

The Economic Role of Cities in the 21ST Century

BY GERALD A. CARLINO

A

s real income increases, the demand for a greater variety of goods and services becomes a more important determinant of where people choose to live. This implies that large cities with more choices will attract high-income households that value variety. Members of these high-income households also tend to be high-skill individuals. Their presence supports cities' new function as incubators of new ideas and innovation. In "The Economic Role of Cities in the 21st Century," Jerry Carlino focuses on the economic activities that make firms in cities more productive and that make cities more attractive to urban households.

What is the role of cities in the 21st century economy? In earlier times, cities grew near transportation hubs, such as ports and railroad yards. To minimize transportation costs, firms needed to be near these hubs, and workers needed to live close to their employers to maintain reasonable commuting distances. Thus, firms and households tended to be highly concentrated in cities. These so-called

agglomeration economies — the efficiency and cost savings that result from being close to suppliers, workers, and customers — were an important factor in the rise of cities as manufacturing centers.

Agglomeration economies tended to support mostly the production side of the economy. That is, proximity to inputs into the production process led to gains in output. However, improvements in transportation technology mean that, today, firms are freer to locate wherever they want, and, unlike before, their choice of location will depend on where their workers choose to live. This means that an area's special features, such as its climate, will be important determinants of where households, and ultimately firms, locate.

As a result, agglomeration economies are increasingly concentrated on the consumption side. Rising real incomes mean that quality-of-life issues have become more and more important as determinants of where people choose to live. For example, growth in real income increases the demand for a greater variety of goods and services (more theaters, varied restaurant cuisine, and professional sports teams). Similarly, access to recreational amenities and better public services, such as good public schools, are also important quality-of-life issues for households.

This implies that large cities with more choices will attract high-income households that put a high value on variety. Members of these high-income households also tend to be high-skill individuals. Their presence supports cities' new function as incubators of new ideas and innovation.

To answer our question about cities' role in the 21st century economy, we will discuss some of the economic functions of cities, focusing on economic activities that make firms in cities more productive and that make cities more attractive to urban households.

AGGLOMERATION ECONOMIES IN URBAN PRODUCTION

While the discussion in this article will emphasize agglomeration economies' role in urban consumption, historically, their biggest influence has been on the production side.

Agglomeration economies constitute an important source of a firm's productivity. Increases in productivity due to agglomeration economies depend not on the size of the firm itself



Jerry Carlino is a senior economic advisor and economist in the Research Department of the Philadelphia Fed.

(internal economies of scale),¹ but rather on the size of a firm's industry in a particular city (localization economies) or on the size of the city itself (urbanization economies).

Localization. The presence of an industry in a particular city could be the result of the available natural resources or simply historical accident. But once an industry develops in a city, other firms in that industry often reap considerable benefits by also locating there.

One advantage is sharing inputs. Consider, for example, the high-tech industry in Silicon Valley, the TV and motion picture industry in Los Angeles, and the auto industry in Detroit — three industries that have concentrated in certain locations. Many production companies in the TV industry, for example, frequently require the services of highly specialized workers, such as people who specialize in writing and editing scripts; workers who specialize in lighting, sound recording, special effects, and set design and construction; and talent agencies and firms that engage in market research.

The need to have quick access to these types of specialists is particularly important in the production of TV shows, and consequently, many of these specialists must be on or near the production set. A production company located far from Los Angeles would need to employ full-time script editors or sound and lighting personnel and set designers, for example, or else spend considerable time and money bringing them from a distance when they are needed. But when TV produc-

tion companies cluster together, their combined needs for highly specialized inputs can support at least one firm that specializes in set design, others that specialize in script analysis, and so on. Thus, these services are available at lower cost from a local firm. All production companies in the cluster can enjoy a lower average cost of production by contracting for these specialized services only when they are needed.

A common labor pool allows firms to more effectively adjust their demand for labor to match fluctuations in the demand for their products.

There also are advantages to sharing a common labor pool in cities. These advantages arise from the uncertainty and variability in any one firm's demand for workers. If a firm is uncertain about the number and skill mix of workers it will hire, the firm has an incentive to cluster with other firms in its industry to draw from a common pool of workers. A common labor pool allows firms to more effectively adjust their demand for labor to match fluctuations in the demand for their products.

Consider our example of the TV industry once again. Producers of TV programs are never quite sure if a new show will be successful. But as economist Arthur O'Sullivan has noted, "When it becomes clear which programs will be discontinued, actors and technicians move from the unsuccessful programs to the successful ones. The concentration of the television industry in Los Angeles and New York facilitates the transfer of labor from one firm to another."

Common labor pools are also of value to workers as well. If any one firm in the cluster is unsuccessful and

lays off workers, these unemployed workers are likely to be hired by one of the other, more successful firms in that cluster.²

In addition to reducing the employment risk of workers and firms, labor market pooling also facilitates the matching of workers and jobs. Having a large pool of workers in an area makes it easier for employers to find people with the set of characteristics they need. At the same time, workers

are more likely to find jobs that better match their experience and skills. Therefore, having a large pool of workers in an area facilitates the number and quality of matches between firms' needs and workers' skills.

Urbanization. Not only does the size of a firm's industry in a city matter but so does the size of the city itself. Just as some kinds of businesses, such as a set-design firm, are found only where specific industries concentrate, other activities, such as financial and business services, are generally found only in urban areas. Often, only a large city can provide a client base sufficient for these specialized firms to flourish. These types of specialized services give rise to economies of scale, called urbanization economies, that are external to any one firm and its industry.

Urbanization brings greater efficiency, but it also brings problems that eventually offset the gains in efficiency. According to the traditional view, as

¹Economists have long recognized that a firm's size can affect its productivity. As a firm increases its size, it can increase productivity by having its workers specialize in particular tasks or by using its capital equipment more efficiently. In these situations, a firm is said to enjoy *internal* economies of scale.

² See the article by Satyajit Chatterjee for further discussion of the advantages of labor market pooling.

cities become more congested, the increased cost of doing business (for example, in the form of higher business rents) will eventually offset any gains in agglomeration economies from additional growth. At that point, existing firms have no incentive to expand production, and new firms will not be enticed to locate in the city. The city's level of population, employment, and output will have stabilized at a certain point.

Recently, economists have focused on a new view: The creation of ideas in cities can lead to *sustained growth* in the output of urban firms even if population and employment are not expanding. The basic theory is that the higher density of population and employment in cities promotes the exchange of ideas among individuals, which economists call knowledge spillovers. The high concentration of people, especially highly skilled people, in cities creates an environment in which ideas move quickly from person to person. It's likely that some of these ideas lead to new goods and to new ways of producing existing goods.³

To the extent that firms more readily adopt innovations that are local, they may be able to produce more output without having to increase the level of inputs into production. In this instance, generating ideas has become an important source of growth, and proximity to individuals who create knowledge is becoming increasingly important to firms. Thus, urban locations' advantages for firms have shifted from proximity to suppliers and customers to proximity to highly skilled workers.

³ See my 2001 *Business Review* article and my paper with Satyajit Chatterjee and Robert Hunt for further discussion of the role of knowledge spillovers in cities.

EVIDENCE ON PRODUCTION BENEFITS OF CITIES

In their 2001 research, economists Stuart Rosenthal and William Strange studied the importance of input sharing, labor market pooling, and knowledge spillovers for manufacturing firms

The decline in the importance of agglomeration economies to firms does not mean that the clustering of people and jobs is no longer important to cities.

at the state, county, and zip code levels. Among the sources Rosenthal and Strange considered, labor market pooling has a strong impact on geographic concentration of manufacturing firms at all of these levels. They also found that other types of input sharing, such as intermediate inputs and natural resources, influence the concentration of manufacturing firms at the state level but have no effect on concentration of manufacturing firms at the county or zip code levels. The effects of knowledge spillovers on the concentration of manufacturing firms tend to be more localized, influencing concentration only at the zip code level.

While Rosenthal and Strange's attempt to identify the relative importance of the various forces that gave rise to the spatial concentration of firms, the vast majority of research to date has tended to analyze the relationship between urban productivity and city size. In a 1976 study, David Segal analyzed the change in urban productivity related to the size of a metropolitan area.⁴ He found that, on average, metropolitan areas with more

⁴ The change in urban productivity is the amount by which output would increase as a result of increasing population in a city, with all inputs held constant.

than 2 million people are 8 percent more productive than metropolitan areas with less than 2 million people. In more productive cities, firms can afford to pay higher wages. At the same time, households and firms are drawn to relatively high productivity cities.

Thus, rents may also rise in these cities. In sum, if the concentration of people and jobs in cities is largely related to urban productivity, both wages and rents should increase with city size.

AGGLOMERATION ECONOMIES IN URBAN CONSUMPTION

Despite agglomeration economies' historical importance to the production side of urban economies, innovations in transportation, production, and communication technologies have weakened the economic advantage of locating closely related activities near one another. However, the decline in the importance of agglomeration economies to firms does not mean that the clustering of people and jobs is no longer important to cities. As we'll see, urban locations are still important to 21st century households.

If consumers prefer a large variety of goods and services and there are substantial economies of scale in providing them, the number of different goods and services offered and consumers' economic welfare will depend on the size of the local market.

Cultural and leisure activities offer good examples. As a hypothetical example, consider professional football, a good with relatively low per capita demand. Suppose that to break even,

the club must sell 30,000 tickets per game, or 240,000 tickets per season (based on eight home games per year). If, on average, 20 percent of a metropolitan area's residents attend a game, a metropolitan area of 1.2 million people is required to support the football team. But as a metro area's population increases, the demand for variety in professional sports teams also increases. The greater New York metropolitan area has a population of almost 20 million people and is home to nine professional sports teams in the four major sports (baseball, football, basketball, and hockey). Large metropolitan regions such as Los Angeles, Chicago, and Philadelphia support at least four teams each. With a population of only about 1 million to 1.5

million, Orlando, Hartford, and Jacksonville support one major professional sports team each (see the table).

In addition to greater variety, the quality of a good or service may improve with the population size of an area. To continue the sports analogy, economist Rodney Fort has noted that large-market teams win much more frequently than do small-market teams. The New York Yankees, a large-market team, are a post-season fixture, whereas the small-market Pittsburgh Pirates have not made the playoffs since 1992. Fort points out that teams with a large fan base earn more revenue for any given level of quality. Teams in large markets can outbid small-market teams for the best players, since large-market teams can earn more revenue from

these players than do teams in small markets. The same must be true for other types of consumer goods and leisure activities, such as theaters, orchestras, and restaurants.⁵

Rising Income. In the 55 years between 1947 and 2002, per capita income adjusted for inflation (that is, real income) almost doubled in the United States. The rise in real income has led to more demand for goods and services, especially luxury goods, such as meals in gourmet restaurants and live theater, which are more plentiful in large cities.⁶ Thus, the greater variety in consumption found in large cities is especially attractive to households as their wealth increases.⁷ Similarly, rising incomes should increase the value that people (especially high-skill individuals) place on amenities, such as good weather.

In a 2004 study, Sanghoon Lee contended that the demand for variety may increase more than proportionately with income. That is, a 1 percent increase in income leads to more than a 1 percent increase in the demand for variety. Lee went one step further and

TABLE

Big Metro Areas Offer Diversity of Sports

Metro Area	No. of Teams	Population (Millions)
New York	9	19.9
Los Angeles	5	15.6
Chicago	5	8.6
Washington-Baltimore	5	7.2
San Francisco-Oakland-San Jose	6	6.7
Philadelphia	4	6.0
Boston	4	5.8
Detroit	4	5.4
Dallas-Ft. Worth	4	4.7
Houston	3	4.3
Atlanta	3	3.6
Cleveland	3	2.9
Pittsburgh	3	2.4
Cincinnati	2	1.9
Kansas City	2	1.7
Indianapolis	2	1.5
Orlando	1	1.5
Hartford	1	1.1
Jacksonville	1	1.0

Source: Rodney D. Fort. *Sports Economics*. New Jersey: Prentice Hall Publishers, 2003, Table 2-2. Used with permission.

⁵ Leonard Nakamura discusses how innovation in retailing (introduction of scanner technology) led to larger supermarkets (superstores) that offer greater variety to their customers (bakeries, banking, pharmacies, as well as greater variety on the shelves). A number of studies by Joel Waldfogel and co-authors have shown that larger cities have more and better newspapers and more and better radio and television stations.

⁶ One key feature of goods such as these is that it's difficult to transport them; therefore, they are referred to as nontraded goods and services. While people can travel to cities offering an abundance of nontraded goods and services, there is little substitution for living in the cities, or their environs, if people value convenient access to nontraded goods and services.

⁷ See, for example, the articles by Jan Brueckner, Jacques-Francois Thisse, and Yves Zenou; Edward Glaeser, Jed Kolko, and Albert Saiz; and Dwight Adamson, David Clark, and Mark Partridge.

argued that since high-skill workers earn more than low-skill workers, high-skill workers will account for a larger share of the work force in large cities and a smaller share in small cities and rural areas.⁸

Other Factors. Economists Ed Glaeser, Jed Kolko, and Albert Saiz point out three other ways in which large cities enhance consumption opportunities. Large cities may provide a greater variety of public goods, too, such as more magnet schools per student (e.g., schools specializing in fine and performing arts, or those specializing in science). Furthermore, large cities make it easier for individuals to make wider social contacts and to have a more diverse set of friends. Along this line, large cities appeal to younger, more highly educated workers because large cities facilitate better development of professional and social connections than small cities and rural areas. Economists Dora Costa and Matt Kahn note that “power couples” (both partners have bachelor’s degrees) are increasingly locating in large cities because large cities offer better employment opportunities for working couples. Finally, large cities may satisfy aesthetic preferences, such as the variety of architecture found in many large cities or the artistic scene in places such as New York City.

Of course, as with the production side of the urban economy, urbaniza-

tion brings not only a greater variety of goods and services but also problems, such as congestion, that take the form of long-distance commuting and higher housing costs, which eventually balance the gains in variety. The higher cost of housing as cities become congested reduces households’ purchasing power and limits the inflow of people.

MORE EVIDENCE ON THE BENEFITS OF CITIES

The value of a city’s special traits, such as pleasant weather or the variety of consumption options, is determined by what people are willing to pay in order to live there. This amounts to the sum of what people are willing to pay for each local characteristic that adds to the quality of life in an area. The trick is to determine the prices of these local traits, since they are not bought and sold in markets.

Even though there is no explicit price for local amenities such as nice weather or greater variety, there is an *implicit* price. Suppose you are considering moving either to Metropolis, which offers its residents great variety in consumption, or to Smallville, which has far less variety than Metropolis. Because variety is something you value, you are willing to pay some extra amount, say, \$1000 a year, to live in Metropolis.

You could pay your extra \$1000 in two ways. One is by bidding up land prices, and ultimately rents, in Metropolis relative to Smallville. But it is not necessarily the case that you will ultimately pay \$1000 more to rent a house in Metropolis. Part of the cost of living in a city with more variety could be paid in the form of wages lower than you would have accepted in Smallville. What must be true is that rent and wage differentials sum to \$1000. Thus, other things equal, the extent to which rent is higher and

wages are lower (so that wages adjusted for the cost of living, which economists call real wages, are lower) is the extent to which the consumption benefit of greater variety is absorbed into local land markets and local labor markets.

This discussion of a city’s special traits ignores the role of the production side of the economy. Earlier we saw that if the concentration of people and jobs in cities is related to urban productivity, both wages and rents should increase with city size. But, as we just saw, if the concentration of people and jobs in cities is related to urban amenities, higher rents will outweigh higher wages, so that real wages are lower in cities offering amenities that people value.

A number of economists have looked at the relationship between a metropolitan area’s size and the level of local wages and rents to determine whether productivity or urban amenities better explain the concentration of people and jobs in cities. The evidence to date is mixed. In a 2000 article, economists Takatoshi Tabuchi and Atsushi Yoshida used data for just over 100 Japanese cities for 1992 and showed that a doubling of city size is associated with about a 10 percent increase in production costs. If firms are making products for national and international markets, the only way firms in relatively high-cost (large) cities can compete with firms in relatively low-cost (small) cities is if productivity (that is, agglomeration economies) is sufficiently higher in high-cost than in low-cost cities. Thus, according to Tabuchi and Yoshida, firms in large cities incur higher costs than similar firms in small cities because large cities offer firms greater agglomeration economies.

But these authors found that a similar doubling of city size is associated with a 7 percent to 12 percent decrease in real wages, which they attribute to households’ willingness to

⁸ Lee’s discussion ignores the role of the production side of the economy. If high-skill workers are relatively more productive than low-skill workers in cities, high-skill workers will be disproportionately drawn to large cities. Put differently, in the extreme case, highly skilled individuals may be drawn to large cities not because of the greater variety of goods and services but because such cities enhance their productivity. No doubt, both of these forces (greater productivity and greater variety) operate in cities. The difficulty is trying to differentiate the extent to which highly skilled people locate in cities because of productivity or because of greater variety.

accept lower real wages as a tradeoff for the greater variety offered in big cities. On balance, their results suggest that while productivity is higher in cities, people's taste for urban amenities and variety is an important factor in accounting for the concentration of population in cities.

In contrast, economists Gianmarco Ottaviano and Giovanni Peri studied a sample of 160 U.S. metropolitan areas and found no evidence that cultural diversity (another way to measure local variety) was important for consumers.⁹ Instead, cultural diversity has a net positive impact on workers' productivity.

But the interpretation of the results of these studies assumes workers have the same level of skill to begin with; therefore, if higher real wages are found in large cities, it reflects greater productivity of similar workers in large cities. Recently, Sanghoon Lee offered another reason that real wages may differ with city size. It could be because workers with different levels of skill are attracted to different locales. For example, if real wages are found to be higher in large cities, it's not necessarily the case that agglomeration economies from locating workers together in a city are making similarly skilled workers more productive. Rather, high-skill workers, who tend to earn more than low-skill workers, may be attracted to large cities in the first place because of the higher level of amenities they offer.

As we have noted, we expect demand for variety to increase with an individual's income. Since high-skill

workers also tend to earn more than low-skill workers, we expect demand for variety also to increase with a worker's skills. Given that variety increases with city size, we expect to find that high-skill workers account for a larger share of the work force in large cities and a smaller share in small cities and rural areas.

According to Lee's theory, then, it's the composition of the work force and not greater productivity that explains why wages tend to rise with city size. Lee used data from the health-care industry to test his theory and found that large cities do, in fact, have more doctors relative to the number of nurses than do small cities. No doubt, both of these forces (greater productivity and greater variety) are at work in cities. The difficulty lies in trying to distinguish the extent to which high-wage (high-skill) workers locate in cities because large cities make them more productive or because large cities offer greater variety that high-wage workers value. This is still an open question.

Although most of the empirical results focus on the tradeoffs between wages and consumption amenities for workers, a recent study by Stuart Gabriel and Stuart Rosenthal focused on this tradeoff for firms. The researchers developed quality-of-life indexes for households and quality-of-business-environment indexes for firms in 37 cities from 1977 to 1995. They then considered how much more in wages and rents a firm is willing to pay to locate an additional worker in a city that offers the firm resources for greater productivity relative to a control city. Gabriel and Rosenthal found that many cities attractive to households are unattractive to firms (e.g.,

Miami, Tampa, and Albany). Similarly, they found that some cities that are attractive to firms are unattractive to households (e.g., Detroit and Washington, D.C.). Finally, a few cities were found to be attractive to both households and firms (e.g., New York, San Francisco, and Los Angeles). If the views expressed in the current article are correct, these cities are poised to do well in the new century.

CONCLUSION

Agglomeration economies will continue to play a large role in the life of 21st century cities. But unlike in earlier times, today's agglomeration economies have turned cities into centers for consumption, rather than places for manufacturing goods. In turn, this shift in focus means that cities now tend to attract more highly skilled and highly paid workers—people who want more consumption options. Consequently, modern cities must offer a wide choice of amenities to attract the high-skill workers needed in this new type of agglomeration economy.

Public policy can play a significant role in attracting and retaining highly skilled workers. Even though the productivity advantages that cities offer to firms may have waned in recent decades, the nation's largest urban areas retain many advantages in providing consumption benefits that people value. Glaeser and co-authors' 2001 study suggests that local policymakers need to focus on life-style issues because they are important in attracting and retaining high-skill workers. One such policy is providing good public schools. Other policies might focus on reducing urban crime and providing amenities such as clean streets and public parks. 

⁹In their study, Ottaviano and Peri measure cultural diversity in a city as the variety of languages spoken by city residents.

REFERENCES

- Adamson, Dwight W., David Clark, and Mark Partridge. "Do Agglomeration Effects and Household Amenities Have a Skill Bias?" *Journal of Regional Science*, 44 (2004), pp. 201-23.
- Brueckner, Jan K., Jacques-Francois Thisse, and Yves Zenou. "Why Is Central Paris Rich and Downtown Detroit Poor? An Amenity-Based Theory," *European Economic Review*, 43 (1999), pp. 91-107.
- Carlino, Gerald A. "From Centralization to Deconcentration: Economic Activity Spreads Out," Federal Reserve Bank of Philadelphia *Business Review* (May/June 1982), pp. 3-13.
- Carlino, Gerald A. "Knowledge Spillovers: Cities' Role in the New Economy," Federal Reserve Bank of Philadelphia *Business Review* (Fourth Quarter 2001), pp. 17-26.
- Carlino, Gerald A., Satyajit Chatterjee, and Robert Hunt. "Matching and Learning in Cities: Urban Density and the Rate of Invention," Working Paper 04-16/R, Federal Reserve Bank of Philadelphia (2004).
- Chatterjee, Satyajit. "Agglomeration Economies: The Spark That Ignites a City?" Federal Reserve Bank of Philadelphia *Business Review* (Fourth Quarter 2003), pp. 6-13.
- Clement, Douglas. "Urban Legends," Federal Reserve Bank of Minneapolis: *The Region*, 18 (2004).
- Costa, Dora L., and Matthew E. Kahn. "Power Couples," *Quarterly Journal of Economics*, 115 (2000), pp. 1287-1315.
- Fort, Rodney D. *Sports Economics*. Upper Saddle River, New Jersey: Prentice Hall, 2003.
- Gabriel, Stuart A., and Stuart S. Rosenthal. "Quality of the Business Environment Versus Quality of Life: Do Firms and Households Like the Same Cities?" *Review of Economics and Statistics*, 86 (2004), pp. 438-44.
- Glaeser, Edward L., and Albert Saiz, "The Rise of the Skilled City," Brookings-Wharton Papers on Urban Affairs 5 (2004), pp. 47-94.
- Glaeser, Edward L., Jed Kolko, and Albert Saiz. "Consumer City," *Journal of Economic Geography*, 1 (2001), pp. 27-50.
- Lee, Sanghoon. "Ability Sorting and Consumer City," unpublished manuscript, University of Minnesota and Federal Reserve Bank of Minneapolis, 2004.
- Moretti, Enrico. "Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Sectional Data," *Journal of Econometrics*, 121(2004), pp. 175-212.
- Nakamura, Leonard. "Is the U.S. Economy Really Growing too Slowly?" Federal Reserve Bank of Philadelphia *Business Review* (March/April 1997), pp. 3-14.
- Ottaviano, Gianmarco, and Giovanni Peri. "The Economic Value of Cultural Diversity: Evidence from U.S. Cities," National Bureau of Economic Research Working Paper 10904 (November 2004).
- O'Sullivan, Arthur. *Urban Economics*. Boston, MA: McGraw-Hill Irwin, 2003.
- Rauch, James E. "Productivity Gains from Geographic Concentration of Human Capital: Evidence from Cities," *Journal of Urban Economics*, 34 (1993), pp. 380-400.
- Rosenthal, Stuart S., and William C. Strange. "The Determinants of Agglomeration," *Journal of Urban Economics*, 50 (2001), pp. 91-229.
- Segal, David. "Are There Returns to Scale in City Size?" *Review of Economics and Statistics*, 58 (1976), pp. 339-350.
- Tabuchi, Takatoshi, and Atsushi Yoshida. "Separating Urban Agglomeration Economies in Consumption and Production," *Journal of Urban Economics*, 48 (2000), pp.70-84.
- Waldfogel, Joel. "Who Benefits Whom in Local Television Markets?" Brookings-Wharton Papers on Urban Affairs, 2003.
- Waldfogel, Joel, and Lisa George. "Who Affects Whom in Daily Newspaper Markets?" *Journal of Political Economy*, 2003.
- Waldfogel, Joel, and Peter Siegelman. "Race and Radio: Preference Externalities, Minority Ownership, and the Provision of Programming to Minorities," *Advances in Applied Microeconomics*, 10, 2001.