomeration Economies in a System of Cities,” *Regional Science and Urban Economics*, Issue 20 (1990), 189-212.

<sup>10</sup> For a definition and discussion of localization and urbanization economies see, Edward Glaeser, Hedi Kallal, Jose Scheinkman, and Andrei Shleifer, “Growth in Cities,” NBER Working Paper 3787 (1991); Keith Ihlanfeldt, “The Importance of the Central City to the National and Regional Economy: A Review of the Arguments and Empirical Evidence,” *Cityscape*, Vol. 1, No. 2 (June 1995).

<sup>11</sup> See Edward Glaeser, “Are Cities Dying?” *The Journal of Economic Perspectives*, Vol. 12, Issue 2 (Spring 1998), 139-160, and Knowledge Economy section below.

<sup>12</sup> The literature review also helped find useful datasets and relevant variables that could be used for the analysis. The results of this first phase, along with preliminary findings and observations, were presented to the members of CEOs for Cities at the annual meeting, held in Chicago in the Fall of 2002. This meeting provided an opportunity to gather the feedback of a select group of urban leaders on the validity of the dimensions and the relevance of the themes, and on which issues and themes were of most significance.

<sup>13</sup> For examples of the variables contained in the database, see tables B50 and B51 in Appendix B.

<sup>14</sup> The project benefited in particular from the contributions of Janet Rothenberg Pack, Richard Voith, Stephen Malpezzi, Robert Atkinson, Saurav Dev Bhatta, Reid Ewing, Rolf Pendall, Don Chen and Ned Hill.

<sup>15</sup> When describing the geographic scope of the findings, the term “city” will be used to refer to the central city; the term “metropolitan area” will be used to refer to the MSA; and the term “urban area” will be used when referring to observations that apply both to the metropolitan area and distinctly to its central city.

<sup>16</sup> Change was measured as logarithmic change (or log change) and not as percentage change. Throughout the paper, income, population, and wage “growth” or “change” refer to log change. See, Charles Jones, *Introduction to Economic Growth*, 2<sup>nd</sup> ed., W.W. Norton & Company, (New York, NY, 2002) p. 203-204, for an explanation of why log change is normally used in this type of analysis.

<sup>17</sup> The project did not analyze population change at the MSA level because many MSA definitions changed over the study period, thus population growth may reflect merely boundary changes. Per capita income and average wage, however, are interpretable even in the context of boundary change, as these variables reflect the central tendency, rather than the size, of the MSA population. Nevertheless, even when analyzing income and wage change, it is possible that some changes may be due to boundary definitions rather than economic change per se. The project did not analyze wages at the city level because such data are not available.

<sup>18</sup> An additional set of issues concerning whether per capita income growth alone is a good indicator of prosperity relates to the other factors that might affect the well being of urban residents. For instance, if prices increase faster than income, urban residents will be worse off, despite being nominally wealthier. Moreover, per capita income does not take into account the availability of amenities and the overall quality of life of city residents. For a review and discussion of these arguments, see Paul Gottlieb, “Growth Without Growth: An Alternative Development Goal for Metropolitan Areas,” Discussion Paper, The Brookings Institution Center of Urban and Metropolitan Policy (February 2002). For a discussion of alternative measures of success see Harold Wolman and Coit Cook Ford III, “Evaluating the Success of Urban Success Stories,” *Urban Studies*, Vol.31, Issue 6 (June 1994), and Cecilia Wong, “Developing Indicators to Inform Local Economic Development in England,” *Urban Studies*, Vol. 39, No. 10 (2002) 1833–1863.

<sup>19</sup> Nevertheless, this is a complex subject, partly dependent on varied views of what constitutes economic success, and the results should be carefully interpreted when applied to particular cities. It is important to understand what different factors in fact contribute to income and wage growth in particular places.

<sup>20</sup> The project’s modeling approach makes it more likely that we are observing causal effects as distinct from contemporaneous correlation, but note that models cannot definitively establish causation. The project followed the approach (pioneered by Barro in cross-country research and adapted by Glaeser to cities) of regressing change in economic performance on earlier conditions (see Edward Glaeser, “Cities, Information, and Economic Growth,” *Cityscape*, Proc. of the Regional Growth and Economic Development Conference, Vol. 1, No. 1 (August 1994).

<sup>21</sup> All income growth figures are adjusted for inflation using the Consumer Price Index (CPI).

<sup>22</sup> Edward Glaeser, Jose Scheinkman, and Andrei Shleifer, “Economic Growth in a Cross-Section of Cities,” *Journal of Monetary Economics*, Vol. 36 (1995), 117-143.

<sup>23</sup> Highly educated people may more often choose places because of location-specific job prospects; or perhaps the amenities that are most relevant to them are different (theatres not beaches?). *In any event, don’t blame it on the weather.*

<sup>24</sup> For important work on convergence, see Janet Rothenberg Pack, *Growth and Convergence in Metropolitan America*, Brookings Institution Press (Washington, D.C. 2002), and Matthew Drennan, Emmanuel Tobier, and Jonathan Lewis, “The Interruption of Income Convergence and Income Growth in Large Cities in the 1980s,” *Urban Studies*, Vol. 33 (1996), 63-82. For overviews of theories of economic growth that pay particular attention to convergence, see Robert Barro and Xavier Sala-I-Martin, *Economic Growth*, MIT Press (Cambridge, MA 2001). For a less technical discussion, see Joseph Cortright, “New Growth Theory, Technology and Learning: A Practitioner’s Guide,” *Reviews of Economic Development Literature and Practice*, No 4 (2001).

<sup>25</sup> See Matthew Drennan, *The Information Economy and American Cities*, Johns Hopkins University Press (Baltimore, London 2002), p. 112.



<sup>26</sup> See, Philippe Aghion and Peter Howitt, *Endogenous Growth Theory*, MIT Press (Cambridge, MA, 1997); Joseph Cortright, “New Growth Theory, Technology and Learning: A Practitioner’s Guide,” *Reviews of Economic Development Literature and Practice*, No 4 (2001).

<sup>27</sup> See Tables B1 and B3 in Appendix B.

<sup>28</sup> The quadratic function is minimized at \$14,560 in city per capita income, which is almost exactly one standard deviation above the median. Below \$14,560 initial income was negatively related to subsequent growth, while above \$14,560 initial income was positively related to growth. See Appendix B for further discussion of the findings from the base models.

<sup>29</sup> The Wall Street Journal, “Greenspan Weighs Evidence And Finds a Lighter Economy,” <<http://anasazi.umsl.edu/FIN455/NonLinear/GreenspanWeighs.htm>>. Greenspan’s point is that intangible assets are a much greater part of the economies output. Intangible assets inherently entail more knowledge and information resources in their creation and composition.

<sup>30</sup> For a discussion of the impact of new technologies on urban economies, see Rob Atkinson, “Urban Economic Prospects in The New Knowledge Economy,” Progressive Policy Institute and CEOs for Cities (2000).

<sup>31</sup> In the shorter term, growth can occur because, for example, an economy imports innovations, effectively applying somewhere else’s ideas to its resources, but in the long term innovation is the source of all economic growth. See Paul Romer, “Two Strategies for Economic Development: Using Ideas and Producing Ideas,” Proc. of the World Bank Annual Conference on Development Economics (1992).

<sup>32</sup> See Matthew Drennan, *The Information Economy and American Cities*, Johns Hopkins University Press (Baltimore, London 2002), and Section 3 below.

<sup>33</sup> For a succinct and informative overview of the knowledge economy and its implications, see John Houghton and Peter Sheehan, “A Primer on the Knowledge Economy,” Center for Strategic Economic Studies, Victoria University (2000).

<sup>34</sup> See Edward Glaeser, “Are Cities Dying?” *The Journal of Economic Perspectives*, Vol. 12, Issue 2 (Spring 1998), 139-160.

<sup>35</sup> See Richard Florida, *The Rise of the Creative Class and How It’s Transforming Work, Leisure, Community and Everyday Life*, Basic Books (New York, NY, 2002).

<sup>36</sup> Paul Sommers and Daniel Carlson, “What the IT Revolution Means for Regional Economic Development,” Discussion Paper, The Brookings Institution Center on Urban and Metropolitan Policy (February 2003), also discussed in the Business Composition section of this report.

<sup>37</sup> An additional area that is often associated with the knowledge economy is globalization. While the knowledge economy relates to (and particularly is an enabler of) globalization, globalization is a distinct, very substantial and important phenomenon. Though it too has major implications for urban areas, it is beyond the scope of this project.

<sup>38</sup> For an insightful analysis of the role of human capital and education in the context of the knowledge economy, see Michael Fogarty, “Picking a Future: Should Ohio Increase Its Investment in Higher Education?” Prepared for the Ohio Board of Regents (September 1997).

<sup>39</sup> See Edward Malecki, “Hard and Soft Networks for Urban Competitiveness,” *Urban Studies*, Vol. 39, Issues 5-6 (2002), 929-9451.

<sup>40</sup> See, e.g., Paul Sommers and Daniel Carlson, “What the IT Revolution Means for Regional Economic Development,” Discussion Paper, The Brookings Institution Center on Urban and Metropolitan Policy (February 2003); Robert Atkinson, “Urban Economic Prospects in The New Knowledge Economy,” Progressive Policy Institute and CEOs for Cities (2000); and Edward Glaeser, Jed Kolko, and Albert Saiz, “Consumer City,” NBER Working Paper 7790 (July 2000).

<sup>41</sup> This is the case in particular for the variables included in the Metropolitan New Economy Index, developed for the Progressive Policy Institute by Robert Atkinson and Paul Gottlieb. See Robert Atkinson and Paul Gottlieb, “Metropolitan New Economy Index,” Progressive Policy Institute (2001), <[www.neweconomyindex.org/metro](http://www.neweconomyindex.org/metro)>. Data for this index, kindly shared by the authors, is available for 50 MSAs starting in 1997.

<sup>42</sup> See Matthew Drennan, *The Information Economy and American Cities*, Johns Hopkins University Press (Baltimore, London 2002).

<sup>43</sup> The adult population here is defined as the number of people that are at least 25 years old.

<sup>44</sup> This variable (along with the art score, which is described below) comes from the Places Rated Almanac, a publication that ranks 350 metropolitan areas on various factors related to quality of life. See David Savageau, *Places Rated Almanac*, Macmillan (New York, NY, 1997)

<sup>45</sup> This index is based on pupil-teacher ratios in the public K-12 system, effort index in K-12, and academic options in higher education.

<sup>46</sup> David Savageau, *Places Rated Almanac*, Macmillan (New York, NY, 1999)

<sup>47</sup> See Appendix B for the complete model output tables.

<sup>48</sup> See, e.g., Robert Atkinson and Paul Gottlieb, "Metropolitan New Economy Index," Progressive Policy Institute (2001), <[www.neweconomyindex.org/metro](http://www.neweconomyindex.org/metro)>.

<sup>49</sup> These are approximations and should be considered a rule of thumb, given the confidence interval of the estimates. For the exact coefficients, and related standard errors, see regression outputs in Appendix B.

<sup>50</sup> On the other hand, the effect of the percentage of total earnings in the information sector on income (and population) growth was not statistically significant. This could be due to differences in labor force participation between cities that have different concentrations of information sector activities. For instance, it is possible that cities that have a stronger presence of the information sector also tend to have lower employment rates, which would explain why the effect is significant for wages but not for income. Other explanations are of course possible, and the subject deserves further analysis.

<sup>51</sup> As a result, no inferences about causation can be drawn from these simple correlations.

<sup>52</sup> These impacts are what the models predict holding all else equal, which of course would not be the case if an additional 100,000 college graduates were present. The analysis nevertheless demonstrates the general magnitude of the impact.

<sup>53</sup> Indeed, it is likely that these other factors are at least as important to attracting workers. Remember, for example, that college educated population is tending to go to places with worse weather, probably because of other factors.

<sup>54</sup> See Paul Gottlieb, "The Problem of Brain Drain in Ohio and Northeastern Ohio," Center for Regional Economic Issues, Weatherhead School of Management, Case Western Reserve University (2001).

<sup>55</sup> Moreover, Gottlieb argues that universities also contribute to economic development by improving the quality of life of urban areas, increasing the provision of cultural amenities and contributing to diversity and creativity. Local governments should thus support higher education institutions, and strengthen their ability to attract the best students. See Paul Gottlieb, "The Problem of Brain Drain in Ohio and Northeastern Ohio," Center for Regional Economic Issues, Weatherhead School of Management, Case Western Reserve University (2001).

<sup>56</sup> See Michael Fogarty, "Picking a Future: Should Ohio Increase Its Investment in Higher Education?" Prepared for the Ohio Board of Regents (September 1997).

<sup>57</sup> See, e.g., Stephen Cohen, J. Bradford DeLong, and John Zysman, "Spending Smart," *Blueprint: Ideas for a New Century* (Summer 2000) pp. 18-21.

<sup>58</sup> See PPI, *New Economy Policies*

<[http://www.ppionline.org/ppi\\_sub.cfm?knlAreaID=107&subsecID=123](http://www.ppionline.org/ppi_sub.cfm?knlAreaID=107&subsecID=123)>, and National Governor's Association <[http://www.nga.org/center/topics/1,1188,D\\_591,00.html](http://www.nga.org/center/topics/1,1188,D_591,00.html)>.

<sup>59</sup> A recent article by Saul Lach and Mark Schankerman ("Incentives and Invention in Universities," NBER Working Paper No. 9727, 2003) shows that universities that grant higher royalty shares to researchers and academic inventors generate more inventions and higher levels of license income. The study also highlights how universities are an important source of technological innovation, accounting for almost 5 percent of all patent grants in the United States. For another interesting study that touches on the relationship between academic research and knowledge commercialization see Joseph Cortright and Heike Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S.," The Brookings Institution Center on Urban and Metropolitan Policy (January, 2001).

<sup>60</sup> Robert Atkinson, "Urban Economic Prospects in The New Knowledge Economy," Progressive Policy Institute and CEOs for Cities (2000).

<sup>61</sup> See section II.A.2 above. Also see Matthew Drennan, *The Information Economy and American Cities*, Johns Hopkins University Press (Baltimore, London 2002), p. 56-57.

<sup>62</sup> Edward Glaeser, Hedi Kallal, Jose Scheinkman, and Andrei Shleifer, "Growth in Cities," NBER Working Paper 3787 (1991).

<sup>63</sup> Jane Jacobs, *The Economy of Cities*, Random House, (New York, NY, 1969).

<sup>64</sup> Maryann Feldman and David Audretsch, "Innovation in Cities: Science-based Diversity, Specialization and Localized Competition," *European Economic Review*, Vol. 43 (1999) pp. 409-429.

<sup>65</sup> Edward Glaeser, Hedi Kallal, Jose Scheinkman, and Andrei Shleifer, "Growth in Cities," NBER Working Paper 3787 (1991).

<sup>66</sup> See Michael Porter, "Location, Competition, and Economic Development: Local Clusters in a Global Economy," *Economic Development Quarterly*, Vol. 14 No.1 (February 2000) 15-34.

<sup>67</sup> For more precise definition of the term cluster, and for a discussion of the literature around this concept, see Edward Bergman and Edward Feser, "Industrial and Regional Clusters: Concepts and Comparative Applications," *Web Book of Regional Science*, Regional Research Institute, West Virginia University, available at <<http://www.rrri.wvu.edu/WebBook/Bergman-Feser/contents.htm>>.

<sup>68</sup> For a provocative discussion of some of the drawbacks of the clusters framework, see Ron Martin and Peter Sunley, "Deconstructing Clusters: Chaotic Concept or Policy Panacea?" *Journal of Economic Geographyp*, Vol. 3 (2003) 5-35.

<sup>69</sup> Gilles Duranton and Diego Puga, "From Sectoral to Functional Urban Specialization," NBER Working Paper 9112 (2002), available at <<http://www.nber.org/papers/w9112>>.

<sup>70</sup> As a reminder, Drennan looks only at traded (or exported) goods and services, since these are the industries accounting for economic growth, and divides them into two sectors: (1) goods production and distribution; and (2) information. The first sector includes three sets of industries: primary production (e.g. mining); manufacturing; and distribution. The information sector also is divided into three sub-groups: financial producer services (e.g. banks, real estate, insurance); other producer services (e.g. communications, law), and advanced consumer services (e.g. movies, health, education).

<sup>71</sup> For exact formula and methodological discussion, see Matthew Drennan, *The Information Economy and American Cities*, Johns Hopkins University Press (Baltimore, London 2002), pp. 64-65.

<sup>72</sup> This might seem counterintuitive, but cities, and especially large cities, can and often do specialize in more than one sector at the time.

<sup>73</sup> While the concept of industry specialization is defined by a precise mathematical formula, the idea of occupational concentration simply refers to the percentage of workers in any given occupation. No precise threshold was used to determine which cities are concentrated in any given occupation.

<sup>74</sup> A detailed definition of each of these variables is available on the Census website at [www.census.gov](http://www.census.gov).

<sup>75</sup> A box plot shows the distribution of a variable Y (measured on the vertical axis) for each value of a variable X (indicated by the horizontal axis). The line inside each box is the median Y for that value of X; the lines that delimit the box correspond to the 25<sup>th</sup> and 75<sup>th</sup> percentile; the two lines outside of the box are used to identify the outliers, and are conventionally set at a distance of 1.5 times the interquartile range from the 25<sup>th</sup> and 75<sup>th</sup> percentile. Any value beyond these two lines is considered an outlier, and, for sake of simplicity, was not included in these charts.

<sup>76</sup> The effect on wage growth was 0.017 for 1 specialization, 0.028 for 2 specializations, and 0.030 for 3 specializations.

<sup>77</sup> The dots on the chart represent the standardized regression coefficients, while the lines show the confidence interval of the estimates. In this chart, the confidence intervals are drawn at the 95% level.

<sup>78</sup> For evidence of the negative correlation between the share of employment in manufacturing and city income and population growth between 1960 and 1990 see, for example, Edward Glaeser, Jose Scheinkman, and Andrei Shleifer, "Economic Growth in a Cross-Section of Cities," *Journal of Monetary Economics*, Vol. 36 (1995), 117-143.

<sup>79</sup> In interpreting these results, it is important to bear in mind that the effects of these variables are all relative to the effect of Household Services, which was the omitted variable in the model.

<sup>80</sup> See Ross DeVol and Frank Fogelbach, "Best Performing Cities: Where America's Jobs are Created," Milken Institute (June, 2003).

<sup>81</sup> Gilles Duranton and Diego Puga, "Diversity and Specialization in Cities: Why, Where, and When Does It Matter?" CEPR Discussion Paper 2256 (October 1999).

<sup>82</sup> Though both industry and functional concentrations may properly be referred to as "specialization," for purposes of clarity, we refer here to industry "specialization" and to functional "concentration."

<sup>83</sup> Gilles Duranton and Diego Puga, "From Sectoral to Functional Urban Specialization," NBER Working Paper 9112 (2002), available at <<http://www.nber.org/papers/w9112>>.

<sup>84</sup> For a more detailed discussion of the issues outlined in this paragraph, and more compelling empirical evidence, see Gilles Duranton and Diego Puga, “From Sectoral to Functional Urban Specialization,” NBER Working Paper 9112 (2002), available at <<http://www.nber.org/papers/w9112>>.

<sup>85</sup> Specialization has another dimension: its benefits flow from the dynamic interaction, shared ideas, labor, and processes within the group of individuals and firms that are concentrated. Identifying operational connections that define genuine operational concentrations would come next: where are the spillovers, networks and business relationships really happening? This entails understanding locally, in detail, which businesses, functions and people are in fact relating to each other, in terms of everything from supply chains and outsourcing to shared labor, scientific base or other resources.

<sup>86</sup> For an example of how shifts in age, race, and ethnicity could affect housing preferences, see Martha Farnsworth Riche, “The Implications of Changing U.S. Demographics for Housing Choice and Location in U.S. Cities,” Discussion Paper, The Brookings Institution Center on Urban and Metropolitan Policy (March 2001).

<sup>87</sup> Defined as neighborhoods where the poverty rate is 40% or higher.

<sup>88</sup> See Paul Jargowski, “Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s,” The Brookings Institution Center on Urban and Metropolitan Policy (May 2003).

<sup>89</sup> The relationship between income distribution and economic growth is at the center of an ongoing debate in the areas of economics and urban studies. For a review of the different theories and positions, see Saurav Dev Bhatta, “Are Inequality and Poverty Harmful for Economic Growth: Evidence from the Metropolitan Areas of the United States,” *Journal of Urban Affairs*, Vol. 31, Issues 3-4 (2001) 335-359.

<sup>90</sup> Saurav Dev Bhatta, “Are Inequality and Poverty Harmful for Economic Growth: Evidence from the Metropolitan Areas of the United States,” *Journal of Urban Affairs*, Vol. 31, Issues 3-4 (2001) 335-359.

<sup>91</sup> For a review of the literature and empirical evidence on ethnic diversity, see Alberto Alesina and Eliana La Ferrara, “Ethnic Diversity and Economic Performance,” NBER Working Paper 10313 (February 2004).

<sup>92</sup> See Edward Glaeser and Jacob Vigdor, “Racial Segregation in the 2000 Census: Promising News,” The Brookings Institution Center on Urban and Metropolitan Policy (April 2001) For additional research and a longer-term perspective on the issue of segregation, see David Cutler, Edward Glaeser, and Jacob Vigdor, “The Rise and Decline of the American Ghetto,” NBER Working Paper 5881 (January 1997).

<sup>93</sup> See Martha Farnsworth Riche, “The Implications of Changing U.S. Demographics for Housing Choice and Location in U.S. Cities,” Discussion Paper, The Brookings Institution Center on Urban and Metropolitan Policy (March 2001).

<sup>94</sup> William Frey and Ross DeVol, “American Demography in the New Century: Aging Baby Boomers and New Immigrants as Major Players,” Milken Institute Policy Brief, No. 9 (March 2000).

<sup>95</sup> Dianne Schmidley, “Profile of the Foreign-Born Population in the United States: 2000,” U.S. Census Bureau, Current Population Reports, Series P23-206, U.S. Government Printing Office (Washington, DC, 2001). William Frey (“Metropolitan Magnets for International and Domestic Migrants,” The Brookings Institution Center on Urban and Metropolitan Policy. October 2003) makes a similar point, observing that the largest metropolitan areas in the United States gained the greatest number of immigrants during the late 1990s. At the same time, Frey notes that these areas also lost the most domestic migrants, attracted by “magnet” cities in the Southeast and West, such as Phoenix, Atlanta and Las Vegas.

<sup>96</sup> For a detailed analysis of the effects of aging baby boomers on the demography of the nation, see William Frey and Ross DeVol, “American Demography in the New Century: Aging Baby Boomers and New Immigrants as Major Players,” Milken Institute Policy Brief, No. 9 (March 2000). For broader analysis of the significance of changing age demographics, see David Foot, *Boom Bust & Echo 2000: Shifting the Demographic Shift in the New Millennium*, Macfarlane Walter & Ross (Toronto, 1996).

<sup>97</sup> See US Department of Housing and Urban Development, “State of the Cities 2000: Megaforces Shaping the Future of the Nation’s Cities,” (Washington, DC, June 2000).

<sup>98</sup> A more detailed and technical explanation is available at <<http://mathworld.wolfram.com/GiniCoefficient.html>>.

<sup>99</sup> Data on the Gini coefficient for MSAs was generously made available to the project by Saurav Dev Bhatta.

<sup>100</sup> For a more technical description of this index, see Jacob Vigdor, “Locations, Outcomes, and Selective Migration,” *The review of Economics and Statistics*, Vol. 84, Issue 4 (2002), 751-755.

<sup>101</sup> For a more detailed discussion of these two measures, see David Cutler, Edward Glaeser, and Jacob Vigdor, “The Rise and Decline of the American Ghetto,” NBER Working Paper 5881 (January 1997).

<sup>102</sup> These race proportion estimates must be interpreted with caution, due to changes in the way the Census measures race.

<sup>103</sup> See Roberto Suro and Audrey Singer, “Latino Growth in Metropolitan America: Changing Patterns, New Locations”, The Brookings Institution Center on Urban and Metropolitan Policy and The Pew Hispanic Center (July 2002).

<sup>104</sup> Edward Glaeser and Jacob Vigdor, “Racial Segregation in the 2000 Census: Promising News,” The Brookings Institution Center on Urban and Metropolitan Policy (April 2001).

<sup>105</sup> A high degree of correlation among the independent variables will inflate the standard errors.

<sup>106</sup> See also Janet Rothenberg Pack, *Growth and Convergence in Metropolitan America*, Brookings Institution Press (Washington, D.C. 2002), Chapter 3.

<sup>107</sup> See Ira Harkavy and Harmon Zuckerman, “Eds and Meds: Cities Hidden Assets,” The Brookings Institution Center on Urban and Metropolitan Policy (August 1999).

<sup>108</sup> As noted, it is also quite possible that the non-significance of diversity for the top 100 cities may be due to smaller sample size.

<sup>109</sup> See Josè Lobo and David Smole, “Stratification and Spatial Segregation of Human Capital as Determinants of Metropolitan Productivity in the United States,” *Urban Studies*, Vol. 39, No. 3 (2002) 529–547.

<sup>110</sup> In order to refine this measure, the model also included an interaction effect between percentage foreign born and a dummy variable for cities with above-average education: neither the main effects nor the interaction term proved to be statistically significant for city income growth and wage growth, and only the percentage of foreign born (but not the interaction term) had a negative and significant effect on MSA income growth.

<sup>111</sup> The subject of what local characteristics attract and retain younger age groups is also discussed with respect to the quality of life variables in the Knowledge Economy dimension.

<sup>112</sup> The term “edge city” refers to places that contain all the functions of a city but are located far from downtown. See Joel Garreau, *Edge City*, Doubleday (New York, NY, 1991); Richard Bingham and Deborah Kimble, “The Industrial Composition of Edge Cities and Downtowns: The New Urban Reality,” *Economic Development Quarterly*, Vol. 9 Issue 3 (August 1995) 259-273.

<sup>113</sup> See Bruce Katz, “Smart Growth: The Future of the American Metropolis?” London School of Economics, CASE paper 58 (July 2002).

<sup>114</sup> See Edward Glaeser and Jesse Shapiro, “City Growth and the 2000 Census: Which Places Grew, and Why,” The Brookings Institution Center on Urban and Metropolitan Policy (May 2001).

<sup>115</sup> See, e.g., George Galster, Royce Hanson, Michael Ratcliffe, Harold Wolman, Stephen Coleman, and Jason Freihage, “Wrestling Sprawl to the Ground: Defining and Measuring an Elusive Concept,” *Housing Policy Debate*, Vol. 12, Issue 4 (2001).

<sup>116</sup> Reid Ewing, Rolf Pendall, and Don Chen, “Measuring Sprawl And Its Impact,” Smart Growth America, available at <[www.smartgrowthamerica.org](http://www.smartgrowthamerica.org)>. The measures elaborated for the Smart Growth America report have generated some controversy, which this project is not trying to address.

<sup>117</sup> See, Stephen Malpezzi and Wen-Kai Guo, “Measuring Sprawl: Alternative Measures of Urban Form in U.S. Metropolitan Areas,” The Center for Urban Land Economic Research, The University of Wisconsin (2001) <<http://wiscinfo.doit.wisc.edu/realestate>>.

<sup>118</sup> Both indexes were computed using principal component analysis. For explanation, see Reid Ewing, Rolf Pendall, and Don Chen, “Measuring Sprawl And Its Impact,” Smart Growth America, p. 30, and Stephen Malpezzi and Wen-Kai Guo, “Measuring Sprawl: Alternative Measures of Urban Form in U.S. Metropolitan Areas,” The Center for Urban Land Economic Research, The University of Wisconsin (2001), p. 10.

<sup>119</sup> For a complete list of the variables included in this index see Reid Ewing, Rolf Pendall, and Don Chen, “Measuring Sprawl And Its Impact,” Smart Growth America, p.28-30.

<sup>120</sup> For a more detailed description of the methodology, see Stephen Malpezzi and Wen-Kai Guo, “Measuring Sprawl: Alternative Measures of Urban Form in U.S. Metropolitan Areas,” The Center for Urban Land Economic Research, The University of Wisconsin (2001).

<sup>121</sup> See William Fulton, Rolf Pendall, Mai Nguyen, and Alicia Harrison, “Who Sprawls Most,” The Brookings Institution Center on Urban and Metropolitan Policy (July 2001), for detailed analysis.

<sup>122</sup> This could explain, for instance, the negative effect recorded for the density factor, which suggests that at least in some places (such as Austin or Las Vegas) the benefits associated with booming growth outweighed the costs of lower density.

<sup>123</sup> This dimension, of course, has non-economic impacts as well. These impacts, extensively documented in the literature on sprawl, might make it a critical dimension to address regardless of its immediate economic significance. For instance, a discussion of the impacts of sprawl on the environment and on quality of life can be found in The Sierra Club, “1998 Sprawl Report,” available at <<http://www.sierraclub.org/sprawl/report98/>>; and in Reid Ewing, Rolf Pendall, and Don Chen, “Measuring Sprawl And Its Impact,” Smart Growth America, available at <[www.smartgrowthamerica.org](http://www.smartgrowthamerica.org)>.

<sup>124</sup> For a study of job location patterns, see Edward Glaeser, Matthew Kahn, and Chenghuan Chu, “Job Sprawl: Employment Location in U.S. Metropolitan Areas,” The Brookings Institution Center on Urban and Metropolitan Policy (May 2001).

<sup>125</sup> See, e.g., Natalie Cohen, “Business Location Decision-Making and the Cities: Bringing Companies Back,” Working Paper, The Brookings Institution Center on Urban and Metropolitan Policy (April 2000), and Edward Glaeser, Jed Kolko, and Albert Saiz, “Consumer City,” NBER Working Paper 7790 (July 2000).

<sup>126</sup> For a discussion and economic modeling of optimal city size, see J. Vernon Henderson, “The Sizes and Types of Cities,” *The American Economic Review*, Vol. 64, Issue 4 (September 1974) 640-656.

<sup>127</sup> It is likely that closer examination will reveal that sprawl effects are not just nonlinear, but locally idiosyncratic. As a result, this dimension may particularly require local assessment and analysis.

<sup>128</sup> Figure from Surface Transportation Policy Project, reported in Bruce Katz, “Smart Growth: The Future of the American Metropolis?” London School of Economics, CASE paper 58 (July 2002).

<sup>129</sup> See, for example, the Location Efficient Mortgage, developed by the Center for Neighborhood Technology, <[www.cnt.org](http://www.cnt.org)>.

<sup>130</sup> See the next section for definitions, issues and findings concerning the regional dimension of urban economies.

<sup>131</sup> See Mark Muro and Robert Puentes, “Investing in a Better Future: A Review of the Fiscal and Competitive Advantages of Smarter Growth Development Patterns,” Discussion Paper, The Brookings Institutions Center on Urban and Metropolitan Policy (March 2004).

<sup>132</sup> While cities and suburbs are political entities, MSAs are economic entities, roughly capturing the regional economy.

<sup>133</sup> For a critical review of these arguments, see Neal Pierce, *Citistates: How Urban America Can Prosper in a Competitive World*, Seven Locks Press (Washington, DC, 1993), p. 21.

<sup>134</sup> See Robert Fishman, “Bourgeois Utopias: Visions of Suburbia”, from *Bourgeois Utopias: The Rise and Fall of Suburbia*, Basic Books, (New York, NY, 1987).

<sup>135</sup> See Joel Garreau, *Edge City*, Doubleday (New York, NY, 1991); Richard Bingham and Deborah Kimble, “The industrial composition of edge cities and downtowns: The New Urban Reality,” *Economic Development Quarterly*, Vol. 9 Issue 3 (August 1995) 259-273.

<sup>136</sup> See Peter Dreier, John Mollenkopf, and Todd Swanstrom, *Place Matters: Metropolitics for the Twenty-First Century*, University Press of Kansas, (Lawrence, KA, 2001).

<sup>137</sup> Manuel Pastor Jr., Peter Dreier, J. Eugene Grisby III, and Marta Lopez-Garza, *Regions That Work: How Cities and Suburbs Can Grow Together*, University of Minnesota Press, (Minneapolis, MN, 2000).

<sup>138</sup> Similar arguments are made by David Rusk, *Cities Without Suburbs*, The Woodrow Wilson Center Press (Washington, DC, 1993), and Myron Orfield, *Metropolitics: A Regional Agenda for Community and Stability*, Brookings Institution Press (Washington, DC, 1997).

<sup>139</sup> See Manuel Pastor Jr., Peter Dreier, J. Eugene Grisby III, and Marta Lopez-Garza, *Regions That Work: How Cities and Suburbs Can Grow Together*, University of Minnesota Press, (Minneapolis, MN, 2000); Peter Dreier, John Mollenkopf, and Todd Swanstrom, *Place Matters: Metropolitics for the Twenty-First Century*, University Press of Kansas, (Lawrence, KA, 2001); Robert Weissbourd and Christopher Berry, “Cities and Economic Prosperity,” available at <[www.CEOsforCities.org](http://www.CEOsforCities.org)>.

<sup>140</sup> For a particularly thoughtful overview of these arguments, see Peter Calthorpe and William Fulton, *The Regional City*, Island Press (Washington, DC, 2001), pp. 1-30.

<sup>141</sup> See Andrew Haughwout and Robert Inman, "Should Suburbs Help Their Central Cities?" in William Gale and Janet Rothenberg Pack, eds, *Brookings-Wharton Papers on Urban Affairs*, pp. 45-88 (2002), available at <<http://www.newyorkfed.org/rmaghome/economist/haughwout/citysubbrookings.pdf>>.

<sup>142</sup> See Charles Adams and Howard Fleeter, "Flight from blight and metropolitan suburbanization revisited," *Urban Affairs Review*, Vol. 31 Issue 4 (March 1996) 529-544.

<sup>143</sup> Curtis Simon, "Human Capital and Metropolitan Employment Growth," *Journal of Urban Economics*, Vol. 43, Issue 2 (1998).

<sup>144</sup> See Richard Voith, "Do Suburbs Need Cities?" *Journal of Regional Science*, Vol. 38, Issue 3 (1998) 445-464.

<sup>145</sup> See, e.g., Bennett Harrison, "It Takes a Region (Or Does It?)," in *Urban-Suburban Interdependencies*, Rosalind Greenstein and Wim Wiwel, eds., Lincoln Institute of Land Policy (Cambridge, MA, 2000); as well as research discussed in the Interpretations section below.

<sup>146</sup> Government fragmentation is a potentially important factor, considering that while regions might be economically integrated, they are also organized into innumerable political units, including not just cities and suburbs, but other governmental units like water districts and school boards. The Chicago metropolitan area, for example, encompasses 272 cities and villages, and literally thousands of smaller governmental units.

<sup>147</sup> Even when the project relaxed the Granger causality test and used city income growth between 1990 and 2000 to predict suburban growth between 1990 and 2000, no effect was found.

<sup>148</sup> Defined as the difference between the poverty rate in the central city and the poverty rate in the suburbs.

<sup>149</sup> Alan Berube and William Frey, "A Decade of Mixed Blessings: Urban and Suburban Poverty in Census 2000," *The Brookings Institution Center on Urban and Metropolitan Policy* (August 2002).

<sup>150</sup> *Ibid.*

<sup>151</sup> See Roberto Suro and Audrey Singer, "Latino Growth in Metropolitan America: Changing Patterns, New Locations", *The Brookings Institution Center on Urban and Metropolitan Policy and The Pew Hispanic Center* (July 2002).

<sup>152</sup> The idea of "global cities", for instance, relies precisely on the ties between the city and the world economy, in the context of globalized international markets. For an illustration of this concept, see Janet Abu-Lughod, *New York, Chicago, Los Angeles: America's Global Cities*, University of Minnesota Press (Minneapolis, MN, 1999), and Saskia Sassen, *The Global City: New York, London, Tokyo*, Princeton University Press (Princeton, NJ, 1991).

<sup>153</sup> In the globalized economy, it is sometimes argued that regions are big enough to compete internationally, but still small enough to benefit from network and agglomeration economies. More specifically, regions may offer a minimum size at which markets and business networks achieve the economies of scale necessary to compete in international markets. At the same time, regions are small enough to provide the geographic proximity of firms which promotes the repeated interactions and mutual trust needed to sustain collaboration, facilitate innovation, and increase productivity. In effect, regions are big enough to constitute a fairly complete economic unit, and small enough to still be one unit. Many markets, such as labor, finance, and housing, just to name a few, now tend to operate at a regional level, and are best analyzed and understood in a regional context. See, e.g., Annalee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Harvard University Press (Cambridge, MA, 1994); Manuel Pastor Jr., Peter Dreier, J. Eugene Grisby III, and Marta Lopez-Garza, *Regions That Work: How Cities and Suburbs Can Grow Together*, University of Minnesota Press, (Minneapolis, MN, 2000); Pierre-Paul Proulx, "Cities, Regions, and Economic Integration in North America," in Richard Harris, ed., *North American Linkages: Opportunities and Challenges for Canada*, University of Calgary Press (Calgary, 2003).

<sup>154</sup> This view of the cities and suburbs as parts of one regional economy is also consistent with Pastor's distinct argument for regionalism: that places that address the inequities within the region will be more likely to succeed, as they will be able to leverage all of the available resources of the entire region in the process of economic growth. Note that the findings about the negative effects of inequality described in the Demographics section are consistent with Pastor's argument.

<sup>155</sup> See Keith Ihlanfeldt, "The Importance of the Central City to the National and Regional Economy: A Review of the Arguments and Empirical Evidence," *Cityscape*, Vol. 1, No. 2 (June 1995).

<sup>156</sup> See Janet Rothenberg Pack, *Growth and Convergence in Metropolitan America*, Brookings Institution Press (Washington, D.C. 2002). In particular, the Appendix B of this book (p. 185) offers a useful review of the literature on intrametropolitan linkages.

<sup>157</sup> Research on the linkages between labor and jobs found that a substantial percentage of suburban earnings come from employment in the central city, meaning that suburban residents rely on city jobs and city employers rely on suburban labor (Joseph Persky, Elliot Sclar, and Wim Wiewel, *Does America Need Cities? An Urban Investment Strategy for National Prosperity*, Economic Policy Institute (Washington, DC, 1991).

<sup>158</sup> See Alex Schwartz, "Corporate Service Linkages in Large Metropolitan Areas: A Study of New York, Los Angeles, and Chicago," *Urban Affairs Quarterly*, vol. 28, no. 2 (1992) 276–296. According to this study, for example, in 1990, 91% of the major corporations located in the suburbs of Chicago used banking services based in the central city; similarly, 67% of the companies in the New York suburbs used legal counseling services located within the central city.

<sup>159</sup> For an example of how a regional approach could help shape and inform policies that address transportation and smart growth issues, see Anthony Downs, "The Need for Regional Anti-Congestion Policies," *The Brookings Institution Center on Urban and Metropolitan Policy* (February 2004).

<sup>160</sup> See, e.g., Melvin Oliver and Thomas Shapiro, *Black Wealth/White Wealth*, Routledge (NY, NY 1995), pp 15-18.

<sup>161</sup> See, e.g., Janice Fanning Madden, "Jobs, Cities, and Suburbs in the Global Economy," *Annals, AAPSS*, 572 (November 2000).

<sup>162</sup> Joseph Cortright and Heike Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S.," *The Brookings Institution Center on Urban and Metropolitan Policy* (January, 2001).

<sup>163</sup> See, e.g., Edward Glaeser, Jed Kolko, and Albert Saiz, "Consumer City," *NBER Working Paper 7790* (July 2000), and Knowledge Economy Section above.

<sup>164</sup> For further discussion of these issues, see Edward Glaeser et al., "Growth in Cities," *NBER Working Paper 3787* (July 1991); Edward Malecki, "Hard and Soft Networks for Urban Competitiveness," *Urban Studies*, Volume 39, Nos 5-6 (2002), 929-945; John Houghton and Peter Sheehan, "A Primer on the Knowledge Economy," *Center for Strategic Economic Studies, Victoria University* (2000); John Seely Brown and Paul Duguid, *The Social Life of Information*, Harvard University Business School Press (Boston 2002).

<sup>165</sup> See, Paul Romer, "Two Strategies for Economic Development: Using Ideas and Producing Ideas," *Proc of the World Bank Annual Conference on Development Economics* (1992).

<sup>166</sup> The cluster analysis was conducted using the methods described in Eisen, M. B., Spellman, P. T., Brown, P. O., and Botstein, D., "Cluster analysis and display of genome-wide expression patterns.," *Proc Natl Acad Sci USA* 95 (1998), 14863–14868.

<sup>167</sup> The complete output of the taxonomy, along with a brief description of each cluster, is available in Appendix D.

<sup>168</sup> The same applies to the variables included in the taxonomy: variables that are closer together in the chart tend to be correlated to each other and have similar values in the same cities.

<sup>169</sup> While the average income growth was similar in both clusters, its distribution was slightly different. In particular, cities in cluster 8 exhibited more variation in their income growth, which ranged from 5% in Baltimore to 17% in Cincinnati. Cleveland's income growth was 14%; Portland's was 15%.

<sup>170</sup> For example, Public Use Micro Sample (PUMS) Census data combined with data available from organizations such as the College Board would address many of these questions. Often, other local sources exist to supplement these. Some original survey work could easily supplement and further customize the analysis.

<sup>171</sup> Specialization has another dimension: its benefits flow from the dynamic interaction, shared ideas, labor and processes within the "cluster" that is specialized. Identifying operational connections that define genuine clusters would come next: where are the spillovers, networks and business relationships really happening? This entails understanding locally, in detail, which businesses, functions and people are in fact relating to each other, in terms of everything from supply chains and outsourcing to shared labor, scientific base or other resources.

<sup>172</sup> Varied specialized data sets might shed some light on regional linkages. For example, on the consumer side, journey to work and tract to tract commuting flows data from the Census can show what percentage of the people who work in the city live in the suburbs, and conversely what percentage of the people who



work in the suburbs live in the city. On the business side, looking at business-to-business relationships, SEC (Securities and Exchange Commission) filings can provide valuable data on the location of the major professional service providers for each publicly owned company.

<sup>173</sup> Such a survey would not be extravagant: it would require only a modest sample, and respondents could easily be identifiable through post office or real estate databases.

<sup>174</sup> See Paul Gottlieb, "The Problem of Brain Drain in Ohio and NorthEastern Ohio," Center for Regional Economic Issues (Case Western Reserve University 2001).

<sup>175</sup> For particularly thoughtful analysis of these issues, see Michael Fogarty, "Picking a Future: Should Ohio Increase Its Investment in Higher Education?" Prepared for the Ohio Board of Regents (September 1997).

<sup>176</sup> See Joseph Cortright and Heike Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S.," The Brookings Institution Center on Urban and Metropolitan Policy (January, 2001).

<sup>177</sup> See Robert Atkinson, "Urban Economic Prospects in The New Knowledge Economy," Progressive Policy Institute and CEOs for Cities (2000).

<sup>178</sup> See, e.g., George Galster, Royce Hanson, Michael Ratcliffe, Harold Wolman, Stephen Coleman, and Jason Freihage, "Wrestling Sprawl to the Ground: Defining and Measuring an Elusive Concept," *Housing Policy Debate*, Vol. 12, Issue 4 (2001); Stephen Malpezzi and Wen-Kai Guo, "Measuring Sprawl: Alternative Measures of Urban Form in U.S. Metropolitan Areas," The Center for Urban Land Economic Research, The University of Wisconsin (2001); and Reid Ewing, Rolf Pendall, and Don Chen, "Measuring Sprawl And Its Impact," Smart Growth America.