Metropolitan Policy Program
The Brookings Institution

The Implications of Service Offshoring for Metropolitan Economies

Robert Atkinson and Howard Wial[1]

"The greatest employment impacts of offshoring will probably be very localized in specific occupations, industries, and even firms within specific places."

Findings

Service "offshoring"—the movement of service jobs from the United States to other countries, especially low-wage countries—has emerged as a concern of both political and business leaders in recent years. Using occupational data, this study projects the likely job losses from service offshoring between 2004 and 2015 in 246 U.S. metropolitan areas. It finds that:

- **Twenty-eight metropolitan areas, with 13.5 percent of the nation's population, are likely to lose between 2.6 and 4.3 percent of their jobs to service offshoring, higher than the average loss among the metropolitan areas studied.** Five metropolitan areas—Boulder, CO; Lowell, MA; San Francisco, CA; San Jose, CA; and Stamford, CT—are likely to lose between 3.1 and 4.3 percent of their jobs to service offshoring between 2004 and 2015, while 23 others are likely to lose between 2.6 and 3 percent of their jobs. However, 158 metropolitan areas are likely to lose no more than 2 percent of their jobs as a result of service offshoring.

- **Large metropolitan areas and metropolitan areas in the Northeast and West are generally more vulnerable to service offshoring than small metropolitan areas or metropolitan areas in the Midwest or South.** Job losses from service offshoring between 2004 and 2015 are projected at 2.4 percent for metropolitan areas with populations of one million or more but only 1.7 percent for metropolitan areas with populations below 250,000. About 2.3 percent of jobs in Northeastern and Western metropolitan areas are likely to be offshored, compared to 2.2 percent in Midwestern metropolitan areas and 2.1 percent in Southern ones.

- **Metropolitan areas with large concentrations of information technology service jobs or back-office jobs are generally more vulnerable to service offshoring than other metropolitan areas.** Between 2004 and 2015, service offshoring is likely to cause the loss of 2.6 percent of jobs in metropolitan areas that specialize in information technology services and 2.4 percent of jobs in metropolitan areas that specialize in back-office services but only 1.9 percent of jobs in other metropolitan areas.

- **At least 17 percent of computer programming, software engineering, and data entry jobs are likely to be offshored in particular metropolitan areas.** Employment of computer programmers, data entry keyers, and software engineers (applications) is projected to fall by at least 17 percent between 2004 and 2015 in Bergen-Passaic, NJ; Boston, MA; Boulder, CO; Danbury, CT; Denver, CO; Hartford, CT; Minneapolis, MN; Nashua, NH; Newark, NJ; Orange County, CA; San Francisco, CA; San Jose, CA; Stamford, CT; and Wilmington, DE because of service offshoring. In Bergen-Passaic, 14 to 17 percent of customer service representatives' and insurance underwriters' jobs are projected to move abroad.

Overall, the loss of service jobs to offshoring in the near future will be modest. However, offshoring's impact will be greater in metropolitan areas with high shares of information technology or back-office service jobs and in particular occupations within metropolitan areas. To reduce vulnerability to service offshoring, federal, state, and local leaders should work in concert to pursue policies that boost productivity and innovation, assist workers who are harmed by offshoring, and modernize approaches to economic and workforce development.

Introduction

In the months running up to the 2004 election the issue of offshoring—the movement of jobs from the United States to other nations—seemed to be on the front pages of newspapers every day. Some of the concern was about the loss of manufacturing jobs to lower-wage countries such as China and Mexico, a process that had been going on for decades. The offshoring of service jobs, though, was something new. Service workers—including college-educated professionals—who previously thought their jobs immune to foreign competition began to worry about this new source of job insecurity. Policymakers concerned about the American standard of living wondered whether service offshoring would eliminate the United States' advantage in high technology industries.

Although public attention to the issue of service offshoring has receded somewhat, some elected officials in the states and the federal government still decry the loss of jobs to low-wage countries. Meanwhile, U.S. companies continue to seek offshore opportunities for a range of types of work. And while relatively modest in its employment impacts to date, offshoring of services is projected to grow over the next decade.

Researchers, consultants, and pundits have debated the effects of service offshoring on the national economy. However, with the notable exception of Berkeley regional economist Cynthia Kroll, none has considered its potential impact on metropolitan economies.[2] Moreover, none has attempted to estimate the extent of offshoring that is likely to occur in specific metropolitan areas in the near future. Just as the extent of job loss varied among metropolitan areas when the large-scale globalization of manufacturing began in the 1970s and 1980s, so the extent of job loss is likely to vary among metropolitan areas as some service jobs are offshored. Furthermore, just as the economies of some manufacturing-dependent metropolitan areas rebounded from manufacturing job loss while others did not, metropolitan economies that depend heavily on offshorable service jobs may experience similarly divergent fortunes. With foreknowledge of the potential impact of service offshoring on specific metropolitan areas, local and state leaders will be better able to craft policies to help their regions reduce their vulnerability to offshoring.

This report deals mainly with the metropolitan-level implications of service offshoring. It explains what kinds of jobs are most likely to be offshored, presents new estimates of the vulnerability of U.S. metropolitan areas to offshoring in the near future, assesses the public policy challenges that offshoring poses for metropolitan areas, and discusses what state and local governments and private sector regional leaders should do to respond to those challenges. Appendix B (available at **http://www.brookings.edu/metro/pubs/20070131_offshoring.htm**) provides a survey of the national and global contexts within which offshoring is occurring.

The report's message, though neither complacent nor alarmist, does require attention and action. Although many services, especially those enabled by information technology (IT), can now be moved to low-wage offshore locations, not every IT-enabled service can be performed anywhere in the world; despite the popularity of the expression, the world is not "flat."[3] Some IT-enabled service work will continue to be performed more economically in the United States, even in large, high-cost metropolitan areas. Service offshoring is not likely to lead to large job losses in the United States as a whole or in most metropolitan areas during the next decade or so.

However, a small number of metropolitan areas are likely to suffer moderate job losses from the direct and indirect effects of offshoring. Particular occupations, such as computer programming and data-entry keying, could end up losing more than one out every five of their jobs between 2004 and 2015 in some of the metropolitan areas that are most vulnerable to offshoring. The greatest employment impacts of offshoring will probably be very localized in specific occupations, industries, and even firms within specific places. In addition, some jobs that are not likely to be offshored in the next decade could be more vulnerable to offshoring in the more distant future, and the economic pressures that lead to offshoring could lead in addition, or instead, to falling wages in service jobs exposed to international competition.

State and local leaders should embrace a number of policies to reduce a region's vulnerability to offshoring. These include policies that improve productivity, promote innovation, educate workers for jobs not likely to be offshored, generate economic activity from within metropolitan areas (rather than recruiting firms from outside), reduce business costs without reducing the standard of living, and preserve the scale economies of existing industry concentrations. Public policy should also assist workers who are displaced by offshoring. State and local economic and workforce development policymakers should recognize that a world of more global competition in services is one that will require them to understand their local economies more thoroughly than they may have in the past and to rethink some of their traditional assumptions and strategies. Finally, metropolitan business leaders should improve their ability to assess offshoring's business costs as well as its benefits. They should not assume that offshoring is inevitable for service jobs exposed to international competition. In fact, some industries and occupations could very well expand to take advantage of service sector export opportunities.

Background

The debate over outsourcing and offshoring has been characterized by a confusion of terms. We define "outsourcing" as the process by which a company contracts with another to conduct specific business tasks (e.g., payroll, customer relations). Companies can outsource work to companies located in the United States or in other nations. When people complain about foreign outsourcing, what they really mean is offshoring, which occurs when a U.S. company either moves some of its own operations overseas or outsources work to another company outside the United States. In this report "offshoring" will refer to any process whereby work is moved outside this nation. Although this can include both goods and services, this report focuses on services, especially information technology-enabled services.

The offshoring of service jobs is one part of the current trend toward the globalization of markets and production, which Appendix B describes in more detail. Service offshoring began in the late 1980s and 1990s and became more widespread during the current decade. In an environment of pervasive cost-based competition, U.S. employers have chosen to separate more routine tasks into distinct jobs and use telecommunications and the Internet to access low-wage, offshore workers to perform them. Improvements in information and communication technology have facilitated this process. The jobs that have been offshored thus far have been ones that involve working with standardized information that can be digitized and transported over telecommunications networks and that require little or no face-to-face contact with customers or other workers.[4] Although a variety of different kinds of service work have been offshored, the major types of jobs that have been affected have been in IT services (such as software development) and IT-enabled back-office business processes (such as call centers and claims processing). These jobs include some that require no more than a high school diploma and some that require a bachelor's degree or even a graduate degree. India has been the most popular recipient of offshored service work, but other low-wage countries, especially English-speaking ones, have also gained offshored jobs.

Overall, a small share of all U.S. jobs will be lost to service offshoring in the next decade.

The United States as a whole is not likely to see a large number of service jobs offshored in the next decade or so. (See Appendix B for a detailed discussion and evaluation of estimates of the number of jobs that have been or could potentially be offshored.) The most credible estimates of the number of service jobs that could potentially be offshored range from 12 million to 15 million jobs, or 9 to 12 percent of all U.S. jobs. However, not all jobs that could potentially be offshored are likely to be offshored in the near future. John McCarthy of the consulting firm Forrester Research projected that 3.4 million U.S. service jobs will be offshored between 2000 and 2015.[5] McCarthy's projection has become the conventional wisdom about the magnitude of future offshoring for the nation as a whole. It is modest in comparison with the total number of jobs and the total amount of job churning in the United States. In 2004 the United States had about 131 million jobs. During that year about 29 million private sector jobs were destroyed as a result of business contractions and closings and about 31 million private sector jobs were created because of business expansions and openings.[6] McCarthy's estimate of 3.4 million jobs lost to offshoring between 2000 and 2015 implies a loss of about 227,000 jobs per year. That amounts to about 0.2 percent of total employment and less than three days' worth of normal private sector job destruction. Even the entire 15-year job loss due to offshoring amounts to only about 2.6 percent of total employment.

However, as Appendix B explains in detail, offshoring may have a variety of indirect effects on employment that could result in additional job losses and/or job gains. Because very little is known about the sizes of these indirect effects, this report estimates only the numbers of jobs likely to be offshored from U.S. metropolitan areas in the near future, not the total employment impact of offshoring on metropolitan areas.

Some types of service jobs are more likely than others to be offshored in the near future.

Several authors have enumerated, in slightly different ways, the characteristics that make jobs more or less likely to be offshored.[7] Based on these authors' work as well as on more specialized studies related to offshoring, the following is a list of attributes that increase the chance that a job will be offshored within the next decade or so.

Heavy reliance on information technology and routine or rule-based work. Jobs that use information or communication technologies intensively are more likely to be offshored than those that do not. In addition, these technologies make any job that involves following a predetermined set of rules, no matter how complex, vulnerable to offshoring. Such a job can easily be performed by workers in low-wage countries who are trained to follow the rules, possibly with the assistance of a computer that can help the worker follow any especially complex rules.[8] The results of the work can be transmitted to consumers online or by phone. Telemarketing that involves following a tight script is in this category. So is much actuarial work.

Lack of need for personal contact. Many jobs simply cannot be digitized and conducted at a distance. Most personal service workers, such as

nurses and teachers, need to have personal contact with the client. Although radiological services can be done at a distance, most direct patient care must be done in person. Likewise, many occupations, such as bus driving, cooking, auto repair, and construction work, involve handling physical items that are too expensive to move abroad. Finally, many jobs that contain a mix of functions are not likely to move, even if some of the work is IT-enabled or rule-based. If part of a job involves intensive work with clients and part does not, the job has to remain near clients unless the two parts can be separated.

Wage cost savings in low-wage countries that outweigh productivity losses. Some managers may make offshoring decisions on the basis of wages alone. However, managers with a more sophisticated understanding of the economics of offshoring will compare the total cost of providing a service from different locations. For services that are labor-intensive, labor costs will dominate these comparisons. Yet wages alone do not determine labor costs. Wages in relation to productivity are what matter. Productivity includes the quality as well as the quantity of services produced per hour of work. Thus, high-wage U.S. metropolitan areas can have relatively low labor costs if they provide services of very high quality. For example, many of the economic activities that cluster together in high-wage metropolitan areas such as New York and San Francisco may have higher productivity in those regions than in other parts of the United States or in other parts of the world. These productivity differentials may even be great enough to make the expensive American metropolitan areas the places with the lowest labor costs for those activities.

Because of what economists call agglomeration economies—the economic gains from the concentration of activity—productivity in some kinds of services can be higher in places with large concentrations of jobs in a particular industry or occupation, and in large metropolitan areas in general.[9] Routine, rule-based, and standardized service jobs are easy to automate or offshore but more complex functions that need to be near each other to thrive, adapt, and innovate are not. Although information technology is increasingly being used in the latter activities, it does not substitute for close physical proximity or face-to-face contact. Rather, information technology supplements personal contact because of the subtle, ambiguous, highly varied, or rapidly changing nature of the interactions and information being transferred. These higher-order activities require more than education. They require creativity, risk taking, and tacit knowledge, which are often found in regional clusters of activity that let participants "be in the loop." As a result, while the routine economy may be dispersing, the innovation economy remains concentrated, particularly in less routine activities undertaken by managers, professionals, and executives in industries such as law and consulting and in business functions such as corporate and regional headquarters offices.[10]

Tradability. To be offshorable, a job has to produce a service or good that can be delivered to people who are located outside the producer's region. Regional economists call such services and goods "tradable."[11] Tradability is often associated with the absence of personal contact between producer and consumer, but that is not always the case; tourist-oriented services and some higher education and hospital services are tradable because consumers travel to the producer's location, while management consulting is tradable because the service provider visits the client. Advances in information and communication technologies have expanded the number of services that are tradable but they have not made dry cleaning or trash collection tradable and are not likely to do so in the next decade. Although nontradable services are not offshorable, not all tradable services are likely to be offshored in the near future or perhaps ever. Tradable services that rank low on one or more other offshoring factors discussed in this section are not likely to be offshored. Legislators produce laws that can be disseminated electronically anywhere in the world, but their jobs are not likely to be moved out of the capital cities of their states or countries.

Availability of needed skills abroad. A job can be offshored if the skills needed to perform it are available abroad. Some low-wage countries, especially India, have produced large numbers of highly educated workers who have the skills to do some kinds of offshored technical work, such as engineering. However, although Indian engineers have routine engineering skills, evidence suggests that only some have the nonroutine, high-level problem-solving, innovation, and communication skills that are more common among American engineers.[12] Thus far, India's system of higher education seems to be good at duplicating the routine skills that American colleges and universities also teach, but not as good at duplicating the nonroutine skills. As long as this gap persists, few U.S. jobs that require nonroutine skills are likely to be offshored.

Labor-intensiveness, ease of physical relocation, and separability of job tasks from other parts of the production process. Other characteristics of the production process influence the likelihood that a job will be offshored. Because the main cost advantage that low-wage countries have over the United States comes from their low wages, jobs in highly labor-intensive services, such as those in call centers or legal transcription services, are more likely to be offshored than those in less labor-intensive services, such as check processing.[13] Likewise, services that are easy to set up in a new location (often the same as those that are labor-intensive) are more likely to be offshored than those with high setup costs.[14]

Offshoring is also more likely when the tasks that are offshored can be done relatively independently of related work that is not offshored. For example, Indian engineers can easily perform parts of automotive design process when their work is not tightly coupled with that of design engineers who must remain in the United States.[15] A job is less likely to be offshored if it must be closely coordinated with other jobs in the United States that are part of the same production process or if the firm doing the offshoring cannot easily monitor the quality of the work done abroad. In the future firms may improve their methods of coordination and monitoring to the point where these problems no longer pose a barrier to offshoring. Or they may eventually find it possible to move all of the workers whose jobs must be coordinated to the same offshore location. Until they do so, however, difficulties in moving pieces of a production process independently of one another will limit offshoring.

Absence of cultural, institutional, and legal barriers. Political constraints make the offshoring of government jobs unlikely and may limit the ability of government contractors to offshore some kinds of jobs, such as those perceived as important to national security. Firms in sectors that place a premium on customer service may be more hesitant to place customer-contact jobs overseas, where problems with accents and cultural attitudes can make it harder to establish a rapport with customers. Consumers may resist offshoring for other reasons as well. For example, some American patients dislike having their medical care influenced by the decisions of foreign radiologists who read their X-rays but with whom they have no other contact.[16] Professional licensing requirements, such as those in law or medicine, can also restrict offshoring. Technological improvements and cost pressures may eventually erode these barriers to offshoring, but they will continue to limit the offshorability of some service jobs in the near future.

While there are factors than can accelerate offshoring, companies do face risks.

Moving jobs offshore is not without risk. For example, in a Gartner survey companies not planning to move offshore cited concerns over security, the viability of providers, and service quality. The quality and security of work done offshore can be problematic.[17] There are also political risks from instability in foreign nations and market risks if there is a consumer backlash against offshoring companies. In addition, infrastructure is not always reliable. Moreover, going the low-cost route can cut firms off from the ability to innovate and learn domestically. Other risks include hidden costs, diminished quality of services, contractual disputes, and loss of organizational competencies.[18] Indeed, depending on the extent of the processes offshored, companies are at risk of losing key proprietary knowledge to would-be competitors. A recent survey by Deloitte Consulting found that large companies often incur unexpected costs from outsourcing services because they underestimate the costs of coordinating activities across firms.[19] Similar concerns apply to offshore outsourcing and to offshoring that occurs within a single multinational company. Privacy concerns, particularly over the handling of more sensitive financial and medical data, may lead some firms to resist going offshore. Finally, there are national security issues with the migration of some work overseas, including defense software applications.[20] For all these reasons businesses are likely to keep a share of their back-office operations in the United States to avoid becoming beholden to outsourcers and to be prepared for disaster situations.

Jobs that are vulnerable to offshoring may not necessarily go abroad.

The jobs most at risk of being offshored are also most at risk of being eliminated by automation. In the 1980s and 1990s much of the manual processing of grocery store coupons was conducted in Mexico. However, with bar coding that allows coupons to be scanned and the information automatically sent electronically to the manufacturer for reimbursement, many of these data entry jobs have been eliminated. Similarly, with the emergence of ticketless travel many of the jobs that American Airlines created in Barbados after moving its ticket-processing center from Tulsa have been eliminated. Further digitization and automation are likely. Easier-to-use and more reliable software, which software companies are now trying to develop, will reduce the need for help desk workers. Software automation tools could enable the production of low-end software to be mechanized. Interactive voice response and Internet-based delivery channels will reduce call center employment. Voice recognition software will eliminate medical transcription jobs. Many data entry jobs will be eliminated if a large amount of information now recorded on paper is entered initially in digital form. As a result, many low-wage nations are probably getting in on the tail end of the product cycle, gaining mobile jobs in the final stage before technology eliminates those jobs.

Immigration is also a potential substitute for offshoring. If low-wage foreign workers can come to the United States, then the labor cost pressure to offshore jobs is reduced. Metropolitan areas with large concentrations of immigrants may, therefore, be less vulnerable to offshoring than similar metropolitan areas with less immigration. At the same time, however, large concentrations of recent immigrants in a region can facilitate closer social and economic ties between that region and the busi-

nesses in the immigrants' home countries that could be the recipients of offshored jobs.[21] These ties may make offshoring more likely.

Some service jobs currently located in high-wage metropolitan areas could move to lower-wage regions of the United States instead of moving abroad. Even though wages are lower in the lowest-wage countries, productivity differentials could make a domestic location less expensive. Skill availability, risk, and cultural, institutional, or legal considerations could also make a domestic low-wage region preferable to an even lower-wage offshore location.

Finally, as noted in Appendix B, the offshoring of some service jobs could create downward pressure on the wages paid by other, similar jobs in the United States. As the wages of the latter jobs fall, the economic benefits that businesses would gain from offshoring them diminishes. Thus, declining wages for offshorable service jobs in the United States could reduce the number of jobs offshored.

Methodology

Currently there are no easily assembled data available to measure the actual number of service jobs that have been offshored from each U.S. metropolitan area. Therefore, this report takes a prospective rather than a retrospective approach. Using data on the characteristics of the jobs that existed in each metropolitan area in 2004, it assesses the percentage of jobs in each metropolitan area that is likely to be offshored between 2004 and 2015.

The basic data source for this assessment is the Bureau of Labor Statistics' 2004 Occupational Employment Statistics Survey (OES). This survey provides information about employment and wages in detailed occupations in each of the nation's metropolitan areas.[22] We chose occupations rather than industries as our units of analysis because occupations are more likely than industries to represent business processes that could be offshored. For example, a retailer's back-office customer service jobs are more likely to be offshored than its in-person sales jobs; considering the retail trade industry as a unit rather than the separate occupations would obscure this distinction. We excluded from our analysis metropolitan areas for which the OES does not provide detailed occupational data for at least 80 percent of all jobs. As a result, the analysis includes 246 metropolitan areas.

Our assessment of metropolitan offshoring risk began with Forrester Research consultant John McCarthy's nationwide classification of service occupations according to their relative offshoring risk over the period 2000-2015. McCarthy placed occupations into five categories ranging from those with no risk of offshoring (e.g., chief executives and cashiers) to those with the highest risk of offshoring (e.g., computer programmers and data entry keyers). These classifications were based on McCarthy's assessment of whether a service is delivered locally, whether necessary skills are available abroad, the role that technology plays in the business process, and whether the business process runs according to well documented rules.[23] We also took into account a similar judgmental assessment by Berkeley economists Ashok Bardhan and Cynthia Kroll. Bardhan and Kroll classified as being at risk of offshoring those occupations that do not require face-to-face contact with customers, have a high information content, can be performed remotely through telecommunications and the Internet, have wages substantially lower in other countries than in the United States, have low set-up costs, and require little or no social networking.[24] To supplement these qualitative assessments with quantitative measures of some of the offshoring-related characteristics of occupations we also considered Jensen and Kletzer's categorization of occupations as tradable or nontradable and Autor, Levy, and Murnane's categorization of the extent to which each occupation requires routine and nonroutine skills.[25] Tradability is necessary if an occupation is to be offshorable, although not all tradable occupations are offshorable. The more an occupation requires routine skills and the less it requires nonroutine skills, the more likely it is to be offshored.

To each of the five offshoring risk categories McCarthy assigned percentages of jobs present in 2000 that he projected were likely to be offshored by 2005 and by 2015. Assuming that four-fifths of the jobs McCarthy projected as likely to be offshored between 2000 and 2005 were actually offshored between 2000 and 2004, we adjusted McCarthy's percentages to percentages of the 2004 job base that were likely to be offshored between 2004 and 2015. We used 2004 as the initial year because it is the most recent year for which OES data were available. We used 2015 as the final year because it is the last year for which McCarthy made offshoring projections.

Offshoring projections by management consultants are open to several criticisms. They may overstate the amount of future offshoring because some consulting firms are in the business of advising other companies on how to offshore jobs. Consulting firms rarely explain the basis for their projections, making it impossible for others to assess the projections. Finally, consultants' estimates are based largely on their own judgment. The first two of these problems do not plague McCarthy's projections. Disinterested observers have described McCarthy's projections as conservative or low.[26] McCarthy has described the basis for his projections and has supplied us with the assumptions he made about potential future offshoring in each OES occupation.[27] Reliance on judgment, however, is inevitable in projecting future offshoring. Even if

the amount of offshoring that occurred in the recent past could be measured accurately, qualitative judgments about the evolution of technology and work organization would still be needed to project future offshoring. Consultants such as McCarthy have developed some expertise in understanding technology and work organization. In recognition of that expertise, we used McCarthy's projections as a starting point for our estimates. However, we did not rely solely on McCarthy's judgment. In assessing occupations' relative vulnerability to offshoring, we used our own judgment to modify McCarthy's, taking into account Bardhan and Kroll's judgmental assessment and quantitative information about the tradability and skill content of jobs.

We made three additional adjustments to the occupational offshoring risk estimates. (See Appendix C (available at http://www.brookings.edu/metro/pubs/20070131_offshoring.htm) for detailed explanations of these adjustments.) First, we considered wages relative to productivity in each occupation in each metropolitan area. Metropolitan areas in which an occupation's average wage is high relative to its productivity are likely to see more offshoring of jobs in that occupation than those in which the occupation's average wage is low relative to its productivity.[28] We applied a regression model to 2004 OES data to estimate a productivity-based wage for each occupation in each metropolitan area, using as explanatory variables measures of agglomeration that capture qualitative as well as quantitative dimensions of productivity. We then used the ratio of each occupation's average wage in each metropolitan area to its productivity-based wage in that metropolitan area as a measure of the wage relative to productivity for the occupation in the metropolitan area.

Second, although our initial assessment of each occupation's offshoring risk took into account the extent to which the occupation as a whole relied on routine rather than nonroutine skills, it did not consider geographic variation in routinization of jobs within an occupation. A lawyer who argues cases before the Supreme Court or invents new ways to carry out complex business transactions relies more on nonroutine skills than one who prepares wills or handles residential real estate closings. The jobs of the latter type of lawyer are more vulnerable to offshoring than those of the former. Therefore, lawyers in metropolitan areas in which jobs are largely of the latter type are, on average, more vulnerable to offshoring than those in which jobs are largely of the former type. To take this into account we developed a within-occupation routinization ratio that indicates how routinized the jobs in a particular occupation are, on average, in one metropolitan area compared to the nation as a whole (e.g., how routinized the average lawyer's job is in Elkhart, IN, compared to the average lawyer's nationwide). This ratio is based on the assumption that the position of an occupation in a metropolitan area's wage distribution indicates the extent to which the occupation is routinized in that metropolitan area. If an occupation has a lower wage in Elkhart, relative to the average wage of all occupations in Elkhart, than in does in Chicago, relative to the average wage of all occupations in Chicago, then we assume that the occupation's jobs are more routinized in Elkhart than in Chicago. The routinization ratio only compares the average degree of routinization of jobs in an occupation in one metropolitan area with that of jobs in other metropolitan areas. It does not compare routinization across occupations (e.g., lawyers versus auto mechanics). Nor does it compare the routinization of some jobs in an occupation with that of others in the same occupation within the same metropolitan area (e.g., the jobs of some lawyers in Chicago versus the jobs of other lawyers in Chicago).

Finally, we assumed that, as a result of political constraints, no public sector jobs would be offshored. This assumption is based on informal constraints and pressures rather than on legal constraints.[29]

Making these adjustments to the occupational offshoring risk estimates, we projected the percentage of jobs in an occupation that are likely to be offshored in a metropolitan area between 2004 and 2015. To do so, we weighted each occupation's projected offshoring percentage by its share of 2004 employment in the metropolitan area and summed the results across all occupations in the metropolitan area. This method assumes that a metropolitan area is more vulnerable to offshoring when:

- a large share of its employment consists of service occupations that are tradable, do not deliver services locally, have necessary skills available abroad, are highly IT-enabled, are highly rule-based, and require routine skills,
- a large share of its employment is in occupations that pay high wages relative to their productivity,
- its jobs are more routinized relative to those in the same occupations nationwide, or
- a small share of its employment is in the public sector.

The ability to take into account many of the likely determinants of offshoring is an important advantage of this method over others that have been used to assess offshoring risk at the national level. However, because of data limitations the method used here is not able to take into account all the likely determinants of offshoring enumerated earlier in this report. It does not attempt to compare the number of jobs lost to offshoring with the number gained through normal job growth; nor does it attempt to estimate job gains that could result from offshoring. It does not attempt to assess the offshorability of production jobs that are typically found in manu-

facturing, mining, farming, and transportation industries. Therefore, metropolitan areas that are highly dependent on manufacturing will rank low in service offshoring risk even though their overall vulnerability to trade-induced job losses may be high. Finally, the approach used here is somewhat sensitive to the various factors that were used to project the percentage of jobs likely to be offshored.

Appendix C provides a detailed description of the more technical aspects of the methodology.

Findings

A. Twenty-eight metropolitan areas, with 13.5 percent of the nation's population, are likely to lose between 2.6 and 4.3 percent of their jobs to service offshoring during the next decade, higher than the average loss among the 246 metropolitan areas studied.

Service offshoring is not likely to have a large direct impact on most metropolitan areas during the next decade. Altogether, the 246 metropolitan areas included in this report are likely to have 2.2 percent of their jobs offshored between 2004 and 2015, and 158 metropolitan areas are likely to have no more than 2 percent of their jobs offshored. No metropolitan area is likely to lose more than 4.3 percent of its jobs to offshoring.

However, 28 metropolitan areas are likely to experience substantially greater than average offshoring. These places, which contained 13.5 percent of the nation's population in 2000, are likely to have between 2.6 and 4.3 percent of their jobs offshored between 2004 and 2015. Five metropolitan areas—Boulder, CO; Lowell, MA; San Francisco, CA; San Jose, CA; and Stamford, CT—are likely to lose between 3.1 and 4.3 percent of their jobs to offshoring between 2004 and 2015, while 23 others are likely to have had between 2.6 and 3 percent of their jobs offshored. These 28 most vulnerable metropolitan areas are similar to the 30 metropolitan areas that Cynthia Kroll, applying a different methodology to OES data, identified as being at the greatest risk of service offshoring.[30]

Table 1 lists the 28 metropolitan areas that are most vulnerable to offshoring during the next decade. Because of the inherent imprecision of the projections the table groups the metropolitan areas by ranges of offshoring vulnerability rather than projecting an exact percentage of jobs offshored for each area. (Appendix A shows potential offshoring for all the metropolitan areas included in this report.)

The direct job losses likely to result from service offshoring are moderate even in the metropolitan areas that are at the greatest risk from offshoring in the near future. For San Jose, CA, one of the five metropolitan areas that could lose up to 4.3 percent of its jobs to offshoring, a 2004-2015 loss of 4.3 percent of the 852,510 jobs that the metropolitan area had in 2004 is a loss of 36,658 jobs over 11 years, or 3,333

Table 1. Metropolitan Areas Most Vulnerable to Service Offshoring, 2004–2015

Percent of 2004 jobs likely to be offshored, 2004–2015	Metropolitan Areas
3.1 to 4.3 percent	Boulder, CO
	Lowell, MA
	San Francisco, CA
	San Jose, CA
	Stamford, CT
2.6 to 3.0 percent	Austin, TX
	Bergen-Passaic, NJ
	Boston, MA
	Cedar Rapids, IA
	Colorado Springs, CO
	Dallas, TX
	Danbury, CT
	Denver, CO
	Des Moines, IA
	Hartford, CT
	Huntsville, AL
	Jersey City, NJ
	Middlesex-Somerset-Hunterdon, NJ
	Minneapolis, MN
	Nashua, NH
	Newark, NJ
	Omaha, NE
	Orange County, CA
	Rochester, MN
	Seattle, WA
	Trenton, NJ
	Washington, DC
	Wilmington, DE

Source: Authors' analysis of 2004 BLS Occupational Employment Statistics

jobs per year. This is only 0.4 percent of the area's total employment in 2004. If the San Jose area had the same rate of job destruction as the nation as a whole, then the annual job loss from offshoring would amount to less than six days of normal private sector job loss. (Since San Jose is likely to have more job churning than the nation as a whole, this estimate probably overstates the impact of offshoring in comparison with normal job destruction.[31])

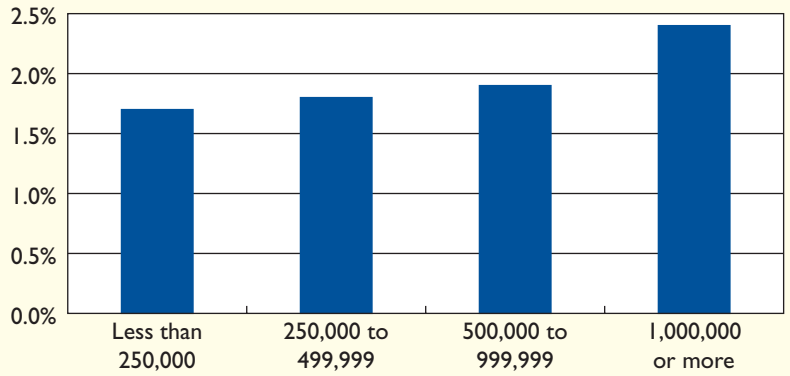
However, when indirect employment effects are considered, the metropolitan areas that are most vulnerable to offshoring could lose many more jobs than our estimates suggest. Because of multiplier effects, the total number of jobs lost in a metropolitan area because of offshoring could be 1.5 to three times as large as the number of jobs that are likely to be offshored.[32] Offshorable service sector jobs are tradable. They bring money into a region by selling services to outsiders. In so doing, they support additional jobs in local (nontradable) services, such as those of dentists and auto mechanics. Therefore, when a metropolitan area loses tradable jobs, it also loses local service jobs. For example, if a call center is closed after the operation is moved to India, not only do the workers at the call center lose their jobs, but so do workers in local businesses that sell to the call center (e.g., janitorial services) or to the call center's employees (e.g., restaurants). These workers may not be able to find new jobs in the same metropolitan area and, therefore, may move to different parts of the United States or leave the labor force.

B. Large metropolitan areas and metropolitan areas in the Northeast and West are generally more vulnerable to service offshoring than small metropolitan areas or metropolitan areas in the Midwest or South.

Large metropolitan areas are generally more vulnerable to service offshoring than small ones. In particular, metropolitan areas with populations of one million or more (as of the 2000 Census) are likely to be at much greater risk than other metropolitan areas of losing jobs to service offshoring. These very large metropolitan areas are likely to have 2.4 percent of their jobs offshored between 2004 and 2015. In contrast, offshoring is likely to affect 1.9 percent of jobs in metropolitan areas with populations of at least 500,000 but below one million, 1.8 percent of jobs in those with populations of at least 250,000 but less than 500,000, and 1.7 percent of jobs in metropolitan areas with populations below 250,000 (Figure 1). Of the 28 metropolitan areas most vulnerable to service offshoring, 14 had populations of one million or more in 2000 (Austin, TX; Bergen-Passaic, NJ; Boston, MA: Dallas, TX; Denver, CO; Hartford, CT; Middlesex-Somerset-Hunterdon, NJ; Minneapolis, MN; Newark, NJ; Orange County, CA; San Francisco, CA; San Jose, CA; Seattle, WA; and Washington, DC), while only 61 of the 246 metropolitan areas included in this report were that large. However, three metropolitan areas with populations below 250,000 are also among the most vulnerable 28 (Cedar Rapids, IA; Danbury, CT; and Nashua, NH), and two metropolitan areas of one million or more people are likely to have had no more than 1.5 percent of their jobs offshored by 2015 (Las Vegas, NV, and Riverside, CA).

Metropolitan areas in the Northeast and West are slightly more vulnerable to offshoring than those in the South and Midwest. About 2.3 percent of jobs in Northeastern and Western metropolitan areas are likely to be offshored between 2004 and 2015, compared to 2.2 percent in Midwestern metropolitan areas and 2.1 percent in Southern ones (Figure 2). Of the 28 metropolitan areas likely to have had more than 2.5 percent of their jobs offshored, only five are in the South (Austin, TX; Dallas, TX; Huntsville, AL; Washington, DC; and Wilmington, DE) and only five are in the Midwest (Cedar Rapids, IA; Des Moines, IA; Minneapolis, MN; Omaha, NE; and Rochester, MN). Eleven are in the Northeast (Bergen-Passaic, NJ; Boston, MA; Danbury, CT; Hartford, CT; Jersey City, NJ; Lowell, MA; Middlesex-Somerset-Hunterdon, NJ; Nashua, NH; Newark, NJ; Stamford, CT; and Trenton, NJ) and seven are in the West (Boulder,

Figure 1. Percent of 2004 Jobs Likely to Be Offshored from Metropolitan Areas, by Metropolitan Population



Source: Authors' analysis of 2004 BLS Occupational Employment Statistics

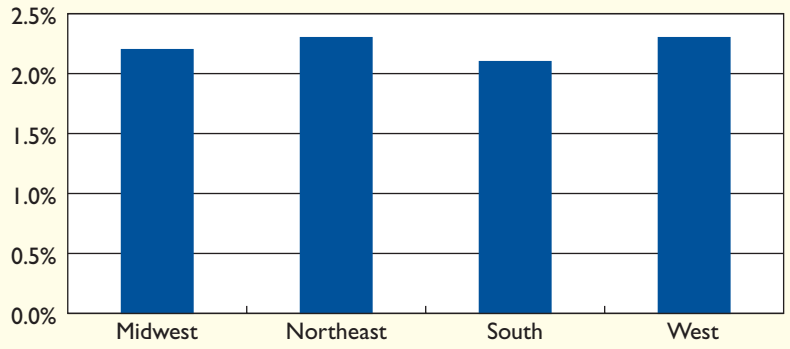
CO; Colorado Springs, CO; Denver, CO; Orange County, CA; San Francisco, CA; San Jose, CA; and Seattle, WA). (In contrast, the majority of metropolitan areas in the United States are in the South and Midwest.)

C. Metropolitan areas with large concentrations of information technology service jobs or back-office jobs are generally more vulnerable to service offshoring than other metropolitan areas.

Metropolitan areas with large shares of information technology service employment (e.g., computer programmers and software engineers) or information technology-enabled back-office service employment (e.g., data-entry keyers and telemarketers) are more vulnerable to service offshoring than those with relatively little employment in those occupations. Figure 3 shows that 2.6 percent of jobs in metropolitan areas that specialize in information technology services and 2.4 percent of jobs in metropolitan areas that specialize in back-office services are likely to be offshored between 2004 and 2015, while only 1.9 percent of jobs in metropolitan areas that specialize in production occupations (primarily in manufacturing) and only 1.9 percent of jobs in all other metropolitan areas are likely to be offshored. (For the purposes of this analysis, metropolitan occupational specializations exist where an occupational group's share of a metropolitan area's employment is at least 110 percent of its share of national employment. A given metropolitan area may have one or more specializations or have no specialization in IT services, back-office services, or production. Appendix C lists the occupations in each category and the metropolitan areas that specialize in each.)

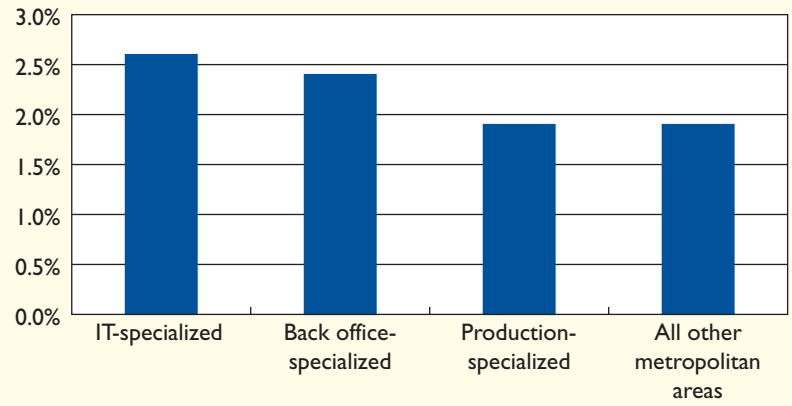
All but one of the 28 of the metropolitan areas most vulnerable to offshoring in the near future specialize in IT services, back-office services, or both. None specializes in production.

Figure 2. Percent of 2004 Jobs Likely to Be Offshored from Metropolitan Areas 2004-2015, by Region



Source: Authors' analysis of 2004 BLS Occupational Employment Statistics

Figure 3. Percent of 2004 Jobs Likely to Be Offshored from Metropolitan Areas 2004–2015, by Occupational Specialization



Note: "All other metropolitan areas" are those that do not specialize in information technology services, back-office services, or production.

Source: Authors' analysis of 2004 BLS Occupational Employment Statistics

Nine specialize in both IT and back-office services, 17 specialize only in IT services, one specializes only in back-office services, and one (Danbury, CT) does not specialize in either IT services or back-office services (Table 2). About 7 percent of jobs in San Jose, CA, and Washington, DC, and about 6 percent of jobs in Boulder, CO, were in IT services in 2004, compared with only 2.2 percent nationwide. About 16 percent of jobs in Des Moines, IA, and Wilmington, DE, were in back-office services, while about 13 percent of all U.S. jobs were in this category. IT and back-office service jobs together made up about 15 percent of jobs in the nation as a whole but about 19 percent of jobs in Des Moines, IA; Jersey City, NJ; Middlesex-Somerset-Hunterdon, NJ; and Wilmington, DE.

Metropolitan areas that specialize in production are mainly those, such as Milwaukee, WI, and Detroit, MI, that

Table 2. Occupational Specializations of Metropolitan Areas Most Vulnerable to Service Offshoring

Metropolitan Area	Specialization in Information Technology Services (Percent of Jobs in Information Technology Services, 2004)	Specialization in Back-Office Services (Percent of Jobs in Back-Office Services, 2004)	Specialization in Production (Percent of Jobs in Production, 2004)
Austin, TX	Yes (4.5%)	No	No
Bergen-Passaic, NJ	Yes (2.5%)	Yes (15.3%)	No
Boston, MA	Yes (4.3%)	No	No
Boulder, CO	Yes (5.7%)	No	No
Cedar Rapids, IA	No	Yes (14.8%)	No
Colorado Springs, CO	Yes (5.4%)	No	No
Dallas, TX	Yes (3.8%)	No	No
Danbury, CT	No	No	No
Denver, CO	Yes (3.7%)	No	No
Des Moines, IA	Yes (3.0%)	Yes (15.8%)	No
Hartford, CT	Yes (3.3%)	Yes (14.1%)	No
Huntsville, AL	Yes (5.5%)	No	No
Jersey City, NJ	Yes (3.5%)	Yes (15.3%)	No
Lowell, MA	Yes (4.8%)	No	No
Middlesex-Somerset-Hunterdon, NJ	Yes (4.7%)	Yes (14.6%)	No
Minneapolis, MN	Yes (3.2%)	No	No
Nashua, NH	Yes (2.9%)	No	No
Newark, NJ	Yes (2.7%)	Yes (14.4%)	No
Omaha, NE	Yes (3.3%)	Yes (14.2%)	No
Orange County, CA	Yes (2.7%)	Yes (14.1%)	No
Rochester, MN	Yes (2.5%)	No	No
San Francisco, CA	Yes (4.5%)	No	No
San Jose, CA	Yes (7.1%)	No	No
Seattle, WA	Yes (3.6%)	No	No
Stamford, CT	Yes (4.3%)	No	No
Trenton, NJ	Yes (3.5%)	No	No
Washington, DC	Yes (6.6%)	No	No
Wilmington, DE	Yes (3.0%)	Yes (15.6%)	No

Note: Nationwide, 2.2 percent of all jobs were in IT services, 12.8 percent in back-office services, and 7.9 percent in production.
Source: Authors' analysis of 2004 BLS Occupational Employment Statistics

specialize in manufacturing industries. These metropolitan areas are generally less vulnerable to service offshoring (although not necessarily to the offshoring of production jobs in manufacturing) than service-dependent areas.

Metropolitan areas' occupational and industrial specializations can affect their indirect job gains and losses from offshoring as well as their direct job losses. If the direct job losses that result from offshoring are offset by equal or larger numbers of new jobs (created either because of expanded exports or for other reasons), then offshoring's impact on employment will be smaller than our estimates suggest. However, if offshoring stimulates exports that lead to the creation of new jobs, those jobs may not be in the same metropolitan areas as the offshored jobs. Some metropolitan areas might well be net job losers (if their regional economies are more specialized in occupations and industries likely to face import competition) while others might be gainers (if their regional economies are more specialized in sectors likely to gain jobs through expanded export opportunities).

D. At least 17 percent of computer programming, software engineering, and data entry jobs are likely to be offshored in particular metropolitan areas.

Offshoring's greatest direct job impact is likely to be on particular occupations or industries within particular metropolitan areas. Some occupations, especially those in IT or back-office services, could lose up to 24 percent of their jobs in particular metropolitan areas by 2015 as a result of offshoring. Employment of computer programmers, data entry keyers, and software engineers (applications) is projected to fall by at least 17 percent between 2004 and 2015 in Bergen-Passaic, NJ; Boston, MA; Boulder, CO; Danbury, CT; Denver, CO; Hartford, CT; Minneapolis, MN; Nashua, NH; Newark, NJ; Orange County, CA; San Francisco, CA; San Jose, CA; Stamford, CT; and Wilmington, DE because of offshoring. In addition, job cuts of 20 to 24 percent are projected for multimedia artists and animators in Stamford. In Bergen-Passaic, which has the third-highest share of back-office employment among the 28 most vulnerable metropolitan areas, customer service representatives and insurance are projected to lose 14 to 17 percent of jobs to offshoring. Appendix D (available at http://www.brookings.edu/metro/pubs/20070131_offshoring.htm) shows the shares of jobs in each occupation that are projected to be offshored between 2004 and 2015 in each of the 28 metropolitan areas that are most vulnerable to offshoring.

Even in metropolitan areas that are not very vulnerable to service offshoring, large percentages of certain IT service or back-office jobs are likely to be offshored. For example, at least 15 percent of the jobs of computer programmers, computer software engineers (applications), and data entry keyers are likely to be offshored by 2015 in the Asheville, NC; Atlantic-Cape May, NJ; Augusta, GA; Bakersfield, CA; Bellingham, WA; Biloxi, MS; Brazoria, TX; Canton, OH; Charleston, SC; Corpus Christi, TX; Elkhart, IN; Erie, PA; Fresno, CA; Gary, IN; Hickory, NC; Janesville, WI; Johnson City, TN; Johnstown, PA; Kenosha, WI; Lafayette, LA; Las Vegas, NV; Lima, OH; Longview, TX; Modesto, CA; Myrtle Beach, SC; Panama City, FL; Riverside, CA; Salinas, CA; Shreveport, LA; Stockton, CA; Tacoma, WA; Terre Haute, IN; Vallejo, CA; Waco, TX; Wheeling, WV; Yakima, WA; and Youngstown, OH, metropolitan areas. Yet none of these metropolitan areas is likely to lose more than 1.5 percent of all its jobs to service offshoring.

Job losses due to offshoring are also likely to vary among firms. International trade has very different employment impacts on firms within the same narrowly defined industry depending on how much each firm exports its own products or services, imports its inputs, and sells products or services that compete with imports.[33] Some firms may lose jobs to offshoring while others in the same industry and metropolitan area and with similar occupational compositions may gain them because of offshoring. The costs and benefits of offshoring to workers may, therefore, be very localized within occupations, industries, and firms in particular metropolitan areas.

Public Policy Responses to Offshoring

Although it is impossible to say that all offshoring is either good or bad, there are some general principles that can guide public policy toward offshoring. First, it would be undesirable to stop all service offshoring. The offshoring of services is a part of a much broader trend of the movement of more services from non-traded to traded activities. Because of improvements in information and communication technologies, what were once sectors that largely sold their services to local residents (e.g., book stores, and local newspapers) are increasingly becoming traded and footloose. An increasing share of these activities will take place online or by phone and at a distance. Workers in foreign countries will deliver some of these services . These technological changes and the expansion of trade that they promote are generally good for American consumers. Thus, it would not be desirable to respond to offshoring by choking off global trade through tariffs or quotas.

However, policymakers should also recognize that offshoring is not good for everyone. It may sometimes be harmful to metropolitan areas or to the nation as a whole (e.g., if high-productivity, difficult to replace industries or occupations are offshored). To reduce their vulnerability to offshoring, the United States and its metropolitan areas must boost productivity (which includes service quality, not just quantity, in relation to hours worked) and innovation. To do so they must move to higher-productivity and more innovative occupations and industries (e.g. growing business consultancy, rather than call centers). They should also raise the productivity and innovative capacity of their existing occupations and industries. In addition, governments should assist workers who are harmed by offshoring.

Federal and State Policies

Federal, state, and local governments, as well as business leaders, can all play important roles in making the United States and its metropolitan areas less vulnerable to offshoring and in assisting workers whose jobs are offshored. This section outlines an agenda of trade, health care, technology, innovation, education, displaced worker assistance, unemployment insurance, and tax policies that federal and state governments could use to accomplish these goals. That agenda would broadly benefit metropolitan areas, especially those at the greatest risk of

service offshoring. Indeed, metropolitan areas' ability to address the challenges of offshoring will largely depend on the adoption of these policies.

1. Policies to Reduce Vulnerability to Offshoring

Level the playing field. Some offshoring occurs because some countries gain artificial cost advantages by distorting the efficient operation of markets. They do so by keeping the value of their currencies artificially low, imposing tariff and non-tariff barriers to trade, allowing piracy of products and services, and suppressing wages. The federal government should try to reduce these distortions by working with the World Trade Organization, International Monetary Fund, and other international organizations to pressure other nations engaged in systemic currency manipulation;[34] vigorously work to enforce global trade rules against product and service piracy; work to open up foreign markets to U.S. goods and services; and work to include meaningful, enforceable labor standards in its trade agreements.[35]

A similar artificial stimulus to offshoring occurs because health care costs are part of the compensation package of many U.S. employers. Employers who provide health coverage to their U.S. employees can more easily hire workers without employer-provided health coverage in low-wage countries. To eliminate this incentive to offshore work, the federal government should spread the cost of health coverage widely among residents and/or businesses. In the absence of federal action state governments should move in this direction.

Improve productivity and promote innovation. Public policy should also try to reduce offshoring by helping to improve the productivity and innovative capacity of U.S. service firms. For most services, more than for most manufactured or agricultural goods, a country's or metropolitan area's comparative advantage in trade does not depend on its climate or access to natural resources. Instead, it depends on technological innovation, workers' skills, and the agglomeration economies that come about when production is concentrated in a particular place—all things that public policy can influence.

Federal technology policies that could help include expanding support for scientific research and expanding the research and development tax credit. In particular, Congress should start by creating a new knowledge tax credit that allows companies to take a 40 percent credit on increases in expenditures on research and experimentation, global standard-setting,[36] and workforce training.[37] This credit, like the existing research and development tax credit, would apply only to activities that firms carry out in the United States.

The nation also needs to do more to build a viable state-federal innovation partnership. Historically the federal innovation system has focused on larger firms and the approximately 30 large first-tier research universities. Both institutions have played key roles in driving innovation. However, entrepreneurial start-ups and small and medium-sized enterprises are now playing an increased role in nation's innovation system. Moreover, many of the nation's non-top tier research universities and colleges have developed significant science and technology strengths and play key roles working with industry in their regions.

States are well positioned to work with these kinds of firms and universities. All 50 states now have initiatives to promote technology-based economic development. However, because the benefits of innovation spill across state borders, states invest less in innovation-based economic development than is in the national interest. As a result, Congress could encourage states to focus more on technology-based economic development by appropriating $1 billion annually for a

"Because the benefits of innovation spill across state borders, states invest less in innovation-based economic development than is in the national interest."

competitive matching grant fund to co-invest in state-supported technology-based initiatives.

Federal and state governments can also help small and medium-sized firms that are not at the technological frontier improve their productivity. The joint federal-state Manufacturing Extension Partnership program plays this role for small and medium-sized manufacturers.[38] A similar program should be developed for the service sector. Knowledge about best practices in improving service sector productivity is a prerequisite to such a program. Because little is currently known about systematic ways of improving service sector productivity, research on that topic should be a priority area for National Science Foundation grantmaking. In addition, federal funding for the emerging discipline of services sciences, which uses principles from the sciences and engineering to improve service sector performance, should be a priority.[39]

Education and training policy can also help boost productivity and innovation in the United States, and federal and state support for education and training should be increased. In addition, education at all levels should place more emphasis on nonroutine problem-solving and communication skills. These skills are the ones that even the most technologically advanced low-wage countries have for the most part not yet developed. Jobs that require nonroutine skills are not likely to be offshored in the foreseeable future. Although basic factual knowledge and routine problem-solving remain important, the current emphasis on standardized tests and drilling students in these "basics" will serve the nation poorly if it causes school districts to cut back on education in nonroutine skills. Development of nonroutine skills (e.g., those that require creativity and problem solving) should also be a priority for colleges and universities. As this report has shown, college-educated workers whose jobs largely require routine skills, such as many computer programmers, are among the workers who are most vulnerable to offshoring.

Businesses that improve their productivity and innovative capacity often require their workers to learn new skills. Sometimes workers can learn the necessary skills on the job, but sometimes they need to take courses in technical schools, community colleges, or universities while continuing to work full-time. Federal and state financial aid programs should recognize this reality by making part-time students eligible for all forms of financial aid.

Because firms in some industries are more productive when they are located near other similar businesses, the economies of metropolitan areas, states, and the nation as a whole can benefit from geographic concentrations of firms. State governments, in collaboration with local business and labor-management partnerships, are well positioned to assess and meet the needs of their existing industry clusters in tradable services as well as in manufacturing. Firms in an industry cluster—"a group of firms, and related economic actors and institutions, that are located near one another and that draw productive advantage from their mutual proximity and connections"—usually share common business needs, such as particular workforce skills.[40] State (and local) governments can help retain these firms by helping them meet their common needs in such areas as technology, training, worker recruitment, and market development.[41]

Encourage businesses to integrate routine and nonroutine tasks. If businesses organize work so that routine and nonroutine tasks are integrated into the same jobs, fewer jobs are likely to be offshored than if they split routine and nonroutine tasks into separate jobs (and offshore the routine jobs). In particular, technicians who currently do nonroutine (but relatively low-paid) work could be trained to do some of the more routine engineering and IT service work that U.S. firms offshore or could potentially offshore. Businesses may discover that a careful analysis of the costs and benefits of such training, relative to those of offshoring, does not always support a decision to offshore, In addition, the federal government should provide incentives to both businesses and community colleges to provide the necessary training. For example, it should require, as a condition of receiving an income tax deduction for training expenditures, that firms spend at least the same percentage of salary on training for lower-paid workers as they do on training for highly compensated employees.[42] The federal government should also expand the National Science Foundation's Advanced Technological Education Program, which promotes partnerships between educational institutions, especially two-year colleges, and employers to improve the training of technicians in high technology fields.[43] This program funds several community college centers that develop and disseminate advanced curricula for technician training. With additional funding, it could support new centers to train technicians in computer programming and other tasks that could potentially be done more economically if they were integrated into technicians' jobs than if they were performed by engineers abroad.

2. Policies to Help Displaced Workers

Extend Trade Adjustment Assistance Act benefits to workers in any industry or occupation who are laid off because of trade. When Congress created the Trade Adjustment Assistance program in 1962 it focused on displacement in manufacturing. Policymakers at that time could not conceive of service functions being conducted halfway around the world at the speed of light. It is time to modernize this anachronistic provision and extend Trade Adjustment benefits to all workers who lose their jobs as a result of trade.

Provide wage insurance to displaced workers. Displaced workers often can find new work only in jobs that, at least at the outset, pay lower wages. The federal government can help displaced workers—and encourage them to find new jobs— by providing wage insurance. Under this proposal, the government would pay a displaced worker who had worked for his or her previous employer for at least two years half the difference between his or her old and new wages, up to a maximum of, say, $10,000, for two years after the start of his or her new job.[44] These benefits would be available in addition to unemployment insurance and Trade Adjustment benefits.

Modernize unemployment insurance. The unemployment insurance system was developed for an economy in which workers were laid off during recessions and recalled to their jobs when business picked up. Today, permanently laid off workers often need lengthy retraining to obtain new jobs. States should allow workers in approved training programs to collect unemployment insurance benefits, provide up to 26 additional weeks of benefit eligibility for displaced workers who are in approved training programs. The federal government should give states an incentive to raise their benefit levels by adjusting the unemployment tax rate and taxable wage base. It should also increase unemployed workers' after-tax benefits by exempting the first $2,500 of benefits and provide from federal income tax.[45]

Reinstate income averaging in the federal tax code. Before the1986 tax reform act went into effect taxpayers could average their income over three years, enabling them to avoid paying higher taxes in years when their incomes were temporarily high. Currently the federal tax code lacks this provision, penalizing workers who lose their jobs. Taxpayers should be allowed to average their income over three years and be able to take a tax credit for prior taxes paid if their tax liabilities fall because their incomes drop.

State and Regional Workforce and Economic Development Policies

As important as general federal and state policies are, metropolitan areas also need to address offshoring through more locally-oriented policies. This section discusses the ways in which state and local leaders can use workforce and economic development policies to respond to the challenges that offshoring poses for metropolitan areas. Those policies, whether implemented by state governments, municipal governments, regional public or private sector organizations (such as Workforce Investment Boards and Chambers of Commerce), educational institutions, or businesses, require the knowledge and involvement of people who understand the economic strengths and challenges of specific metropolitan areas. For this reason they differ from the more general policies discussed above.

Understand state and metropolitan economies. To craft specific, locally tailored responses to the offshoring challenge, workforce and economic development policymakers and practitioners must first understand the industries and occupations that are important to their states and metropolitan areas. Workforce and economic development officials and their staffs should ask employers, employer associations, and worker associations in their regions about the kinds of work that are being done, how those kinds of work are changing, which types of work are vulnerable to offshoring, and whether employers have any unmet needs that workforce or economic development agencies could help them meet.

Understand the business costs and benefits of offshoring. Public and private sector leaders should understand both the costs and benefits of offshoring to business. Businesses should measure these costs and benefits as

"As important as general federal and state policies are, metropolitan areas also need to address offshoring through more locally-oriented policies."

accurately as possible rather than simply assuming that offshoring will be the least expensive choice for routine services. Economic development organizations should help businesses in their states and metropolitan areas assess the costs and benefits of offshoring.

Recognize changing needs for workforce development services. The workers likely to lose their jobs because of offshoring are very different from the disadvantaged workers and displaced manufacturing workers for whom existing workforce development services have been created. They live in different metropolitan areas. Many work in occupations that require a college degree and that pay even higher wages than the highest-wage production jobs in manufacturing. State and local workforce development policymakers should recognize that offshoring could change the nature and geographic distribution of workers' needs for job placement, retraining, and income support. Policymakers in the metropolitan areas that are likely to suffer the most job losses from offshoring should be prepared to meet new and increasing demands on their workforce development systems.

Orient workforce development and educational programs toward services less likely to be offshored. Workforce development programs and institutions of higher education should generally orient their course offerings toward services that are not likely to be offshored in the near future. This does not mean that state colleges should stop offering computer science courses. However, it does mean that they should consider an occupation's offshoring potential when deciding whether to expand course offerings, open new departments or programs, or modify requirements of existing courses or programs. For example, adding nonroutine skills such as project management and system design to computer science programs could help make graduates of those programs less vulnerable to offshoring. Colleges and workforce development programs should ensure that all their curricula offer education in nonroutine skills, such as solving complex, unstructured problems or managing challenging projects; they should not overemphasize such routine skills as solving highly structured problems. Educational and training institutions that are designed to serve the needs of a state or metropolitan area should also tailor their programs to the specific kinds of nonroutine skills that the state or metropolitan economy is likely to need in the future. To understand these evolving skill needs they will have to develop close relationships with employers, industry groups, unions, and professional associations.

There is one important exception to the general recommendation to emphasize education in nonroutine skills. Technicians and back-office administrative support workers could be trained to do some of the more routine engineering and IT service work that U.S. firms offshore or could potentially offshore. Employers could find it more economical to hire these workers to do such routine tasks as computer programming as part of their jobs in the United States, rather than to treat computer programming as a separate service that would be offshored. Community colleges should offer courses in those routine skills as part of their educational programs for technicians.

Be prepared for changes in the spatial distribution of businesses within metropolitan areas. Services that do not require face-to-face contact are increasingly likely to be available online and some may be able to be offshored. This shift from face-to-face commerce to e-commerce, which goes beyond offshoring per se, has important implications for metropolitan economies now that more services are becoming tradable. It means that employment in bricks-and-mortar retail establishments facing Internet competition, whether located in central business districts or suburban malls, will likely grow more slowly. Similarly, offshoring of the most routine professional and administrative service jobs is likely to dampen employment growth in professional and business services in both central business districts and office parks. These developments poses challenges for central cities, older suburbs, and newer suburbs alike. At the same time, offshoring could spur the growth of distribution facilities, which are often located in suburban areas with good highway access.. For example, Amazon.com employs hundreds of workers at its New Castle, DE, and Kansas City distribution facilities. Likewise, 1-800 CONTACTS, a company that fills prescriptions for contact lenses over the Internet, employs over 550 employees in Salt Lake City, Utah.

Modernize economic development strategies by focusing more on knowledge- and innovation-intensive industries and occupations and by improving the productivity of existing employers, not subsidizing the recruitment of new firms that might offshore jobs later. With more services becoming tradable and footloose, economic development practitioners may be tempted to try to rely on traditional cost-based development strategies. They may think that the way to attract and retain service jobs is to subsidize companies to locate in their states and states and regions and emphasize low wages and taxes as sources of competitiveness. This would be a mistake. American states and metropolitan areas can never match the wage and tax costs of developing nations and should not strive to do so. To the extent that they continue to use locational subsidies as economic development tools, they should at the very least not subsidize activities (such as call centers) that are very likely to be offshored in the near future. Even better, they should focus on increasing their productivity and innovative capacity, which can be the new sources of comparative advantage for

their own economies.

States and metropolitan areas should continue to shift into more knowledge- and innovation-intensive industries and occupations. Such a shift may be especially important for large metropolitan areas. More routinized, cost-based work has filtered down out of many large, high-cost metropolitan areas to smaller, lower-cost metropolitan and rural areas. Large metropolitan economies may be best suited to specialize in complex, knowledge-based activities that rely heavily on nonroutine skills. These activities have strong agglomeration economies and are least likely to be offshored.

Shifting into these activities does not mean that every metropolitan area in the United States, or even every large one, should stake its future on the information technology or biotechnology industry. Few metropolitan economies are well suited to become centers for these industries.[46] Moreover, specializing in high technology industries that have by now generated a large number of routine jobs (such as computer programming jobs) will not protect a local economy against offshoring. A metropolitan area's ability to develop new technologies, products, or services, or to make creative use of those developed elsewhere, is what will afford it the best protection against offshoring. For example, if the information technology centers that this report has identified as most vulnerable to offshoring (e.g., San Jose, CA, and Lowell, MA) are able to remain at the technological cutting edge, then offshoring will be less of a problem for them.

Shifting into more knowledge- and innovation-intensive activities does not mean that it is sufficient to produce, attract, and retain as many college graduates as possible. Rather, metropolitan areas should produce, attract, and retain workers with nonroutine skills at all levels of formal education. College degrees, by themselves, do not guarantee these skills. Some of the occupations that are very vulnerable to offshoring, such as software engineering and actuarial work, are ones in which many workers have bachelor's or higher degrees.

States and metropolitan regions should also focus less on attracting jobs from the outside and more on generating economic activity internally. They should develop and implement economic strategies that seek to capitalize on their natural advantages as innovation incubators. States and metropolitan areas can do and are doing a host of things to compete in today's economy. Indeed, the "new economic development" of the last two decades, which focuses more on promoting innovation and learning than simply on cutting costs, is a reflection of the need to adapt to new economic conditions.[47] It includes targeted efforts to develop state and metropolitan strategic plans for economic development, build clusters of firms, boost skills, expand an innovation infrastructure (e.g., university research centers, venture capital programs, and technology transfer programs), spur entrepreneurial activity (e.g., small-business incubators and reduced barriers to the formation of small businesses), and help traditional firms modernize and become more productive. Although many communities continue to pursue cost-based recruitment strategies, this practice is becoming and should continue to become less prevalent compared to "new economic development" strategies,

Reduce business costs without reducing the standard of living. A major goal of state and local economic development policy is to raise the standard of living of state and local residents, especially low- and middle-income residents. Attempting to compete with low-income countries on the basis of low wages and taxes is not only unlikely to succeed; even in places where it does succeed in attracting business it may end up reducing the standard of living for the majority of

"A metropolitan area's ability to develop new technologies, products, and services, or to make creative use of those developed elsewhere, is what will afford it the best protection against offshoring."

"To improve their chances of remaining on the technological frontier, the most advanced IT firms in IT-specialized metropolitan areas should form consortia to promote cross-firm learning among managers, engineers, and other workers who can contribute to the development of new products and new technologies."

residents. Nevertheless, the increasingly footloose nature of many services means that state and local governments cannot afford to ignore business costs entirely. Business costs that are substantially higher than those of comparable locations need to be offset by business advantages, such as agglomeration economies or high-quality public services. If they are not offset in this way, then state and local governments should try to lower business costs in ways that raise or at least do not lower the standard of living of their low- and middle-income residents. For example, in growing metropolitan areas, zoning and building regulations that raise the cost of new construction drive up real estate values and rents and require wages to be higher than they would otherwise be.[48] Loosening these regulations would lower business costs without reducing the standard of living of residents who do not own real estate. Another way in which business costs can be lowered without reducing living standards is by improving the quality of state and local government services by reorganizing government work. Manufacturers have raised productivity and quality by using "high-performance work organization," which gives teams of production workers more authority over and responsibility for quality.[49] State and local governments could use similar changes in work organization to raise the quality of their services.

Maintain cost advantages from economies of scale. Economies of scale—the cost reductions that come about when a firm or an industry cluster expands production of a good or service—are a pervasive feature of economic life. A metropolitan area, state, or nation can often gain a cost advantage over other locations by expanding production of a tradeable good or service faster than other locations.[50] Therefore, a boost in demand for goods and services produced in the region or country can reduce regional or national costs of production, thereby reducing the likelihood of offshoring. State, and local governments can help retain tradable services by taking the location of service providers into account when making procurement decisions. A service provider's location in the United States or in a particular metropolitan area, state, or multi-state region should be one factor that counts in its favor if it seeks to be a government contractor. However, there are some industries that the use of government purchasing power will not be sufficient to retain and others in which a metropolitan area, state, or even the United States as a whole has no economic stake in retaining. Therefore, other states should not follow the example of New Jersey, which has banned state government purchases of services provided by firms located outside the United States. Instead, they and their local governments should implement a more flexible geographically based preference for government service contracts that takes into account the economic importance of a service to the state and its metropolitan areas and the likelihood that a government procurement preference will be effective in retaining a local service industry. State and local officials need considerable knowledge of their regional economies to implement such a preference.

Policies for Two Different Types of Metropolitan Areas: Concentrations in IT vs. Back-Office Services

This report has shown that two types of metropolitan areas—those that specialize in information technology services and those that specialize in information technology-enabled back-office services—are likely to be the most vulnerable to offshoring in the near future. These two types of metropolitan areas face different kinds of challenges in reducing their vulnerability to offshoring.

For metropolitan areas, such as San Jose, CA, that specialize in information technology services, the challenge is to remain on the technological cut-

ting edge. These places will need to continue to develop new goods and services and new technologies if they are to maintain their high standards of living. If they can do so then they may still experience many job losses because of offshoring, but they may gain even better jobs to replace the ones that they lose. There is nothing inevitable about their ability to do this, however. Not all metropolitan areas that have been highly successful in information technology services in the past will automatically be as successful in the future.

To improve their chances of remaining on the technological frontier, the most advanced IT firms in IT-specialized metropolitan areas should form consortia to promote cross-firm learning among managers, engineers, and other workers who can contribute to the development of new products and new technologies. Regional associations of IT workers, which already help workers share ideas across firm boundaries, could help IT firms form these consortia. The consortia would formalize and expand the kind of cross-firm idea sharing that already occurs in Silicon Valley and that has been an important reason for that region's economic dynamism.[51] Because the idea-sharing that these consortia would promote would benefit entire metropolitan economies, not just the IT firms and workers that participated in the consortia, state and local governments and independent economic development organizations should contribute modest amounts of seed funding to help start the consortia. They should also employ people whose industry knowledge and personal contacts would enable them to convene the industry actors who would lead the consortia.

For metropolitan areas, such as Danbury, CT, that specialize in back-office services, the challenges are different. These places specialize in more routine activities that are highly vulnerable to offshoring. They may be able to replace the offshored jobs with other routine service jobs that leave larger, more expensive metropolitan areas. If they can maintain a balance between jobs lost to offshoring and jobs gained through domestic relocation then they will be able to minimize the impact of offshoring on their economies. However, these metropolitan areas may not be able to maintain a sufficient inflow of routine jobs from higher-cost regions of the United States because some of those jobs are likely to be offshored immediately or eliminated by new technologies. In that case, metropolitan areas that now specialize in back-office services will need to specialize in higher-productivity activities. To do so they will have to upgrade their workforce skills and their innovative capacity.

State and local governments in back-office metropolitan areas should pay special attention to the quality of their educational systems at all levels of formal education, as well as to the quality of their workforce development programs. Community college programs that train non-engineers to perform some of the more routine engineering tasks that would otherwise be offshored could be especially important in lower-cost back-office metropolitan areas. If data-entry keyers, for example, could also do computer programming, the balance of productivity and wage costs could encourage employers to keep their jobs in those metropolitan areas rather than to offshore them.

State and local governments and independent economic and workforce development organizations in back-office metropolitan areas should also identify the largest employers in their metropolitan areas and understand both the reasons why those employers are located in those places and the forces that could lead those employers to offshore jobs. If those key employers have specific needs that they cannot meet in those metropolitan areas, then state and metropolitan leaders should use government policy or coordinated public-private strategy to help them meet those needs. In so doing, they can help reduce the likelihood that their major employers will offshore jobs.

The policies that would help back-office and IT-service metropolitan areas reduce their vulnerability to offshoring are not mutually exclusive. Metropolitan areas that specialize in both IT services and back-office services (as do nine of the 28 metropolitan areas that are most vulnerable to offshoring in the near future) would benefit from both sets of policies.

Conclusion

Mark Twain once stated that "prophecy is a good line of business, but it is full of risks." Certainly, any attempt to predict future economic changes, particularly at the metropolitan level, is full of risks. Yet the alternative—ignoring what we know about current trends, likely possibilities, and regional economic structures—is equally if not more risky, as it threatens to leave metropolitan areas unprepared for potential economic restructuring. As a result, this report should be read not so much as a forecast but as a roadmap of what kinds of risks particular metropolitan areas may face. Knowing those risks will better enable local economic development officials and civic leaders to assess their own risks and plan and implement strategies for succeeding in the future.

Appendix A: Offshoring Job Loss Projections for Metropolitan Areas

(Appendices B through D are available at http://www.brookings.edu/metro/pubs/20070131_offshoring.htm)

3.1 to 4.3 Percent
Boulder-Longmont, CO PMSA
Lowell, MA-NH PMSA
San Francisco, CA PMSA
San Jose, CA PMSA
Stamford-Norwalk, CT PMSA

2.6 to 3.0 Percent
Austin-San Marcos, TX MSA
Bergen-Passaic, NJ PMSA
Boston, MA-NH PMSA
Cedar Rapids, IA MSA
Colorado Springs, CO MSA
Dallas, TX PMSA
Danbury, CT PMSA
Denver, CO PMSA
Des Moines, IA MSA
Hartford, CT MSA
Huntsville, AL MSA
Jersey City, NJ PMSA
Middlesex-Somerset-Hunterdon, NJ PMSA
Minneapolis-St. Paul, MN-WI MSA
Nashua, NH PMSA
Newark, NJ PMSA
Omaha, NE-IA MSA
Orange County, CA PMSA
Rochester, MN MSA
Seattle-Bellevue-Everett, WA PMSA
Trenton, NJ PMSA
Washington, DC-MD-VA-WV PMSA
Wilmington-Newark, DE-MD PMSA

2.1 to 2.5 Percent
Akron, OH PMSA
Albany-Schenectady-Troy, NY MSA
Ann Arbor, MI PMSA
Atlanta, GA MSA
Baltimore, MD PMSA
Birmingham, AL MSA
Boise City, ID MSA
Bridgeport, CT PMSA
Burlington, VT MSA
Charlotte-Gastonia-Rock Hill, NC-SC MSA
Chicago, IL PMSA
Cincinnati, OH-KY-IN PMSA
Cleveland-Lorain-Elyria, OH PMSA
Columbus, OH MSA
Detroit, MI PMSA
Fort Lauderdale, FL PMSA
Fort Worth-Arlington, TX PMSA
Green Bay, WI MSA
Harrisburg-Lebanon-Carlisle, PA MSA
Houston, TX PMSA
Indianapolis, IN MSA
Jacksonville, FL MSA
Kansas City, MO-KS MSA
Lawrence, MA-NH PMSA
Lincoln, NE MSA
Los Angeles-Long Beach, CA PMSA
Madison, WI MSA
Manchester, NH PMSA
Melbourne-Titusville-Palm Bay, FL MSA
Miami, FL PMSA
Milwaukee-Waukesha, WI PMSA
Nashville, TN MSA
Nassau-Suffolk, NY PMSA
New Haven-Meriden, CT PMSA
New York, NY PMSA
Oakland, CA PMSA
Orlando, FL MSA
Philadelphia, PA-NJ PMSA
Phoenix-Mesa, AZ MSA
Pittsburgh, PA MSA
Portland, ME MSA
Portland-Vancouver, OR-WA PMSA
Portsmouth-Rochester, NH-ME PMSA
Provo-Orem, UT MSA
Raleigh-Durham-Chapel Hill, NC MSA
Richland-Kennewick-Pasco, WA MSA
Richmond-Petersburg, VA MSA
Sacramento, CA PMSA
Salt Lake City-Ogden, UT MSA
San Diego, CA MSA
Santa Barbara-Santa Maria-Lompoc, CA MSA
Santa Cruz-Watsonville, CA PMSA
Santa Rosa, CA PMSA
Sioux Falls, SD MSA
St. Louis, MO-IL MSA
Tampa-St. Petersburg-Clearwater, FL MSA
Tulsa, OK MSA
Ventura, CA PMSA
West Palm Beach-Boca Raton, FL MSA
Worcester, MA-CT PMSA

1.6 to 2.0 Percent
Albuquerque, NM MSA
Allentown-Bethlehem-Easton, PA MSA
Anchorage, AK MSA
Appleton-Oshkosh-Neenah, WI MSA
Baton Rouge, LA MSA
Benton Harbor, MI MSA
Billings, MT MSA
Bismarck, ND MSA
Brockton, MA PMSA
Buffalo-Niagara Falls, NY MSA
Charleston, WV MSA
Chattanooga, TN-GA MSA
Chico-Paradise, CA MSA
Columbia, SC MSA
Davenport-Moline-Rock Island, IA-IL MSA
Daytona Beach, FL MSA
Dayton-Springfield, OH MSA
Dubuque, IA MSA
Duluth-Superior, MN-WI MSA
Eau Claire, WI MSA
Eugene-Springfield, OR MSA
Evansville-Henderson, IN-KY MSA
Fargo-Moorhead, ND-MN MSA
Flint, MI PMSA
Fort Collins-Loveland, CO MSA
Fort Myers-Cape Coral, FL MSA
Fort Pierce-Port St. Lucie, FL MSA
Fort Wayne, IN MSA
Gainesville, FL MSA
Grand Rapids-Muskegon-Holland, MI MSA
Greensboro-Winston-Salem-High Point, NC MSA
Greenville-Spartanburg-Anderson, SC MSA
Hamilton-Middletown, OH PMSA
Honolulu, HI MSA
Jackson, MI MSA
Kalamazoo-Battle Creek, MI MSA
Knoxville, TN MSA
Lakeland-Winter Haven, FL MSA
Lancaster, PA MSA
Lansing-East Lansing, MI MSA
Lexington, KY MSA
Little Rock-North Little Rock, AR MSA
Louisville, KY-IN MSA
Lubbock, TX MSA
Lynchburg, VA MSA
Macon, GA MSA

Appendix A: Offshoring Job Loss Projections for Metropolitan Areas (continued)

(Appendices B through D are available at http://www.brookings.edu/metro/pubs/20070131_offshoring.htm)

Memphis, TN-AR-MS MSA
Missoula, MT MSA
Monmouth-Ocean, NJ PMSA
Monroe, LA MSA
Montgomery, AL MSA
Naples, FL MSA
New London-Norwich, CT-RI MSA
New Orleans, LA MSA
Norfolk-Virginia Beach-Newport News, VA-NC MSA
Odessa-Midland, TX MSA
Oklahoma City, OK MSA
Parkersburg-Marietta, WV-OH MSA
Pensacola, FL MSA
Peoria-Pekin, IL MSA
Providence-Fall River-Warwick, RI-MA MSA
Racine, WI PMSA
Reading, PA MSA
Reno, NV MSA
Roanoke, VA MSA
Rochester, NY MSA
Rockford, IL MSA
Saginaw-Bay City-Midland, MI MSA
Salem, OR PMSA
San Antonio, TX MSA
San Luis Obispo-Atascadero-Paso Robles, CA MSA
Sarasota-Bradenton, FL MSA
Savannah, GA MSA
Scranton-Wilkes-Barre-Hazleton, PA MSA
South Bend, IN MSA
Spokane, WA MSA
Springfield, IL MSA
Springfield, MA MSA
Springfield, MO MSA
St. Cloud, MN MSA
Syracuse, NY MSA
Tallahassee, FL MSA
Toledo, OH MSA
Topeka, KS MSA
Tucson, AZ MSA
Utica-Rome, NY MSA
Wausau, WI MSA
Wichita, KS MSA
York, PA MSA

1.1 to 1.5 Percent

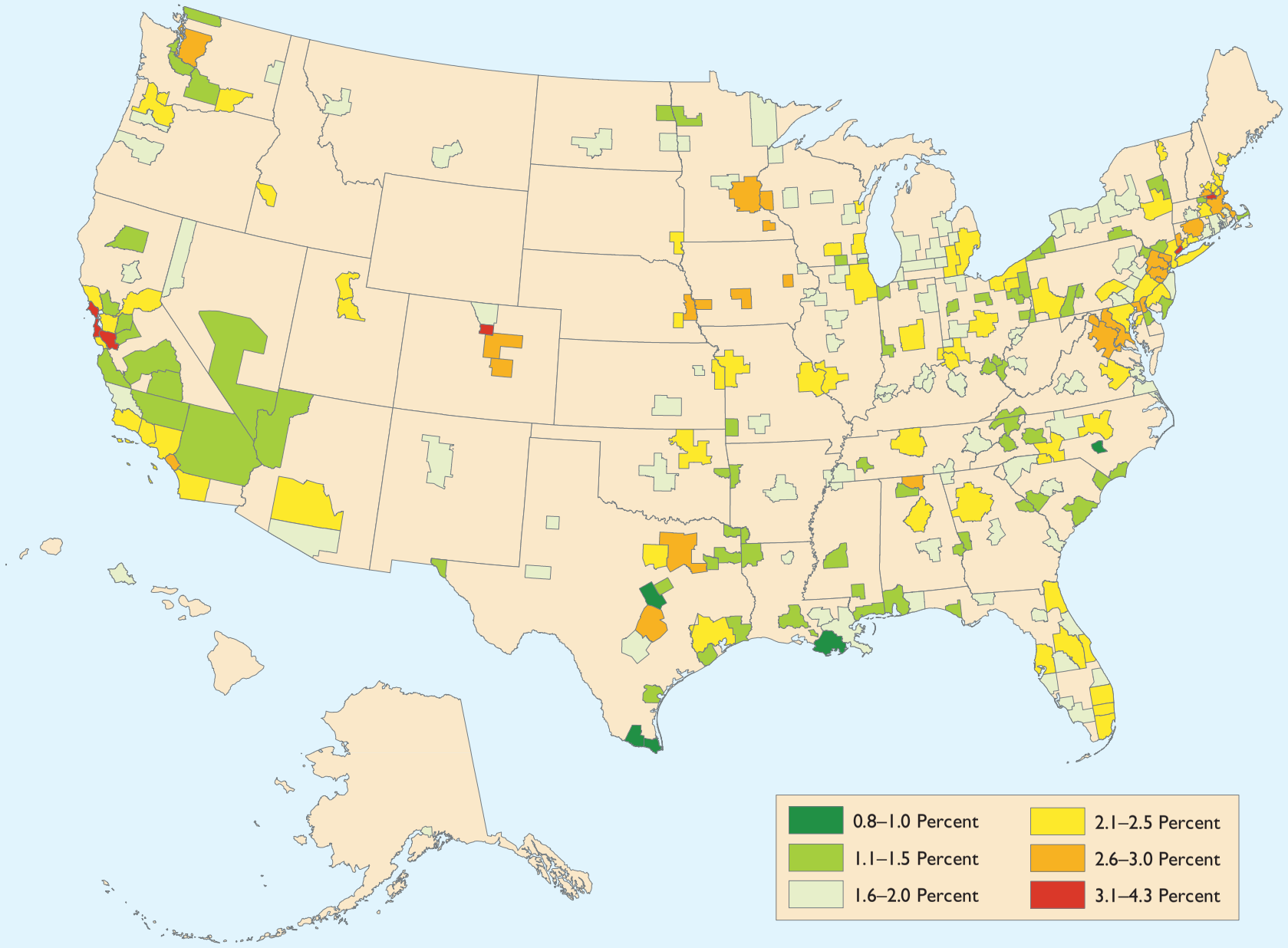
Altoona, PA MSA
Asheville, NC MSA
Atlantic-Cape May, NJ PMSA
Augusta-Aiken, GA-SC MSA
Bakersfield, CA MSA
Barnstable-Yarmouth, MA MSA
Beaumont-Port Arthur, TX MSA
Bellingham, WA MSA
Biloxi-Gulfport-Pascagoula, MS MSA
Binghamton, NY MSA
Brazoria, TX PMSA
Bremerton, WA PMSA
Canton-Massillon, OH MSA
Charleston-North Charleston, SC MSA
Columbus, GA-AL MSA
Corpus Christi, TX MSA
Decatur, AL MSA
Dover, DE MSA
El Paso, TX MSA
Elkhart-Goshen, IN MSA
Erie, PA MSA
Fitchburg-Leominster, MA PMSA
Fort Smith, AR-OK MSA
Fresno, CA MSA
Gary, IN PMSA
Glens Falls, NY MSA
Grand Forks, ND-MN MSA
Hattiesburg, MS MSA
Hickory-Morganton-Lenoir, NC MSA
Huntington-Ashland, WV-KY-OH MSA
Jackson, MS MSA
Jackson, TN MSA
Jamestown, NY MSA
Janesville-Beloit, WI MSA
Johnson City-Kingsport-Bristol, TN-VA MSA
Johnstown, PA MSA
Joplin, MO MSA
Kenosha, WI PMSA
Lafayette, LA MSA
Las Vegas, NV-AZ MSA
Lima, OH MSA
Longview-Marshall, TX MSA
Mansfield, OH MSA
Mobile, AL MSA
Modesto, CA MSA
Myrtle Beach, SC MSA
Newburgh, NY-PA PMSA
Panama City, FL MSA
Redding, CA MSA
Riverside-San Bernardino, CA PMSA
Salinas, CA MSA
Shreveport-Bossier City, LA MSA
Stockton-Lodi, CA MSA
Tacoma, WA PMSA
Terre Haute, IN MSA
Texarkana, TX-Texarkana, AR MSA
Tyler, TX MSA
Vallejo-Fairfield-Napa, CA PMSA
Visalia-Tulare-Porterville, CA MSA
Waco, TX MSA
Wheeling, WV-OH MSA
Wilmington, NC MSA
Yakima, WA MSA
Youngstown-Warren, OH MSA

0.8 to 1.0 Percent

Brownsville-Harlingen-San Benito, TX MSA
Fayetteville, NC MSA
Houma, LA MSA
Killeen-Temple, TX MSA
McAllen-Edinburg-Mission, TX MSA

Source: Authors' analysis of 2004 BLS Occupational Employment Statistics

Appendix A: Projected Levels of Service Offshoring by Metropolitan Area, 2004–2015



Source: Authors' analysis of 2004 BLS Occupational Employment Statistics.

Endnotes

1. Robert Atkinson is president of the Information Technology & Innovation Foundation. Howard Wial is an economist with the Metropolitan Policy Program at the Brookings Institution.

2. See Cynthia Kroll, "State and Metropolitan Area Exposure to Services Offshoring." Unpublished paper, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 2005; Cynthia Kroll, "State and Metropolitan Area Impacts of the Offshore Outsourcing of Business Services and IT." Paper 293, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 2005.

3. See Thomas L. Friedman, *The World Is Flat* (New York: Farrar, Straus and Giroux, 2005).

4. See Ashok D. Bardhan and Cynthia Kroll, "The New Wave of Outsourcing." Paper 1103, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley, 2003; Rafiq Dossani and Martin Kenney, "Lift and Shift: Moving the Back Office to India." *Information Technologies and International Development* 1 (2003): 21–37.

5. John C. McCarthy, *Near-Term Growth of Offshoring Accelerating* (Cambridge, MA: Forrester Research, 2004).

6. Bureau of Labor Statistics Current Employment Statistics (total private employment) and Business Employment Dynamics (job destruction and creation) data, available at **www.bls.gov**.

7. See, e.g., Bardhan and Kroll, "New Wave"; Kroll, "State and Metropolitan Area Impacts"; C. Alan Garner, "Offshoring in the Service Sector: Economic Impact and Policy Issues," *Economic Review* (Federal Reserve Bank of Kansas City), 3d quarter 2004: 5-37; Desiree van Welsum and Xavier Reif, "Potential Offshoring: Evidence from Selected OECD Countries," in Susan M. Collins and Lael Brainard, eds., *Brookings Trade Forum 2005* (Washington: Brookings Institution, 2006).

8. See Garner, "Offshoring in the Service Sector"; Frank Levy and Richard Murnane, *The New Division of Labor* (Princeton: Princeton University Press, 2004).

9. Cortright gives a comprehensive review of the economic benefits of agglomeration economies, See Joseph Cortright, Making Sense of Clusters: Regional Competitiveness and Economic Development (Washington: Brookings Institution, 2006). Wheaton and Lewis show that wages are higher in metropolitan areas that have occupational or industry agglomerations; this suggests that productivity is also higher in those places. See William C. Wheaton and Mark J. Lewis, "Urban Wages and Labor Market Agglomeration," *Journal of Urban Economics* 51 (2002): 542-562.

10. Edward Leamer and Michael Storper, "The Economic Geography of the Internet Age," *Journal of International Business Studies* 32 (2001): 641-665; Michael Storper and Anthony J. Venables, ""Buzz: Face-to-Face Contact and the Urban Economy," *Journal of Economic Geography* 4 (2004): 351-370.

11. See, e.g., Cortright, "Making Sense"; J. Bradford Jensen and Lori G. Kletzer, "Tradable Services: Understanding the Scope and Impact of Services Offshoring," in Susan M. Collins and Lael Brainard, eds., *Brookings Trade Forum 2005* (Washington: Brookings Institution, 2006).

12. Gary Gereffi and Vivek Wadhwa, "Framing the Engineering Outsourcing Debate: Placing the United States on a Level Playing Field with China and India" (Durham, NC: Master of Engineering Management Program, School of Engineering, Duke University). David Autor, Frank Levy, and Richard Murnane introduced the terms "routine" and "nonroutine" as applied to skills. See David Autor, Frank Levy, and Richard Murnane, "The Skill Content of Recent Technological Change: An Empirical Exploration," *Quarterly Journal of Economics* 118 (2003): 1279–1333.

13. See Garner, "Offshoring in the Service Sector."

14. Bardhan and Kroll, "New Wave."

15. See Susan Helper and Surendra Khambete, "Offshoring, Interfaces, and Collaboration across the Supply Chain: A Case Study in Automotive Product Development." Unpublished paper, Weatherhead School of Management, Case Western Reserve University, 2005.

16. Frank Levy and Ari Goelman, "Offshoring and Radiology," in Susan M. Collins and Lael Brainard, eds., *Brookings Trade Forum 2005* (Washington: Brookings Institution, 2006).

17. Spencer E. Ante, "Shifting Work Offshore? Outsourcer Beware." *Business Week*, January 12, 2004. However, some of this can be mitigated if American firms set up captive shops or outsource to other American firms. Moreover, a survey of 104 software projects by the Center for eBusiness at MIT (cited in Ante, "Shifting Work") found that the median Indian project had 10 percent more bugs than comparable U.S. projects.

18. Benoit A. Aubert, Michel Patry, and Suzanne Rivard, "Assessing the Risk of IT Outsourcing" (Montreal: Centre Interuniversitaire de Recherché en Analyse des Organizations, 1998).

19. See Deloitte Consulting, Calling a Change in the Outsourcing Market: The Realities for the World's Largest Organizations (2005).

20. Joseph I. Lieberman, "White Paper: National Security Aspects of the Global Migration of the U.S. Semiconductor Industry" (Washington: Office of Senator Joseph I. Lieberman, Ranking Member, United States Senate Armed Services Committee, 2003).

21. See Michael J. Piore, "The Limits of the Division of Labor in Design and the Prospects for Off-Shore Software Development in Mexico." Paper prepared for the Software Industry in the Developing World Workshop, Yale University, 2004.

22. The 2004 OES uses the 1999 metropolitan area definitions rather than the metropolitan area definitions that are currently in effect. The 2005 OES, which uses the current definitions, was not yet available when we conducted our analysis.

23. Garner, "Offshoring in the Service Sector."

24. Bardhan and Kroll, "New Wave."

25. Jensen and Kletzer, "Tradable Services"; Autor, Levy, and Murnane, "Skill Content."

26. Garner, "Offshoring in the Service Sector"; Alan S. Blinder, "Offshoring: The Next Industrial Revolution?" *Foreign Affairs* 85 (2006): 113–128.

27. For a description of the basis of McCarthy's projections see Garner, "Offshoring in the Service Sector."

28. Although it would have been ideal to compare wages relative to productivity across all U.S. metropolitan areas and all offshore locations, the necessary foreign data are unavailable at the occupational level.

29. Federal legislation restricting offshoring applies to only a few narrowly defined categories of government jobs . See Timothy Sturgeon, *Services Offshoring Working Group Final Report* (Cambridge: MIT Industrial Performance Center, 2006). As of 2005, only New Jersey had banned offshoring in state contracts and only a few other states had enacted legal preferences for onshore providers of services to state government. See Kroll, "State and Metropolitan Area Exposure."

30. See Kroll, "State and Metropolitan Area Impacts."

31. On the role of job mobility in the Silicon Valley economy, see AnnaLee Saxenian, *Regional Advantage* (Cambridge: Harvard University Press, 1994).

32. This range of estimates is derived from studies of the impact of export-industry (or "economic base") employment on total employment in U.S. metropolitan areas. See N. Edward Coulson, "Measuring and Analyzing Urban Employment Fluctuations," in Richard J. Arnott and Daniel P. McMillen, eds., *A Companion to Urban Economics* (Malden, MA: Blackwell, 2006); Mark S. Henry and J.C.O. Nyankori, "The Existence of Short-Run Economic Base Multipliers: Some New Empirical Evidence," Land Economics 57 (1981): 448-458; G.E. Thompson, "An Investigation of the Local Employment Multiplier," *Review of Economics and Statistics* 41 (1959): 61-67; George H. Hildebrand and Arthur Mace, "The Employment Multiplier in an Expanding Industrial Market: Los Angeles County, 1940-47," *Review of Economics and Statistics* 32 (1950): 241-249. Estimates exist only for a few metropolitan areas in a few time periods.

33. Michael W. Klein, Scott Schuh, and Robert K. Triest, *Job Creation, Job Destruction, and International Competition* (Kalamazoo, MI: Upjohn Institute, 2003).

34. Under rules established by the International Monetary Fund, each member country has agreed not to engage in "protracted, large-scale intervention in one direction in the exchange market." See Morris Goldstein, "Currency Manipulation," *JoongAhn Daily*, December 11, 2003.

35. The U.S.-Jordan Free Trade Agreement's requirement that each country enforce its own labor laws, is a first step toward this goal. See "Agreement Between The United States of America and the Hashemite Kingdom of Jordan on the Establishment of a Free Trade Area," article 6, **www.ustr.gov/assets/Trade_Agreements/Bilateral/Jordan/asset_upload_file250_5112.pdf**.

36. Corporate investments to participate in global standard-setting processes are an important component of U.S. competitiveness. But because each company can benefit from the actions of other companies in this area without doing anything on its own, U.S. companies appear to underinvest in standard-setting activities, just as they do in R&D.

37. Companies that would not qualify for the knowledge credit because their R&D-to-sales ratio has declined could take a credit equaling 10 percent of qualified research and training expenses over 50 percent of their qualified research expenses. This would include the average of qualified research expenses over the last three years. The logic here is to help provide an incentive for firms that for reasons unrelated to declines in research (e.g., mergers, firm maturity) could not otherwise take the credit.

38. For a description of this program see Philip Shapira, "Evaluating Manufacturing Extension Services in the United States: Experiences and Insights," in Philip Shapira and Stefan Kuhlmann, eds., *Learning from Science and Technology Policy Evaluation* (Cheltenham, U.K.: Edward Elgar, 2003).

39. On services sciences see Faiz Gallouj, *Innovation in the Service Economy: The New Wealth of Nations* (Cheltenham, U.K.: Edward Elgar, 2002).

40. Cortright, *Making Sense of Clusters*, p. iv.

41. Ibid.

42. Such a requirement could be patterned after the provision of federal tax law that requires firms that provide tax-favored pension plans to highly compensated employees to include lower paid workers in the same plans.

43. For a description of this program see **http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464&org=ESIE&from=home**.

44. Lori G. Kletzer and Robert E. Litan, "A Prescription to Relieve Worker Anxiety." Policy Brief #73 (Washington: Brookings Institution, 2001).

45. For a more detailed description of this proposal see Robert D. Atkinson, *Modernizing Unemployment Insurance for the New Economy and the New Social Policy* (Washington: Progressive Policy Institute, 2002).

46. Joseph Cortright and Heike Mayer, *Signs of Life: The Growth of Biotechnology Centers in the U.S.* (Washington: Brookings Institution, 2002)

47. Andrew M. Isserman, "State Economic Development Policy and Practice in the United States: A Survey Article," *International Regional Science Review* 16 (1994): 49-100.

48. See Edward L. Glaeser, Joseph Gyourko, and Raven E. Saks, "Urban Growth and Housing Supply," *Journal of Economic Geography* 6 (2006): 71–89.

49. See Eileen Appelbaum and others, *Manufacturing Advantage* (Ithaca, NY: Cornell University ILR Press, 2000).

50. See Ralph E. Gomory and William J. Baumol, *Global Trade and Conflicting National Interests* (Cambridge: MIT Press, 2000).

51. Saxenian, *Regional Advantage*.

References

Ante, Spencer E. 2004 "Shifting Work Offshore? Outsourcer Beware." Business Week, January 12.

Appelbaum, Eileen, and others. 2000. *Manufacturing Advantage.* Ithaca, NY: Cornell University ILR Press.

Atkinson, Robert D., 2002. *Modernizing Unemployment Insurance for the New Economy and the New Social Policy.* Washington, DC: Progressive Policy Institute.

Aubert, Benoit A., Michel Patry, and Suzanne Rivard. 1998. "Assessing the Risk of IT Outsourcing." Montreal: Centre Interuniversitaire de Recherché en Analyse des Organizations.

Autor, David, Frank Levy, and Richard Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics* 118: 1279–1333.

Bardhan, Ashok D., and Cynthia Kroll. 2003. "The New Wave of Outsourcing." Paper 1103, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley.

Blinder, Alan S. 2006. "Offshoring: The Next Industrial Revolution?" *Foreign Affairs* 85: 113–128.

Cortright, Joseph. 2006. *Making Sense of Clusters: Regional Competitiveness and Economic Development.* Washington: Brookings Institution.

Cortright, Joseph, and Heike Mayer. 2002. *Signs of Life: The Growth of Biotechnology Centers in the U.S.* Washington: Brookings Institution.

Coulson, N. Edward. 2006. "Measuring and Analyzing Urban Employment Fluctuations," in Richard J. Arnott and Daniel P. McMillen, eds., *A Companion to Urban Economics.* Malden, MA: Blackwell.

Deloitte Consulting. 2005. *Calling a Change in the Outsourcing Market: The Realities for the World's Largest Organizations.* New York: Deloitte Consulting.

Dossani, Rafiq, and Martin Kenney 2003a. "Lift and Shift: Moving the Back Office to India." *Information Technologies and International Development* 1: 21–37.

Friedman, Thomas L. 2005. *The World Is Flat.* New York: Farrar, Straus and Giroux.

Gallouj, Faiz. 2002. *Innovation in the Service Economy: The New Wealth of Nations.* Cheltenham, U.K.: Edward Elgar.

Garner, C. Alan. 2004. "Offshoring in the Service Sector: Economic Impact and Policy Issues." *Economic Review* (Federal Reserve Bank of Kansas City), 3d quarter, pp. 5-37.

Gereffi, Gary, and Vivek Wadhwa. 2005. "Framing the Engineering Outsourcing Debate: Placing the United States on a Level Playing Field with China and India." Durham, NC: Master of Engineering Management Program, School of Engineering, Duke University.

Glaeser, Edward L., Joseph Gyourko, and Raven E. Saks. 2006. "Urban Growth and Housing Supply." *Journal of Economic Geography* 6: 71–89.

Goldstein, Morris. 2003. "Currency Manipulation," *JoongAhn Daily,* December 11.

Gomory, Ralph E., and William J. Baumol. 2000. *Global Trade and Conflicting National Interests.* Cambridge: MIT Press.

Helper, Susan, and Surendra Khambete. 2005. "Off-shoring, Interfaces, and Collaboration across the Supply Chain: A Case Study in Automotive Product Development." Unpublished paper, Weatherhead School of Management, Case Western Reserve University.

Henry, Mark S., and J.C.O. Nyankori. 1981. "The Existence of Short-Run Economic Base Multipliers: Some New Empirical Evidence." *Land Economics* 57: 448–458.

Hildebrand, George H., and Arthur Mace. 1950. "The Employment Multiplier in an Expanding Industrial Market: Los Angeles County, 1940-47." *Review of Economics and Statistics* 32: 241–249.

Isserman, Andrew M..1994. "State Economic Development Policy and Practice in the United States: A Survey Article," *International Regional Science Review* 16: 49–100.

Jensen, J. Bradford, and Lori G. Kletzer. 2006. "Tradable Services: Understanding the Scope and Impact of Services Offshoring," in Susan M. Collins and Lael Brainard, eds., *Brookings Trade Forum 2005.* Washington: Brookings Institution.

Klein, Michael W., Scott Schuh, and Robert K. Triest. 2003. *Job Creation, Job Destruction, and International Competition.* Kalamazoo, MI: Upjohn Institute.

Kletzer, Lori G., and Robert E. Litan. 2001. "A Prescription to Relieve Worker Anxiety." Policy Brief #73. Washington: Brookings Institution.

Kroll, Cynthia. 2005a. "State and Metropolitan Area Exposure to Services Offshoring." Unpublished paper, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley.

_____. 2005b. "State and Metropolitan Area Impacts of the Offshore Outsourcing of Business Services and IT." Paper 293, Fisher Center for Real Estate and Urban Economics, University of California, Berkeley.

Leamer, Edward, and Michael Storper. 2001. "The Economic Geography of the Internet Age." *Journal of International Business Studies.* 32: 641–665.

Levy, Frank, and Ari Goelman. 2006. "Offshoring and Radiology," in Susan M. Collins and Lael Brainard, eds., *Brookings Trade Forum 2005*. Washington: Brookings Institution.

_____ and Richard Murnane. 2004. *The New Division of Labor.* Princeton: Princeton University Press.

Lieberman, Joseph I. 2003. "White Paper: National Security Aspects of the Global Migration of the U.S. Semiconductor Industry." Washington: Office of Senator Joseph I. Lieberman, Ranking Member, United States Senate Armed Services Committee.

McCarthy, John C. 2004. *Near-Term Growth of Offshoring Accelerating.* Cambridge, MA: Forrester Research.

Piore, Michael J. 2004. "The Limits of the Division of Labor in Design and the Prospects for Off-Shore Software Development in Mexico." Paper prepared for the Software Industry in the Developing World Workshop, Yale University.

Saxenian, AnnaLee. 1994. *Regional Advantage*. Cambridge: Harvard University Press.

Shapira, Philip. 2003. "Evaluating Manufacturing Extension Services in the United States: Experiences and Insights," in Philip Shapira and Stefan Kuhlmann, eds., *Learning from Science and Technology Policy Evaluation.* Cheltenham, U.K.: Edward Elgar.

Storper, Michael, and Anthony J. Venables. 2004. ""Buzz: Face-to-Face Contact and the Urban Economy." *Journal of Economic Geography* 4: 351–370.

Sturgeon, Timothy. 2006. *Services Offshoring Working Group Final Report.* Cambridge: MIT Industrial Performance Center.

Thompson, G.E. 1959. "An Investigation of the Local Employment Multiplier." *Review of Economics and Statistics* 41: 61–67.

van Welsum, Desiree, and Xavier Reif. 2006. "Potential Offshoring: Evidence from Selected OECD Countries," in Susan M. Collins and Lael Brainard, eds., *Brookings Trade Forum 2005*. Washington: Brookings Institution.

Wheaton, William C., and Mark J. Lewis. 2002. "Urban Wages and Labor Market Agglomeration." *Journal of Urban Economics* 51: 542–562.

Acknowledgments

The authors thank Alec Friedhoff for research assistance and Alan Berube, Bill Dickens, Brad Jensen, Cynthia Kroll, Sue Helper, Amy Liu, Tim Sturgeon, and Joel Yudken for advice and comments on earlier drafts of this report. They are also grateful to John McCarthy for sharing his occupational offshoring risk projections, to Brad Jensen and Lori Kletzer for sharing data on the tradability of services, and to David Autor for sharing data on the skill content of occupations. The Brookings Institution Metropolitan Policy Program thanks the John D. and Catherine T. MacArthur Foundation for its support of this report and of the Metropolitan Economy Initiative.

For More Information

Robert Atkinson
Information Technology & Innovation Foundation
ratkinson@innovationpolicy.org
(202) 449-1351

Howard Wial
The Brookings Institution Metropolitan Policy Program
hwial@brookings.edu
(202) 797-6412

About the Brookings Institution Metropolitan Economy Initiative

To inform debate about metropolitan economic development, the Brookings Institution has launched a series of analyses designed to promote understanding of the economic transformation underway in the nation's metropolitan areas. The Metropolitan Economy Initiative provides practical research and policy advice that state and local leaders can use to maximize their communities' economic potential and achieve prosperity.

In the Series:

- *Making Sense of Clusters: Regional Competitiveness and Economic Development*
- *Bearing the Brunt: Manufacturing Job Loss in the Great Lakes Region, 1995–2005*
- *The Implications of Service Offshoring for Metropolitan Economies*

Forthcoming:

- *Earnings Inequality in U.S. Metropolitan Areas*

THE BROOKINGS INSTITUTION

1775 Massachusetts Avenue, NW • Washington D.C. 20036-2188
Tel: 202-797-6000 • Fax: 202-797-6004
www.brookings.edu

METROPOLITAN POLICY PROGRAM
DIRECT: 202-797-6139 • FAX/DIRECT: 202-797-2965
www.brookings.edu/metro