Industrial Performance Center

Massachusetts Institute of Technology

Services Offshoring Working Group

Final Report

Why We Can't Measure the Economic Effects of Services Offshoring: The Data Gaps and How to Fill Them

Timothy J. Sturgeon

Working group coordinator and lead author

With steering committee members:

Frank Levy, Department of Urban Studies and Planning, MIT (Chair)

Clair Brown, Department of Economics and Center for Work and Technology, Institute for Industrial Relations, UC Berkeley

J. Bradford Jensen, Institute for International Economics

David Weil, Department of Finance and Economics, Boston University School of Management and Kennedy School of Government, Harvard University

September 10, 2006

MIT

292 Main Street, E38-104

Cambridge, MA 02139-4307

P 617-253-7522

web.mit.edu/ipc/www

The views expressed herein are the authors' responsibility and do not necessarily reflect those of the MIT Industrial Performance Center or the Massachusetts Institute of Technology.

ACKNOWLEDGEMENTS

We thank the Rockefeller Foundation and Alfred P. Sloan Foundation for their support of our Working Group. We would also like to thank the dozens of scholars and government officials who took time to be interviewed and attend our workshop. The interview respondents and workshop attendees are listed in Appendix B and Appendix C. We would especially like to thank Cynthia Kroll, Lori Kletzer, Ronil Hira, Catherine Mann, William Milberg, Richard Lester, Rafiq Dossani, George Stamas, Ralph Kozlow, and Sharon Brown for their helpful comments on an earlier draft of this report. Telephone discussions with Loren Yager and Michael Mohr were helpful in clarifying key issues. Scudder Smith helped with data retrieval and analysis. However, the views expressed in the report, as well as any errors or omissions, are entirely the responsibility of the authors.

TABLE OF CONTENTS

TABLES

FIGURES

MIT IPC WORKING GROUP ON SERVICES OFFSHORING: FINAL REPORT

EXECUTIVE SUMMARY

PURPOSE:

Our working group had two purposes: 1) to evaluate the data available for characterizing and measuring services offshoring and its effects on the United States economy, and 2) to make recommendations for improvements in data collection, dissemination, and analysis.

FINDINGS:

Although the scale of services offshoring has likely been modest so far, it will inevitably grow and stimulate changes in the United States economy — both positive and negative — through the relocation of work and the internationalization of innovative activities. Effective policy responses to these changes require a clear, detailed, and timely view of services offshoring and related economic changes based on solid economic data. Good economic data also provide appropriate market signals for companies, workers, students, and educational institutions.

The data system in the United States currently has significant gaps in the area of services, especially in the area of services trade. This undermines the development of sound policy. We see three broad solutions to this problem, each of which should be aggressively pursued: 1) more and better data on services trade should be collected; 2) more information should be extracted and published from existing data resources; and 3) quantitative research methods should be combined with qualitative methods to provide a better view of the context and character of services offshoring.

Our findings, in more detail, are as follows:

- Existing studies suggest that the current employment impacts of services offshoring are relatively small at the aggregate level. However, there is potential for rapid growth, which in turn could have larger impacts on U.S. employment and economic growth. Large and sudden changes undermine the ability of the economy to adapt to economic change. Furthermore, the effects of services offshoring will inevitably be more pronounced in specific industries, occupations, and geographic areas. This is why the collection and use of more detailed statistics are required.
- The data currently available for characterizing and measuring services offshoring have severe limitations.
    - The most significant gap is in services trade, both internationally and within the United States.
    - Employment by occupation (service or otherwise) cannot currently be tracked over time or by industry at the state and metropolitan levels.
    - These data limitations impede the development of appropriate policy responses to services offshoring because we do not know where in the economy to test for the effects of services offshoring.

- A better understanding of services offshoring will require a clearer view of the context in which offshoring occurs. Analysis of services offshoring must take into account factors such as:
    - how automation and computerization interacts with or substitutes for the relocation of service work;
    - how the character of labor markets in specific service industries and occupations enable or impeded services offshoring;
    - how corporate strategies in specific service industries influence the structure and location of service work.
- Information on the context for services offshoring is best collected using qualitative research methods.

RECOMMENDATIONS:

The government programs that collect and distribute economic data, inside and outside the United States, are undergoing constant improvement. Major strides have been made, specifically in the areas of improved classification systems, international harmonization, and data access. However, resources are constrained and many improvements are not proceeding as fast as they could.

There are many improvements that could be made to the data collection system of the United States and how it is used, so it is important to set priorities. The most severe defect in the United States' data collection system for services, by far, is in the realm of international trade.

We have identified five recommendations where current efforts to improve data on services will need to be dramatically accelerated if our understanding of services offshoring and its effects is to improve. We believe that these five recommendations, if implemented, will go a long way toward generating both the basic information and the deep understanding that will be required to formulate and effectively implement sound policies related to the globalization of service work. Because they will require substantial, long-term effort, it is imperative that our recommendations be implemented *now*, before the effects of services offshoring become larger and more acute.

Our five recommendations are as follows:

1) Collect more detail on international trade in services.

The Bureau of Economic Analysis (BEA) should collect more detail on services products that are traded internationally (affiliated and unaffiliated services imports and exports). The BEA currently collects data on only 17 categories of traded services products. In contrast, import and export statistics for the United States are currently available for more than 16,000 categories of goods. Without a more detailed view of which services are traded internationally, it will remain impossible to determine which sectors experience pressure from import competition. As a result, we cannot know where in the economy to look for the effects of services offshoring with any precision. This in turn renders other data on services less useful.

2) Collect more detail on domestic trade in services.

The U.S. Census Bureau should accelerate its efforts to collect more detailed statistics on services traded within the United States (services inputs and outputs). These more detailed statistics will help to provide a better view of the role that services play in the economy of the United States. Services account for more than 85% of U.S. private sector GDP, but we have very little information on the services that are bought and sold by companies.

3) Collect more detail and publish time series data on employment by occupation.

Because service work plays a role in all industries, adequate data on employment by *occupation* is necessary to determine the employment and wage effects of services offshoring. Data should be collected at the establishment level to enable links to data on domestic and international trade. We recommend two concrete steps in this regard:

> 3A) The Bureau of Labor Statistics should publish consistent time series on employment by occupation from the Occupational Employment Statistics (OES) program. If possible these data should be published, by industry, at the national, state, and metropolitan levels. Time series data will allow policy-makers to track employment trends in the occupations most vulnerable to job loss from services offshoring.
>
> 3B) The Bureau of Economic Analysis should collect data on more occupational categories in its surveys on the activities of U.S.-based multinational firms. More detail on the occupations created by multinational firms, at home and abroad, will provide a clearer picture of the employment effects of services offshoring.

4) Archive and provide access to more micro-data resources.

Steps should be taken to extract as much information as possible from the data that is currently collected by government programs. An inventory of current and potential micro-data resources should be made, and as many "micro-data" sets as possible should be archived, maintained, and made available to both government and academic researchers. Micro-data are the data that supports government administrative programs and underlies published statistics. In general, quantitative research based on micro-data can provide a better and more detailed view of services offshoring and its effects than research based on published statistics.

5) Accelerate research that combines quantitative and qualitative research methods.

No single approach or data set can hope to bring the complex and dynamic phenomena of services offshoring into complete focus. An interdisciplinary, collaborative approach is needed to combine insights from data collected by government programs with insights from researcher-generated surveys and field interviews. Quantitative methods allow researchers to estimate the magnitude and speed of economic change and to implement causality tests, while qualitative methods can provide a rich and nuanced picture of the complexity, context, and dynamics of services offshoring.

MIT IPC Working Group on Services Offshoring, Summary of Recommendations

1) Collect more detail on international trade in services.

The Bureau of Economic Analysis (BEA) should collect more detail on services products that are traded internationally (affiliated and unaffiliated services imports and exports). The BEA currently collects data on only 17 categories of traded services products. In contrast, import and export statistics for the United States are currently available for more than 16,000 goods. Without a more detailed view of which services are traded internationally, it will remain impossible to determine which sectors experience pressure from import competition. As a result, we cannot know where in the economy to look for the effects of services offshoring with any precision. This in turn renders other data on services less useful.

2) Collect more detail on domestic trade in services.

The U.S. Census Bureau should accelerate its efforts to collect more detailed statistics on services traded within the United States (services inputs and outputs). These more detailed statistics will help to provide a better view of the role that services play in the economy of the United States. Services account for more than 85% of U.S. private sector GDP, but we have very little information on the services that are bought and sold by companies.

3) Collect more detail and publish time series data on occupational employment.

Because service work plays a role in all industries, adequate data on employment by *occupation* is necessary to determine the employment and wage effects of services offshoring. We recommend two concrete steps in this regard:

3A) The Bureau of Labor Statistics should publish consistent time series on employment by occupation from the Occupational Employment Statistics (OES) program. If possible these data should be published, by industry, at the national, state, and metropolitan levels. Time series data will allow policy-makers to track employment trends in the occupations most vulnerable to job loss from services offshoring.

3B) The Bureau of Economic Analysis should collect data on more occupational categories in its surveys on the activities of U.S.-based multinational firms. More detail on the occupations created by multinational firms, at home and abroad, will provide a clearer picture of the employment effects of services offshoring.

4) Archive and provide access to more micro-data resources

Steps should be taken to extract as much information as possible from the data that is currently collected by government programs. An inventory of current and potential micro-data resources should be made, and as many "micro-data" sets as possible should be archived, maintained, made available, and used to both government and academic researchers. Micro-data are the data that support government administrative programs and underlie published statistics. In general, quantitative research based on micro-data can provide a better and more detailed view of services offshoring and its effects than research based on published statistics.

5) Accelerate research that combines quantitative and qualitative research methods.

No single approach or data set can hope to bring the complex and dynamic phenomenon of services offshoring into complete focus. An interdisciplinary, collaborative approach is needed to combine insights from data collected by government programs with insights from researcher-generated surveys and field interviews. Quantitative methods allow researchers to estimate the magnitude and speed of economic change and to implement causality tests, while qualitative methods can provide a rich and nuanced picture of the complexity, context, and dynamics of services offshoring.

BACKGROUND

The MIT Working Group on Services Offshoring was formed in February 2005 to evaluate the data available for characterizing and measuring services offshoring and its effects on the United States economy, and to make recommendations for improvements. In this report we summarize the debates triggered by recent increases in services offshoring, highlight the policy issues raised, evaluate the data and methods currently used to study the employment impacts of services offshoring, and make five recommendations for improved data collection and research methods. The working group is based at the Massachusetts Institute of Technology's Industrial Performance Center and derives its funding from the Rockefeller and Alfred P. Sloan Foundations. It has been led by Dr. Timothy J. Sturgeon and supported by a four-member steering committee (see Appendix A for the names, affiliations, biographies of the working group members). We have collected information and opinions about research and data issues related to services offshoring through a series of in-person and telephone expert interviews (see Appendix B for a list of in-person and telephone interview respondents), a day-long workshop held on the MIT campus on October 29, 2005 (see Appendix C for a list of attendees), and a review of the academic literature, United States government publications, and press reports on topics related to services offshoring.

WHAT'S IN THE REPORT

We begin our report with a summary of the recent public debate over the scale, speed, and welfare implications of services offshoring. We conclude that the employment effects have likely been modest so far, but point out that these effects may be felt differentially and, also, that there is potential for large and rapid change in the future. The context for this discussion, as well as those that follow, is the current lack of detailed government statistics on services, especially in the area of international and domestic trade. We also stress that services offshoring cannot be understood in isolation from other aspects of economic change, especially the rapid transformation of service work by information and communication technologies. We then present a set of key policy questions raised by services offshoring. These are important questions, and the lack of adequate statistics impedes the development of appropriate policy responses to services offshoring. We then present a set of arguments for why the current statistical regime in the United States, and the methods used by researchers, will be unable to cope with the policy questions raised by services offshoring without a dramatic acceleration of current efforts to improve them. The report concludes with a summary of our five recommendations.

THE SERVICES OFFSHORING DEBATE

Services offshoring has triggered a great deal of alarm and public debate in the United States and other advanced economies about the shift of white-collar work to countries with lower wages. It is easy to understand the concern. After twenty-five years of absolute decline in United States manufacturing employment, from a peak of 19.3 million in 1978 to 14.3 million in 2005, and a steady increase in service sector employment, from 61.9% of United States non-farm private sector employment in 1939 to 83.4% in 2005, the country has come to rely heavily on services for both employment and economic growth.[2] The offshoring of basic software coding began in earnest in 1998 with the run up to Y2K[3], and offshore call centers began to grow rapidly after 2000 with plummeting international telecommunications rates. Never the less, tight labor markets in the United States, together with the small size of these early developments relative to the overall economy, led them to be widely ignored. But by the fall of 2002 a debate over services offshoring was raging in the press, in policy circles, and a bit later, in academia. Why the sudden anxiety about services offshoring? We see three reasons.

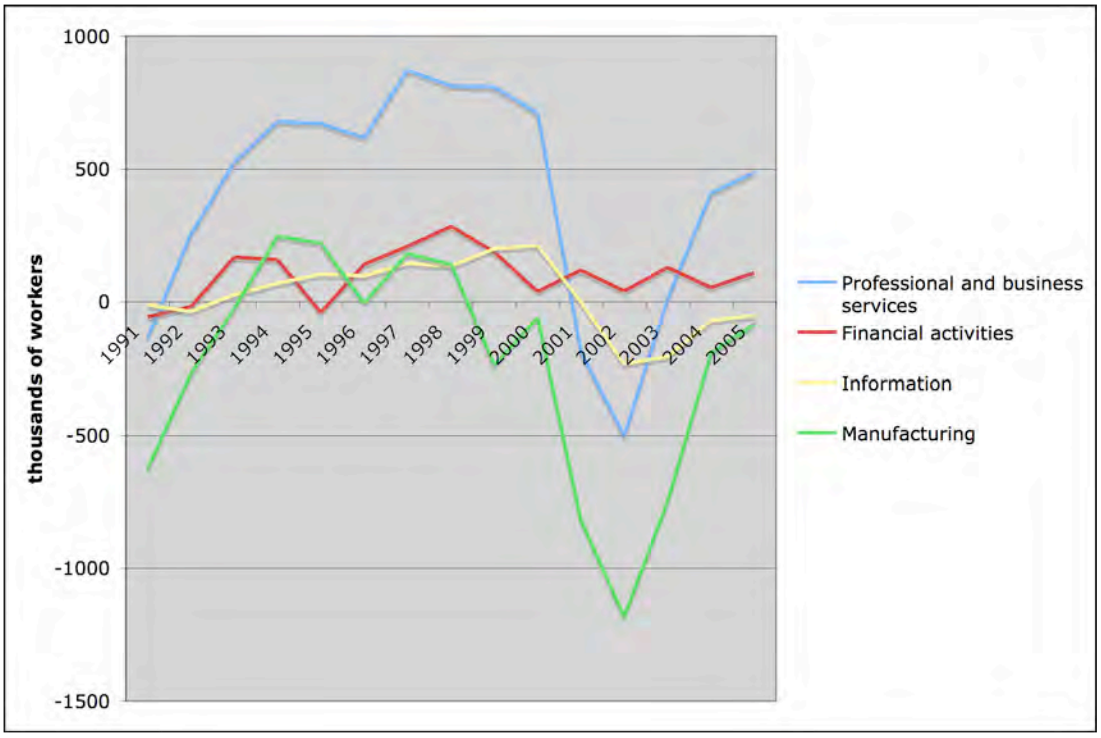
First, and perhaps most importantly, the initial debate over services offshoring took place in the context of a "jobless" recovery from a recent recession and a hotly contested presidential election. In the long and politically charged run-up to the 2004 presidential election, Lou Dobbs famously used his cable television news commentary to broadcast a nightly list of companies, and even some government agencies, that had announced plans to move back-office work offshore, and called for condemnation of the practice and legislation to stop it. The opposite pole in the debate was somewhat awkwardly established in February 2004 when N. Gregory Mankiw, author of one of the most popular college textbooks on economics and then chairman of the president's Council of Economic Advisers, remarked to reporters that the offshoring of U.S. service jobs was only "the latest manifestation of the gains from trade that economists have talked about" for centuries (Weisman, 2004). "Outsourcing is just a new way of doing international trade," Mankiw told reporters. "More things are tradable than were tradable in the past and that's a good thing." With historically high unemployment, slow job creation, and large-scale layoffs in some of the key occupations in the previously booming information industry such as software programming, there was ample opportunity to contrast Mankiw's abstract statements with real examples of American technology workers losing out to foreign workers. Moreover, the information industry had been widely touted throughout the 1990s as the backbone of the "new economy," so it was jarring to learn that this sector was subject, not only to severe

[2] Figures are from Bureau of Labor Statistics, Current Employment Statistics, http://www.bls.gov/sae/.

[3] Y2K stands for "Year 2000." It refers the upgrading of computer systems to accommodate the use of four-digit calendar dates. Because Y2K modifications were needed for older computer systems that required less than cutting-edge computer programming skills, and because there were labor shortages in the information technology sector in advanced economies at the time, Y2K work provided some of the first large contracts for Indian IT outsourcing firms such as Tata Consultancy Services and Infosys. As Phaneesh Murthy, a Director at Infosys, said, "Y2K allowed us to expand our target client list. Many medium-sized firms that would not otherwise have considered Indian software firms were forced to get to know them as a result of the shortage of U.S.-based programmers in the run up to Y2K. These software firms were later able to get other business from the medium-sized firms." (quoted in Dossani and Kenney, 2004; p. 16).

recessions, but also to seemingly permanent job loss through offshoring. Figure 1 shows that job loss in the information industry continued in 2004 and 2005, even as job creation in the other two service sectors shown in the figure resumed.

Figure 1. Net Annual Employment Change, Selected Sectors, 1991-2005,



Note: In the 2002 NAICs industry classification system, the information industry (NAICS 51) consists of traditional publishing, software, motion pictures, and broadcasting; Internet publishing and broadcasting; telecommunications; Internet service providers, web search portals, and data processing services; and other information services, including libraries.
Source: Bureau of Labor Statistics Current Employment Statistics, http://data.bls.gov/ces.

Second, the pace of services offshoring clearly increased during the 2001-2003 recession. A spate of press reports and company announcements in 2002 and 2003 outlined plans by dozens of large multinational firms to shift a wide variety of back-office functions to low-wage "offshore" locations, either by establishing their own offshore affiliates or by outsourcing the work to foreign contractors and local contractors with foreign operations. Prominent examples included banks such as Citicorp, HSBC, and J.P Morgan, as well as technology firms such as Accenture, Dell, Hewlett-Packard, and IBM. The primary recipient of this new business and investment has been India, but service work has also shifted to other places in Asia, East Europe, Ireland, Canada, and the Caribbean that have previously been used only for a very limited set of simple service tasks — primarily data entry.[4] In

[4] Such announcements continue to be made. According to the Financial Times, the IT services firm Electronic Data Systems (EDS), based in Plano, TX, recently reported that it will double its workforce in low wage countries to 45,000 (about 40% of its total workforce) in the "next few years" while it cuts employment in high wage countries through automation and downsizing. In April 2006 EDS had already acquired Mphasis, an Indian IT services company with 12,000 workers. The same report noted that IBM Global Services, which already has 45,000 (about 23%) of its workforce in India, will to continue to "rebalance" its global workforce by shifting employment in low cost locations (Waters, 2006).

India, companies including GE and American Express established large facilities of their own, but work was also shifted to multinational and local contractors such as Sykes and Wipro (Dossani and Kenney, 2003). The largest United States-based IT services firms, including IBM Global Services and Electronic Data Services, began to build up large operations in low-cost locations, especially India. Indian contractors, including HCL, Infosys, Satyam, TCS, and Wipro, all reported extremely rapid growth. All of this provided real evidence of rapid growth in services offshoring.

As the debate picked up steam, however, the list of services jobs mentioned as being vulnerable to offshoring grew beyond basic software coding and call center work to include a wide range of back-office functions such as payroll and accounting, financial and legal research, and even highly-skilled and tightly-regulated work such as the interpretation of radiology images. In retrospect, it is clear that some of the fears of rapid high-skilled job loss were unfounded. The idea that nearly all knowledge work, including research and development, was vulnerable to relocation (Engardio et al, 2003 and 2005), stoked fear in the workplace and helped to increase magazine sales, but did little to shed light on the actual or potential employment impacts of services offshoring.

Third, the apparently high potential for so many services to be produced at great distance from where they are consumed came as something of a surprise to many observers. Service work has historically been thought to consist of non-routine activities that require face-to-face contact between producers and users. In addition, services as different as haircuts and legal advice have traditionally been consumed, in place, as soon as they are produced. The customized and ephemeral nature of many services has led them to be considered "non-tradable" by economists or at least very "sticky" in a geographic sense relative to the production of tangible goods. But as was the case with manufacturing 100 years ago, many aspects of service work have begun to move from the realm of "craft production," where inputs and outputs are tailored and unique, into the realm of "mass production," where inputs and outputs are standardized and produced with the heavy application of machinery. In services, it is information technologies that have made the difference. Computerization is allowing a growing range of service tasks to be standardized, fragmented, codified, modularized, and more readily and cheaply transported between producers and consumers who might be at great distance. As in goods production, the application of information technology to the provision of services allows some degree of customization within the rubric of high volume production; what Pine and Davis (1999) call "mass customization." With computerization and inexpensive data storage, the second defining feature of services, that they cannot be stored, has also become less true than in the past. The apparent suddenness and breadth of these technological changes certainly added intensity to the services offshoring debate.

There has been some policy response to the public anxiety about services offshoring, but it has been largely reactive and incoherent. At the federal level, Congress passed the Thomas–Voinovich Amendment, forbidding any executive agency from using contractors outside the United States to provide civil services for one year.[5] Legislation was introduced in the House of Representatives, but not passed, to reduce the numbers of skilled foreign

[5] The Thomas–Voinovich Amendment applied only to outsourcing of civil service work under the Competitive Sourcing initiative, the procedures for which are described in the Office of Management and Budget Circular A-76. Outsourcing of civil service work under A-76 rules constitutes a small portion of federal procurement.

workers allowed into the United States to work on temporary "H-1B" and "L-1" visas.[6] Legislation was introduced in 34 states containing a variety of offshoring-related measures, from prohibitions on state contractors performing work outside of the country to restrictions on the movement of personal data to offshore processing centers (Kroll, 2005). Some of this legislation has been passed. The debate in Europe and Japan was more muted and nuanced, with few measures to limit services offshoring taken beyond those related to security (UNCTAD, 2004: 209-212).

The flurry of policy activity in the United States suggested a drift toward protectionism, and this caught the attention of policy-makers and academics who believe that freer trade is essential for the economic well being of the United States and its trading partners. Clearly, the jobs created by the investments of foreign firms in the United States, as well as the jobs created by further focusing the United States economy on activities best suited to its current capabilities — its comparative advantages — should be part of any serious effort to understand the employment impacts of services offshoring. When the jobs created by services trade and investment are included in any calculation of aggregate effects, the negative impact of services offshoring is reduced. A series of papers and reports were written to bring out these points (e.g., Mann, 2003; Garner; 2004; Groshen et al, 2005), and this in turn generated rebuttals from those focused on the concerns of labor (e.g., Bivens, 2005). Specifically, Price and Bivens (2004) used Indian data on (rising) software exports to the U.S. and U.S. data on (declining) software employment at home to infer that offshoring was eliminating high wage jobs in the United States.

How many jobs?

With services offshoring suddenly but quite firmly established as a real and present trend, the question that has been asked again and again has been: how many jobs are at stake? In response to the demand for numbers, a series of reports were released that

[6] Reducing the number of temporary visas for skilled foreign workers may at first seem incompatible with the aim of placing limits on services offshoring. However, it has been suggested that such reductions could help to speed the flow of services work to developing countries by restricting the skilled labor supply in advanced economies (UNCTAD, 2004; p. 209). Others have argued, on the contrary, that visa programs for skilled workers have accelerated services offshoring by providing foreign workers and contractors with the hands-on experience needed to better understand the requirements and business systems of their customers when work is subsequently moved offshore (Hira, 2005; p. 26). But the common thread between reductions in temporary skilled worker visas and limits on offshoring is that they both are intended to buffer skilled workers in the United States from competition from foreign workers, regardless of where the work is performed. Heavy use of skilled foreign workers — at home or abroad — during periods of negative or weak employment growth can place downward pressure on wages if foreigners working on temporary visas are paid less than natives. Widely publicized instances of workers in the United States being asked to train their foreign replacements in order to receive severance pay have added to a growing unease among the workforce in the information technology sector. Clearly, the wage effects of both offshoring and skilled worker visa programs depend critically on the overall demand for labor in specific industries and occupations. Hira and Hira (2005) have criticized the H-1B and L-1 visa programs on the grounds that companies in the United States increased, rather than decreased, their use of foreign workers after the bursting of the IT bubble in 2001, effectively changing the rationale for the program from a way to maintain staffing levels under conditions of tight labor markets to a way cut labor costs in a period of slack demand. Mann and Kirkegaard (2006, pp. 147-156) have refuted these claims. Using data from visa filings, they show that the number of H1-B visas granted peaked in 2001 at 331,206 and then fell to 197,537 in 2002 and 217,340 in 2003.

contained estimates of the current and future magnitude of job loss from services offshoring. Estimates were produced for the number of services jobs that had moved offshore since the year 2000 (77,000-100,000 per year), the number of service jobs that would move offshore in the next decade or so (54,000-600,000 per year), and the number of current service jobs in the United States that are "at risk" to offshoring (9,400,000 – 23,000,000).[7] Most estimates of job loss were based either on "expert judgments" or on extrapolations based on press reports, company announcements, and firm surveys. Bronfenbrenner and Luce (2004, p. 55), using extrapolations from media reports of production shifts out of the United States, estimate that 204,000 jobs were lost to offshoring in 2001 and 406,000 were lost in 2004. Nevertheless, the vast majority of these were manufacturing jobs. Of the 177 companies that announced job shifts in January-March 2004, 147 were in manufacturing industries. While such techniques provide a reasonable if rough estimation of recent moves by the largest firms, projections from company surveys and announcements are unreliable because companies can and do change their plans based on a range of factors, not least their experiences with new and largely untested practices like services offshoring.

Many economists have been quick to point out that the most commonly cited estimate of 340,000 service jobs lost per year, published in a report released in November 2002 by the market research and consulting firm Forrester Research, would amount to only .3 percent of total non-farm employment and one percent of average annual private sector job churn since 1993.[8] Moreover, standard trade theory posits that increases in trade lead to long-term benefits for high-wage economies through lowered prices and a shift of economic activity toward higher value activities. Mann (2003) has made this case specifically for the offshoring of information technology (IT) hardware manufacturing during the 1980s and 1990s. American IT hardware firms were able to prosper by offshoring the labor-intensive aspects of production while retaining control over the innovative trajectory of the industry. Lower production costs led to lower hardware prices, which stimulated demand and led to a proliferation of computer use across the economy, and in turn to large increases in aggregate productivity in the United States economy. Mahoney et al (2006) argue that services offshoring is having different demand effects; while services offshoring has lowered costs for companies, these savings have not led to an increase in demand for services inside the United States.

Estimates of the net job impacts of services offshoring, those that considered the

---

[7] For summaries of these estimates and their methodologies see GAO (2004, pp.44-45), Sako (2005, pp. 27-30); and NAPA (2006, pp. 49-78). The high estimate of six million jobs lost to services offshoring through 2013 (roughly 600,000 per year) was made in a newsletter published by Goldman Sachs in September 2003 (Dudley et al, 2003).

[8] For example, 32.1 million workers lost their jobs in the private sector in 2002. In the same year, 31.7 million workers found new jobs. So, while the economy, in recession, lost 356,000 jobs in 2002, the job churn that led to this outcome was nearly 1,000 times greater than the absolute change in the number of jobs. From 1993-2003, more than 327.7 million new jobs were added and 309.9 million jobs were lost in the United States, creating 17.8 million new jobs in the process (Bureau of Labor Statistics Business Dynamics Database). The point that many economists make in citing these data is that the United States economy, as a whole, typically creates more than 30 million jobs annually, a number that can easily absorb jobs lost through services offshoring. Others argue that job churn data do not provide the appropriate context for job loss caused by services offshoring because they include data on voluntary separations and relocations within companies as well as permanent elimination of jobs.

number of jobs *created* as well as jobs lost, essentially showed no significant impacts, especially over time. For example, according to the GAO (2004, p. 45) the consulting firm Global Insight, in a report commissioned by the trade group Information Technology Association of America, estimated that "about 104,000 of the 372,000 information technology (IT) jobs…lost from 2000 to 2003 [were due to] offshoring, or 2.8 percent of total core IT jobs in 2000." In their estimate of the number of United States jobs that would be required to produce net imports domestically, Groshen et al (2005, p. 7) reach a similar conclusion: that offshoring "…has contributed only marginally to the labor market's weak performance in recent years. Through year-end 2003, the number of jobs embodied in net imports did not exceed 2.4 percent of the country's total employment." Jensen and Kletzer (2006) examine net employment growth in industries and occupations they identify as tradable and find little difference in net employment growth between tradable and non-tradable services.

In interpreting these figures, we note that modest *net* employment changes can still lead to important distributional consequences – i.e. the mix of winners and losers in the economy. Small changes, if they are concentrated in specific occupations, industries, or geographic locations, can have devastating effects on those firms and workers who are directly affected. If the routine aspects of production are increasingly accomplished offshore, and the economy comes to consist of jobs associated with innovation and management on one hand, and low paid personal service jobs on the other, fears of widening the already large gap between rich and poor are raised (Autor et al, 2006). It also seems reasonable to be concerned that pervasive outsourcing and offshoring of tasks typically performed by entry-level personnel could undercut the possibilities for training and so eventually restrict the supply of high skilled labor (Hira, 2005).

Moreover, some economists have taken issue with the wisdom of projecting the modest near term aggregate effects of offshoring into the future. They point out that the fragmentation of service work made possible by information technology, combined with huge, suddenly-available labor pools and quickly rising capabilities in low-wage countries, creates risks of rapid high-wage job loss and wage suppression (Freeman, 2005), and decreases the ability of industries in advanced economies such as the United States to capture the full benefits of innovative activity. If an increasing amount of the work in industries where the United States has a comparative advantage is carried out outside the country from the very earliest stages of industry and market development, the employment and wage benefits of innovation will be more weakly felt at home (Samuelson, 2004). If some of the activities that are being moved offshore contain key elements of the innovation process itself, it becomes conceivable that the center of gravity of innovation and new market creation could eventually shift to locations outside the United States, a shift that would even impact jobs at the high end of the wage distribution.

The bottom line: we don't know

While our group concurs with what has by now become a near consensus that the number of jobs lost to services offshoring has so far been modest at the aggregate national level, and that the United States economy as a whole will certainly be able to absorb job losses from services offshoring in the near term, we believe that the focus on historical trends and aggregate effects that has characterized much of the debate so far misses two important points.

First, as already mentioned, the effects of services offshoring, or any new feature of the economy, are inevitably felt differentially across various constituencies. Even if the employment effects of services offshoring are positive at the aggregate level, job losses can be felt acutely if they are concentrated in specific occupations, industries, or metropolitan areas. In addition to job loss, there are real possibilities for the erosion of job quality, either through downward pressure on wages and decreased employment security caused either by fears of offshoring, its real effects, or some combination of the two. When adjustment policies are appropriate, they must be designed with these differential and subtler effects in mind, and data on services must be collected and published in sufficient detail to support flexible and targeted policies. For workers who have to move into jobs with lower wages, for example, some form of wage insurance to supplement pay temporarily may be appropriate (Kletzer, 2002). To implement such policies, however, the data must be adequate to identify such workers (or at least their occupations, industries, or locations) and determine the reasons for their fall in wages. Even some of those who argue strongly for greater trade openness (and, similarly, the net benefits deriving from offshoring) acknowledge the political impact of ignoring the distributional consequences of globalization. Recently, Ben Bernanke, the chairman of the Federal Reserve Board, argued that the benefits of globalization should be more widely shared within countries in order to build a "consensus for welfare-enhancing change" and avoid a resurgence of protectionism (quoted in Guha, 2006).

The second missing dimension in the debate has been the "co-evolutionary" character of global-scale economic integration: patterns of globalization that have already developed typically work to alter future patterns. While services offshoring has often been referred to as a "new" feature of the global economy, it may be unwise to conceive of it as entirely novel. We must consider the possibility that the pace of globalization observed in manufacturing industries since the 1970s will be a poor indicator of what is likely to happen in services. The offshoring of computer hardware production, for example, began at a time when the firms in societies receiving this new business had few capabilities. International communications systems were slow, unreliable, of limited functionality, and very costly to use. Services offshoring, by contrast, is expanding with the infrastructure, firm capabilities, and business models that have been established, tested, and refined in support of global manufacturing already in place. Services offshoring, then, may flow down the well-trodden avenues in the global economy that were put in place largely to support global-scale goods production: across highly functional and low-cost broadband communications systems, through cross-border business relationships that have now been in place for decades, according to business models regarding outsourcing and offshoring that have been worked out in exquisite detail, and through firms with huge, well established multinational operations.

We cannot and should not pretend to know precisely how much or what kind of economic activity will flow across these pathways, but we cannot afford to be complacent. The long-term prospects for continued innovative leadership of the United States may be less certain given the vastly altered playing field on which services offshoring is unfolding. Given this uncertainty, and the potential for rapid change, effective policy responses to the changes wrought by services offshoring will require a clear and timely view of the process based on solid economic data. In large part, such data does not currently exist. Better data is urgently needed and most importantly, the data must provide the detail required to support policies that are supple enough to be implemented when and where they are needed.

We need to look no farther than the current debate over services offshoring to see the importance of better data. Some contributors to the debate, at its worst, failed to make distinctions between those jobs that were *actually* being relocated, the jobs that companies *planned* to relocate, and the jobs that could *conceivably* be relocated. Whatever the actual number of jobs lost or at risk, the feeling certainly has grown in many American workplaces that large-scale job losses from services offshoring are both imminent and inevitable. Even if the vision of rapid escalation in the scale and skill content of services offshoring is somewhat unrealistic, the fear it has generated may well be having the real effects of retarding wage growth and job mobility in technology sectors and directing students away from computer science and other disciplines closely associated with technology sector careers. Indeed, the fear of offshoring, rather than offshoring itself, may be one reason why wages have been stagnant over the last five years, despite robust productivity growth, because the threat of job movements has caused employees to be cautious in exercising wage demands. Better data can provide substantial benefits simply by removing unwarranted fears. The sometimes shrill and unproductive character of the debate has certainly caused firms to become reluctant to announce their plans to engage in services offshoring, and given the current lack of detail in the official statistics on services trade, such barriers to the flow of information are particularly troubling.

At the same time, the debate over services offshoring has been useful in a number of ways. First, it has stimulated a hard look at the quality of the economic statistics available for measuring the scale and character of services offshoring and its effects on the United States economy, found them deficient, and generated calls for improvements. Second, it has focused attention on the long-term prospects for American leadership in the realm of innovation and new market creation -- leadership that can help to ensure prosperity in the face of economic change. Third, it has motivated new research on services offshoring, some of which has been extremely revealing. Fourth, it has renewed debate about the government's role in assisting workers and communities that are disproportionately hurt by economic change.

THE POLICY IMPLICATIONS OF SERVICES OFFSHORING

Why do we need better data on services? Like any group, our Working Group comes to its task with a set of prior notions of what the key issues are and why they are important. We take seriously the view that industry re-organization, computerization, increasing international trade, and rising capabilities and labor availability outside the United States are combining to create a more fluid global economy in which work can be more easily dispersed while remaining tightly coordinated on a daily, or even hourly, basis. The potential for rapid increases in services offshoring is sufficiently large that we cannot be complacent. Recent quantitative work by Jensen and Kletzer (2006) suggests that a significant share of United States employment are in service activities that are being traded across regions within the U.S., which in turn suggests that these same activities might be tradable internationally. Qualitative research on recent developments in a range of global industries also suggests that it has become easier to move service work offshore (e.g., Dossani and Kenney, 2005a).

Five trends driving the pace of services offshoring

We see five trends that could combine to accelerate the pace of services offshoring:

1. The "great doubling" of the global workforce. The end of the cold war and abandonment of autarkic "import substituting" development policies in places like India, Russia, and China have quite suddenly increased the size of the global workforce from approximately 1.5 billion to 2.9 billion (Freeman, 2005). If the energy and talent of these workers can indeed be effectively tapped (see below), this increase could prove large and sudden enough to place downward pressure on wages in both advanced industrial economies such as the United States as well as developing places that have long been part of the global system such as Latin America and South East Asia.
2. Lower costs and greater capacity in global communications networks. The overbuilding of international data transmission networks during the "dot.com" boom, as well as aggressive efforts by countries such as India and China aimed at improving their international links and domestic infrastructure, have contributed to a radical and sudden lowering of the costs of shifting work offshore. This has improved access to the huge pools of low cost but adequately skilled labor that have recently become available in the global economy.
3. The standardization, formalization, and digitization of service work. There has been broad application of information technology to a wide variety of work tasks and business processes (e.g., word processing, call routing, inventory management, factory production). Information technology facilitates both the fragmentation and relocation of work and the reintegration of those fragments once tasks are completed (Bardhan and Kroll, 2003; Berger at al, 2005). As more firms have adopted information technology it has become more standardized to facilitate system inter-operation and information sharing (Levy and Murnane, 2004). The encapsulation of work tasks into standardized modules (Baldwin and Clark, 2000) eases the movement of work because it reduces the need for exchanging tacit knowledge and the amount of training or new capital

investment required. Such "modularity" may be less common in services than in manufacturing, but advancements are proceeding with great speed, in part because of what has been learned in the realm of manufacturing (Gereffi et al, 2005; Berger et al, 2005).

4. The new, global supply-base. Standardization has also helped to create new business opportunities for "global supplier" firms that pool capacity for a range of customers (see Sturgeon (2002) for examples from electronics manufacturing and Batt et al (2005) for call centers). Some of these suppliers are located offshore (e.g., in India, Canada, and Ireland), and others have become global in scope, with facilities both within the U.S. and in a range of foreign countries. Such "global service providers" specialize in collecting work from other firms and moving it to its "optimal" location on the globe. They make it easier for medium-sized and even small firms to locate parts of their business outside of the United States.

5. The rise of the global start-up. Because of the above four trends, it has become possible for start-up firms to set up global operations from the first day of operation (Breznitz, forthcoming). Venture capitalists, in fact, are encouraging this practice (see Wilson, 2003; Mieszcowski, 2003; and Grimes, 2004). Not only does this raise the possibility that a larger share of employment creation from new firm and industry formation will occur offshore, it also raises questions about the continued innovative leadership of the United States, since parts of the innovation process itself are being moved offshore. In industries such as electronic hardware, United States-based firms have been able to retain (and in some cases regain) control over the innovative trajectory of some product categories while moving high volume, labor intensive, and price sensitive segments of the value chain to low cost geographies. The question is how sustainable this is, and if this same pattern can or will emerge in services.

These five trends open the possibility that the scale of offshoring in services will be very large, and moreover, that the speed of change will be quite rapid. Indeed, the pace of change has emerged as a critical factor in the services offshoring debate (Bardhan and Kroll, 2003; Blinder, 2005). There are three basic positions regarding how increases in services trade — and deepening global integration in general — will affect developed economies like the United States. These are spelled out in very rough terms as follows: (1) Specialization and innovative leadership will continue to make developed economies rich, so no policy interventions will be required (Bhagwati, 2004). (2) Policy-makers only need to worry if developed economies hive off parts of industries in which they have comparative advantages, but these negative effects will likely be small, so all policy should aim to do is compensate losers (Samuelson, 2004). (3) It is entirely possible for developed economies to lose comparative advantages over time, so policy-makers should take steps in some instances to assist existing industries and bolster innovative capabilities (Gomory and Baumol, 2000). All of these positions suggest that time is required for successful adjustment to globalization. Innovation and new market creation take time to occur, compensating losers is only possible if there are not too many coming on stream too quickly, and the erosion of comparative advantage might be staunched through policy interventions as long as it happens gradually. If services offshoring occurs with extreme rapidity, it will be difficult to innovate fast enough, compensate the flood of losers quickly enough, or craft and implement effective policy measures in time to make a difference. Dossani and Kenney (2004; 32) argue that the low capital intensity of service work, and the purely electronic form in which many services

can be delivered, will cause services offshoring to grow much faster than has been the case in manufacturing. And because service occupations are widely distributed throughout the economy, the negative effects of services offshoring could be more broadly based than has been the case with the offshoring of manufacturing work (Bardhan and Kroll, 2003). It may be that the flow of service work offshore will be large and rapid enough to make adjustment extremely difficult. In this view, it is not that the theory of comparative advantage is wrong, but "…sometimes quantitative change is so large that it brings about qualitative change" (Blinder, 2005, p. 2).

Our basic position is this: Although the scale of services offshoring has almost certainly been modest so far, it will inevitably grow and stimulate changes in the United States economy, both positive and negative, through the relocation of work and internationalization of innovative activities. A host of critical policy questions follow directly from this simple observation. They range from macro-level questions, such as the long-term innovative capacity of the United States in the face of deepening global integration, which cannot be answered directly by any data but about which talented researchers can certainly learn more with better basic data; to important questions that can be answered directly if substantial efforts to collect better data are made, such as how trade-impacted service industries and occupations are faring; to important questions that we can answer with relatively minor improvements in the way current data are reported, such as what is happening to jobs in occupations that we *suspect* — from case studies, company announcements, and press reports — are highly vulnerable to services offshoring.

We present a partial list of important policy questions raised by the growth of services offshoring below. These fall into two broad categories, questions about distributional impacts and questions about what specific policy responses should be. Again, these constitute only a partial list.

What are the distributional impacts of services offshoring?

- How are specific industries, occupations, and geographic locations being affected by services offshoring? Without better data on services trade, there will continue to be no satisfactory way of answering this question.

- Is global integration in services creating greater divergence between the success of United States-based firms and the economic health of workers and communities in the United States? If so, how can this be reversed? Current government statistical programs provide very little detail about the number and kind of service jobs created abroad by United States-based firms in affiliates, alliance partners, or suppliers.

- Which geographic and social communities are most at risk from services offshoring? Although there is reasonable detail in the data on employment and wage trends in specific service industries and occupations, there is not enough detail available at the level of individual states and metropolitan areas.

What should the policy response to services offshoring be?

- What employment, training, and social service programs are needed for workers harmed by services offshoring in particular, and global integration in general? How can these individuals and their needs be identified? The current Trade Adjustment Assistance program is only available for workers who have been displaced from jobs related to the production of physical goods, or "articles."

- How do educational institutions need to adapt to the growth of services offshoring? Which occupations and skills will be required in the future? At the national level we are currently able to track employment and wages in specific occupations with some precision, but because educational institutions tend to serve the surrounding community first and foremost, these data would be even more useful if industry and occupational detail were published together at the level of specific states and metropolitan areas.

- What policies can help firms based in the United States compete in the context of global integration? Before we can answer this question, we need to know more about how services firms succeed or fail in the global economy. How do firms leverage global value chains in services to their advantage and when they do, what are the effects on employment and innovative capacity at home? Insight into such questions will require more case studies and the use of micro-data to identify the factors that affect behavior and performance of firms in service industries.

- What immigration policies, including the granting of student visas and both temporary and permanent work visas, are appropriate for globally integrated industries? What effects are current immigration policies having on firm performance, employment, and wages as well as on universities in the United States? The geographic circulation of skilled people is an important characteristic of the global economy, and better data are needed for policies that regulate the flow of students and skilled workers. Although we have data on foreign students attending United States universities, especially for graduate degrees, we do not have data on what these students do after graduation. We need to know how long foreign graduates work in the United States and if (and when) they return home. Likewise, we have data on H-1B visa applications, but we do not have information on where temporary visa holders were educated and if they return home or become permanent residents.

- What steps can our public institutions take to help ensure technological and innovative leadership in the face of increased services offshoring? Despite some good preliminary research suggesting that "offshoring has been steadily creeping up the value chain and has reached the R&D segment within individual firms" (Bardhan and Jaffee, 2005, p. 15),[9] we currently have a poor understanding of the innovative process in service

[9] While Bardhan and Jaffee (2005, p. 16) state that "comparative advantage, or the forces of specialization and trade have reached the market for innovation goods and services," the results of their survey of 48 technology firms in California suggests that offshore R&D is unlikely to be carried out by the most innovative (small) firms.

industries, or of how closely tied innovation in services is to other activities in the value chain. We therefore have little basis for implementing targeted R&D tax credits or basic research funding in the realm of services. More case studies, the use of micro-data, and the collection of better basic economic data on services trade can help to shed light on the innovative processes in service industries.

What role do services play in the United States economy?

The importance of these policy questions means that we need to learn more about how service industries actually function. What role do services play in the United States economy? Without better data on services inputs and outputs inside the United States, for example, there will continue to be no way to answer this question in any detail. On this issue the U.S. Census Bureau, in explaining its reasons for focusing on definitions for services products in the new North American Product Classification System, has the following to say:

> Service industries now account for almost 70% of economic activity, over 85 million employees, and a disproportionate share of economic growth, yet there remains a significant imbalance with respect to the information available on services industries, the fastest growing segment of the New Economy, compared with the wealth of information available for manufacturing industries. If unaddressed, economic policymakers will be increasingly misinformed and misdirected about changes in the real economy, related to rates and sources of growth in output, prices, productivity, and trade. Moreover, this new services product information is critical to understanding some of the most hi-tech, dynamic, and rapidly growing areas of the service economy -- information, communication, computer services, business services, and health. Presently, there exists no official body of information on the richness of products produced by such firms, what market groups they serve, and the important changes in product composition that are occurring as the industry evolves. [10]

While we lack a detailed view of the roles that services play in the economy, it is clear that services are no longer limited to the support of manufacturing industries and the provision of personal services to individuals. Modern service industries are extremely dynamic and innovative. They create value, job growth, and influence the competitive position of the United States economy on the global stage. The bottom line is that the statistical system of the United States had not adequately adapted to the increased importance of services by developing systems that collect and disseminate highly detailed economic statistics, as they do in the goods sector.

The relatively small number of jobs that have likely been lost to services offshoring so far provides an opportunity to have the debates that are needed, craft and implement policies that are appropriate given the limited data, and ensure that the right data are available to answer the difficult and politically charged questions that will inevitably be asked in the future. Perhaps the recent debate about services offshoring will fade, but more likely it

[10] This passage can be found in a response to the frequently asked question: "Why does [the] North American Product Classification System initially focus on service industries?" (http://www.census.gov/eos/www/napcs/faqs.htm).

will return with a vengeance as the phenomenon continues to grow and change. Implementing improvements in the nation's statistical system is necessarily a slow process. The collection of reliable and useful data requires a great deal of planning and trial and error. For this reason, it is important to act quickly. We have little choice but to accelerate efforts to improve our data collection methods if our goal is to craft wise and effective policy responses to the rapidly evolving phenomena of services offshoring.

It is notable and quite unsettling that the most widely quoted estimates of the kind and number of jobs affected by services offshoring have come from the private sector. Whatever their actual quality, consulting firm estimates involve the actions of current or potential clients, and therefore cannot be counted on to support public policy. The lack of detailed government statistics, especially on services trade, both within the United States and internationally, has left a vacuum that has helped to create a debate that has been notable for its polarization and lack of nuance. Congressional requests to the Government Accountability Office and the National Academy of Public Administration to assess the data available to measure and characterize services offshoring have now yielded four reports (GAO, 2004, 2005a, 2005b; NAPA, 2006). Each of these has concluded that government statistics are not up to the job. These and other careful and balanced reports (e.g., Sargent and Meares, 2004; Aspray et al, 2006) note that the data required for a full picture of services offshoring and its effects are sorely lacking. Other than a 2004 white paper from the offices of Senator Lieberman and a 2005 GAO investigation into large variations in the scale of services trade reported by the United States and Indian government statistical agencies, no specific recommendations have yet been put forward to fill these data gaps. In the final section of the report we make five recommendations of our own. But first, we will make the case for why current data and methods are not up to the job.

WHY EXISTING DATA AND METHODS DON'T DO THE JOB

While a great deal of ink has been spilled in trying to reveal the extent of services offshoring using existing data, and to reassure policy-makers and the general public by re-stating basic economic theories regarding the benefits of international trade and the normalcy of large scale job churn in an economy the size of the United States, surprisingly little effort has gone into specifying how the federal government might improve data collection in the realm of services or how investigators might design new research to make better use of existing data. This remainder of this report tries to fill that gap.

As we noted in the previous section, most estimates of the kind and number of jobs affected by services offshoring that have been discussed in the press have come from the private sector. Why not use official government statistics? The data currently available for characterizing and measuring services offshoring have severe limitations.

In comparison with the data resources available for physical goods and manufactured products, the statistical system in the United States, or in any other country or international agency, for that matter, has very few methods for tracking detailed trends in service industries, services trade, and services inputs and outputs. Why is this the case? One reason is that services have long been viewed as ancillary to manufacturing, either as direct inputs (e.g., transportation) or as services provided to people who worked in manufacturing (e.g., residential construction, retail sales, etc.). As such, services have been viewed as a by-product, not a source, of economic growth. Because of this the infrastructure for the collection of economic data that emerged in the latter half of the 20th century was tuned to collecting data related to the production and trade of physical goods. Clearly, the assumptions behind this data regime have changed and the time has come for the statistical system to catch up.

In the realm of international trade, for example, data on the shipment of goods are compiled from the declaration forms that are filled out when physical goods pass through customs. Because of complex and shifting tariff schemes, customs forms require that goods in transport be assigned one of thousands of highly detailed product codes.[11] The absence of tariffs on services, and their non-physical character, means that when service work moves across borders, no customs forms are filled out and no such data are generated. The lack of an economic incentive to collect data (i.e. tariff revenues) therefore impedes the development of detailed data that in turn undermines the ability to create appropriate policy responses to services offshoring. Because of this we must rely on government surveys to collect data on services trade.

The combination of detailed data collection on inputs, outputs and trade and the relatively recent availability of establishment-level micro-data have enabled researchers to produce a wealth of analyses on the dynamics within the manufacturing sector on topics

[11] One example from more than 8,000 on the 2002 United Nations harmonized commodity list is HS 520852: "woven fabrics of cotton, containing 85% or more by weight of cotton, printed, plain weave, weighing more than 100 grams per square meter." See http://unstats.un.org/unsd/comtrade/mr/rfCommoditiesList.aspx for the full list.

such as job creation and destruction, productivity growth, and the impact of international trade. For example, Bernard, Jensen and Schott (2005a) link product-level information on United States goods imports to establishment level data on United States manufacturing plants to provide a detailed view of the effects of trade. They show that establishments that produce goods with a high level of competition from low wage countries are more likely to shed employment or close altogether, or if they do remain in operation shift production to goods that are more capital intensive and face lower import competition. While such studies do not tell us the entire story of the economic effects of international trade—because they have not examined the magnitude of employment created in unrelated establishments (e.g., as a result of lower costs of inputs) or other reasons why establishments might change (e.g., changes in technology)—the rich detail does provide a clear picture of a dynamic economy adapting to the pressures of international competition. (As we will point out later in our report, there is enormous potential to learn more from such micro-data.) The central point is that work of this kind is currently impossible for services. Linking international trade to the performance of domestic establishments requires both domestic and international detail that is currently available in the goods sector only. **We believe that the types of data available for the manufacturing sector can provide a useful template for the types of data that should be collected in service sectors.**

The importance of developing and deploying better classification systems for collecting data on services

The collection of detailed economic statistics requires detailed categories for collecting and publishing data. Classification systems that are standardized across data collection programs managed by different government agencies, both within the United States and internationally, vastly increase the comparability of official statistics and ease the matching of the "micro-data" generated. Until quite recently, the lack of attention paid to data collection in services, along with the difficulties inherent in enumerating and valuing many service activities, have resulted in very general categories for the collection of data on service industries, products, and occupations. But recent progress has been made. **The main task, therefore, is to fully develop and deploy these new classification systems across the statistical system, regardless of the agency that has responsibility for developing and maintaining the classification scheme.**

THE NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS)

In 1997 a NAFTA-level industry classification system, the North American Industry Classification System (NAICS) was created to replace the Standard Industrial Classification (SIC) system. It was developed in cooperation with the statistical agencies of Canada and Mexico to establish a 3-country standard that allows for a high level of comparability in business statistics among the three countries. NAICS is the first economic classification system to be constructed based on a single economic concept; namely a "process-oriented" approach to classify establishments.[12] The NAICS was updated in 2002 to include an

[12] The SIC treated establishments engaged in service work in two different ways. Establishments that were providing services to a parent firm in a manufacturing industry were classified as part of the parent firm's

expanded range of service industries. As a result, the system contains a much richer set of industry categories for services, which were sorely lacking under the old SIC system.[13]

The NAICS is gradually being implemented across the statistical system, but we believe that the pace of this work should be accelerated. For example, the Bureau of Economic Analysis has begun to utilize the NAICS for its surveys of multinational firms, but only at the four-digit level. Table 1 shows 4-digit NAICS detail in Professional, Scientific, and Technical Services. **As part of our first recommendation, we urge the Bureau of Economic Analysis to collect and publish more industry detail in its surveys on the activities of United States multinational firms.**

Table 1. Four Digit NAICS detail collected in BEA Surveys of Multinational Firms, examples from Professional, Scientific, and Technical Services

NAICS code	Industry
5411	Legal services
5412	Accounting, tax preparation, bookkeeping, and payroll services
5413	Architectural, engineering, and related services
5414	Specialized design services
5415	Computer systems design and related services
5416	Management, scientific, and technical consulting services
5417	Scientific research and development services
5418	Advertising and related services
5419	Other professional, scientific, and technical services

Source: Bureau of Economic Analysis, Guide to Industry Classifications for International Surveys, 2002. Available at http://www.bea.gov/bea/surveys/diasurv.htm.

THE NORTH AMERICAN PRODUCT CLASSIFICATION SYSTEM (NAPCS)

Data on international trade in physical goods and material is available in exquisite detail, on-line, in the United Nations Statistical Division's Commodity Trade Statistics Database (known as UN COMTRADE). This database contains detailed imports and exports statistics reported by the statistical authorities of nearly 200 countries, from 1962 to the most recent year, currently 2005.[14] Because these data are collected from many different national statistical agencies, they vary in quality and coverage. Nevertheless, the COMTRADE database provide information on imports and exports by value and in some cases by the number of units or volume shipped, according to seven different commodity lists, the most detailed being the 2002 Harmonized Tariffs Code (HTC) list, which at the six-digit level includes more than 8,000 product descriptions. As far as we know, COMTRADE is the only comprehensive, highly detailed, globally harmonized economic dataset that is available on any subject. There is nothing of similar scope in the areas of employment,

---

industry (a "demand-oriented" approach), while establishments that were not were classified according to the corresponding service industry (a "process-oriented" approach). The NAICS corrected this discrepancy by fully adopting a "process-oriented" approach to industry classification. It is important to note that dropping the characteristics of the main product of the parent firm as a criteria for industry classification runs the risk of moving firms out of industrial sectors of which they are a vital part and into sectors to which they have little affinity.

[13] See http://www.census.gov/epcd/naics02/naicod02.htm for a complete list of NAICS industry categories.

[14] See http://unstats.un.org/unsd/comtrade/

wages, or domestic output. The United States data, published by the Department of Commerce, is available at the ten-digit HTC level, which includes more than 16,000 product descriptions.

These data have been used to reveal trade flows at the global level, and allowed researchers to estimate, with a high degree of specificity, how international trade affects firms and workers in individual industries. The availability of these data has, understandably, tilted research on international trade towards the goods sector. While this work has contributed greatly to our understanding of international trade and its impacts on various national economies and industries, the lack of similar detail or global coverage in statistics on international trade in services trade has created a significant knowledge gap.

Likewise, in the realm of domestic trade, we can contrast the detail available in goods to the lack of detail in services. For the manufacturing sector, the Census Bureau collects fairly comprehensive information on a range of plant inputs including production workers, non-production workers, energy inputs, and capital stock in the plant. Survey questions about inputs and outputs are tailored to individual sectors and are classified according to more than 6,000 product codes. For the service sector, the information is not nearly as detailed or as comprehensive. There are fewer than 100 product codes in current use for service inputs.

However, recent progress has been made that has the potential to solve many of these problems. In the spring of 2006 the Census Bureau, in collaboration with its counterpart agencies in Canada and Mexico, completed the development of 99 detailed product lists that identify and define the significant products produced by about 370 service industries. Work to date has focused on the products produced by service industries in 12 2-digit NAICS sectors (48-49 through 81). In all, more than 3,500 individual service products have been defined. This work has taken place under the auspices of the North American Product Classification System (NAPCS), a joint, multi-phase initiative to develop a comprehensive demand-oriented product classification. To provide a flavor of the detail that these new product lists contain, we provide a sample from the provisional product list for Software Publishers, Internet Service Providers, Web Search Portals, and Data Processing Services (NAICS industries 5112, 518, 54151) in Table 3. What is important about these product definitions is that they are extremely detailed in terms of what they do, and in many cases do not, include. This level of detail, if fully deployed in our statistical system, would go a long way toward filling the data gap in services trade.

Although the product descriptions in NAPCS are provisional and have not yet been developed into a full-blown, hierarchical product code system, and have so far only been assigned reference codes for use by the NAPCS working group, they represent a significant step in the direction of defining the characteristics of services for data collection purposes. **The main element of our first, and most important, recommendation is that the product definitions in the NAPCS be fully developed by the U.S. Census Bureau and deployed in the BEA surveys on international trade in services.** This does not mean that all respondents should have to choose among 3,500 product definitions. As with the product codes for goods in surveys conducted by the U.S. Bureau of Census, for example in the Economic Census, the survey questions will need to be tailored to the specific products typically produced (outputs) and consumed (inputs) by firms operating in a specific industry.

Table 2. Sample Descriptions from the North American Product Classification System (NAPCS); Provisional Service Product List, Samples from the Software Publisher, Internet Service Provider, Web Search Portal, and Data Processing Services Industries

Working Group Code	Product Title	Product Definition
1.2.1.1	Customization and integration of packaged software	Adapting (modifying, configuring, etc.) and installing an existing application so that it is functional within the clients' information system environment. This service may include custom programming and training. Excludes: service contracts where this service is bundled with the hosting and management of the application on an on-going basis are classified to the appropriate sub-category of the Hosting and IT Infrastructure provisioning services under 1.3, Hosting and information technology (IT) infrastructure provisioning services.
1.2.1.2	Database design and development services	Designing the structure and content of a database and/or of writing the computer code necessary to create and implement a database (data warehouse). Excludes: service contracts where the design and development of a database is bundled with the on-going management of the data holdings are in 1.3.6, Data management services.
1.2.1.3	Custom programming services, except web sites, database, and packaged software integration	Designing the structure and writing the computer code as necessary to design, develop, and implement a custom software application, other than programming for websites, databases, or packaged software integration.
Continued…		82 additional definitions in these three industry categories (1 of 99 lists).
Total		3,500 definitions in 370 service industry categories in 99 lists.

Source: United States Census Bureau, Provisional Product List for NAICS 5112, 518, 54151: Software Publishers, Internet Service Providers, Web Search Portals, and Data Processing Services, http://www.census.gov/eos/www/napcs/napcs.htm.

While there are plans to use the NAPCS product lists in the 2007 Economic Census to collect data on service outputs, there are no current plans that we know of to collect additional detail on services inputs. **In our second recommendation, we urge the Census Bureau also to use NAPCS in the 2007 Economic Census for the collection of inputs, even if only in a limited set of pilot surveys. These data should be collected at the establishment level (as they are in the manufacturing sector), rather than using firm-level collection instruments, because this provides a much more precise view of the sectoral and geographic characteristics of economic activity.**

THE STANDARD OCCUPATIONAL CLASSIFICATION SYSTEM (SOC)

In 2000 the Bureau of Labor Statistics completed a new system for classifying occupations called the Standard Occupational Classification (SOC). In this system all workers are classified into one of over 820 occupations according to their occupational definition. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. Each broad category groups occupations

requiring similar job duties, skills, education, or experience. The SOC has a greatly expanded range of service and service-related occupations in comparison with the various occupational classification schemes that have been used by government agencies in the past. As a rough indication of the coverage of occupations involving service or service-related activities, we found that 234 of the occupations in the SOC have the word "service" either in the occupation's title or its description.

The BLS has made good progress in deploying the SOC across its data collection programs. To date, the system is currently in use in the key programs on employment, including the Occupational Employment Statistics program and the Current Population Survey. The SOC is also used in the Employer Costs for Employee Compensation, the Census and Survey of Fatal Occupational Injuries and Illnesses, and the Employment Cost Index. The SOC is currently being rolled out in the various National Compensation Surveys, a process that will be completed by the end of 2008.

We recommend that the SOC also be used, in some form, in other data collection programs. Specifically, the Bureau of Economic Analysis should use the 23 major occupational groups in the SOC in its surveys on United States multinational firms. Currently, these surveys only collect data on 2-3 occupational groups: production, non-production, and in some surveys, research and development. The manufacturing focus of these categories, and their extremely thin detail, is apparent. The 23 major occupational groups in the SOC are shown in Table 3.

Table 3. The 23 Major Groups of the Standard Occupational Classification System

11-0000 Management Occupations	13-0000 Business and Financial Operations Occupations	15-0000 Computer and Mathematical Occupations
17-0000 Architecture and Engineering Occupations	19-0000 Life, Physical, and Social Science Occupations	21-0000 Community and Social Services Occupations
23-0000 Legal Occupations	25-0000 Education, Training, and Library Occupations	27-0000 Arts, Design, Entertainment, Sports, and Media Occupations
29-0000 Healthcare Practitioners and Technical Occupations	31-0000 Healthcare Support Occupations	33-0000 Protective Service Occupations
35-0000 Food Preparation and Serving Related Occupations	37-0000 Building and Grounds Cleaning and Maintenance Occupations	39-0000 Personal Care and Service Occupations
41-0000 Sales and Related Occupations	43-0000 Office and Administrative Support Occupations	45-0000 Farming, Fishing, and Forestry Occupations
47-0000 Construction and Extraction Occupations	49-0000 Installation, Maintenance, and Repair Occupations	51-0000 Production Occupations
53-0000 Transportation and Material Moving Occupations	55-0000 Military Specific Occupations (note: not collected in the OES)	

Source: Bureau of Labor Statistics, Standard Occupational Classification, http://www.bls.gov/soc/soc_majo.htm

As we can see from these examples, the statistical system of the United States is moving in the direction of providing more detail on the service sector, and has developed, or begun to develop, classification schemes that reflect the richness and importance of services. These classification schemes have begun to be deployed across the statistical system. But given that the service sector already dominates the United States economy, and that the globalization of service work is likely to become a prominent feature of the economic landscape, we recommend that the pace of this work accelerate. These investments will enable researchers and policymakers to better understand the role that services play in the larger economy, and in particular, how international trade is affecting service employment. **We believe that the statistical system, as a whole, should collect and publish more detailed information on service industries, service sector inputs, service sector outputs, international trade in services, and service-related occupations using the three classification schemes discussed in this section.**

International trade in services – the biggest data gap

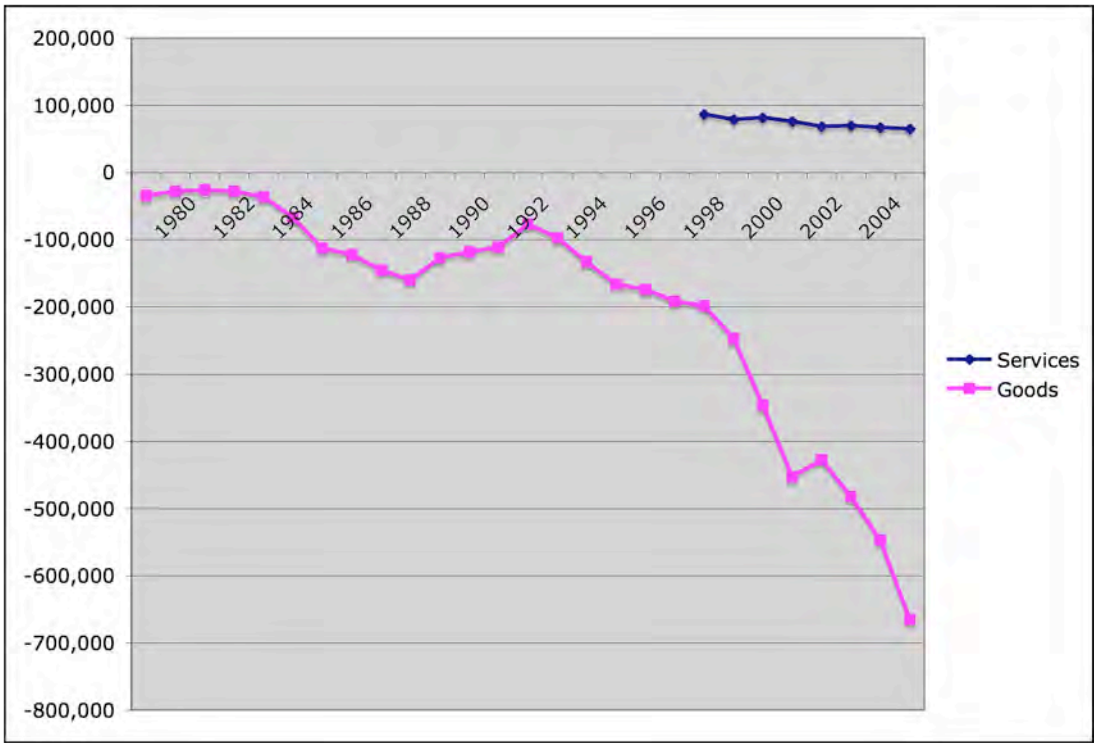
When value added outside of the United States enters the country it shows up in economic statistics as imports, either of goods or services. A question from a customer in the United States that is answered in India contributes to international trade in exactly the same way that a car shipped to the United States from Japan does. This simple point explains what Gregory Mankiw was driving at when he described services offshoring as "just another form of trade." While services trade statistics cannot provide a direct count of the number of jobs displaced by services offshoring, they can reveal the magnitude of the phenomenon and — if adequate industry detail is available — which sectors are, and are not, experiencing import competition.

The Bureau of Economic Analysis designs and conducts most of the surveys that collect data on international services transactions. These are mandatory surveys with penalties for noncompliance.[15] The United States was one of the first countries to begin measuring international trade in services through direct surveys of companies. The advantages of direct surveys of this kind, over data gleaned from customs forms, include the ability to capture receipts and payments associated with trade in services regardless of the way the services are delivered (movement of service provider to customer's territory, over the internet, through a commercial presence by the service provider in the customer's territory, etc.).

As a way to begin our discussion of the gaps in services trade statistics, and how they might be filled, we explore what the existing data on services trade can tell us. The value of services imports, especially from lower wage countries, roughly correlate to the value of services offshoring. Figure 1 shows the balance of trade for the United States in goods from 1978 through 2004 and for services from 1997 through 2004. In stark contrast to the large and increasing deficits in goods trade, the Bureau of Economic Analysis (BEA) estimates that the United States enjoys a trade surplus in services, although this has been steadily eroding, from an estimated $87.0 billion in 1997 to $65.3 billion in 2004 (see Figure 2).

[15] For copies of BEA report forms, go to <http://www.bea.gov/bea/di/home/more.htm>http://www.bea.gov/bea/di/home/more.htm and look under "Survey Forms and Related Materials."

Figure 2. United States Balance of Trade in Goods and Services, 1978 - 2004 (millions of dollars)



Source, United States Bureau of Economic Analysis, October 2005

Is this erosion due to services offshoring? A breakdown of the balance of private services trade by product category, shown in Table 2, suggests that the answer is likely to be no. Most of the erosion of the United States trade position in private services can be attributed to increased spending by American companies and individuals on foreign travel and transportation, either from money spent while abroad or on passenger fares and other payments on transportation made to foreign companies. Except for insurance, which shows a large and growing trade deficit that is very likely unrelated to services offshoring,[16] all other major categories of private services tracked by the BEA, including education, financial services, telecommunications, and business, technical, and professional services, show steadily increasing trade surpluses between 1997 and 2004 (see Table 4).

[16] According to Ralph Kozlow, BEA Associate Director for International Economics, the United States trade deficit in insurance services relates to reinsurance by U.S. insurance companies with foreign insurance companies. Reinsurance transactions are motivated by desires to reduce and diversify overall risk and increase insurance underwriting capacity, not to serve foreign markets, hire low-cost foreign labor, or offshore any production from the United States.

Table 4. United States Balance of Trade in Private Services by Product, 1997-2004, millions of dollars.

	2004	2003	2002	2001	1999	1997	Change '97-'04	Change '01'-'04
Total Private Services[1]	**65,293**	**66,918**	**69,934**	**68,740**	**82,072**	**86,994**	**-21,701**	**-3,447**
Affiliated[2]	*30,855*	*31,283*	*28,350*	*25,374*	*26,128*	*27,560*	*3,295*	*5,481*
Unaffiliated[3]	*34,438*	*35,635*	*41,584*	*43,366*	*55,944*	*59,434*	*-24,996*	*-8,928*
Travel, passenger fares, and other trans.	**-13,304**	**-11,736**	**-4,245**	**-3,254**	**7,085**	**22,152**	**-35,456**	**-10,050**
Royalties and license fees	**28,742**	**28,747**	**25,154**	**24,158**	**26,563**	**24,067**	**4,675**	**4,584**
Other private services	**49,855**	**49,907**	**49,025**	**47,836**	**48,424**	**40,775**	**9,080**	**2,019**
Education	**9,998**	**10,077**	**9,925**	**9,178**	**7,809**	**6,950**	**3,048**	**820**
Financial services	**16,229**	**14,449**	**12,486**	**8,409**	**7,992**	**6,296**	**9,933**	**7,820**
Insurance services	**-23,757**	**-20,681**	**-17,683**	**-13,283**	**-6,336**	**-3,761**	**-19,996**	**-10,474**
Telecommunications	**9**	**255**	**-343**	**-438**	**-2,052**	**-4,428**	**4,437**	**447**
Business, professional, and technical	**30,272**	**29,088**	**28,544**	**28,495**	**25,881**	**23,048**	**7,224**	**1,777**
Computer and information services	2,697	2,798	2,539	2,124	2,149	3,526	-829	573
Affiliated	-1,900	-1,400	-1,200	-1,500	-1,800	800	-2,700	-400
Unaffiliated	4,597	4,198	3,739	3,624	3,949	2,726	1,871	973
Computer and data processing services	2,268	1,400	1,548	1,474	1,989	1,373	895	794
Database and other information services	2,331	2,795	2,191	2,150	n.a.	n.a.	n.a.	181
Management and consulting services	-571	454	522	1,590	n.a.	n.a.	n.a.	-2,161
Research, development and testing	5,080	4,325	5,014	4,321	n.a.	n.a.	n.a.	759
Operational leasing	7,050	7,104	6,445	4,729	3,694	2,467	4,583	2,321
Other business, professional, and tech.	16,018	14,407	14,023	15,731	18,809	15,782	236	287
Detail on unaffiliated trade for selected business, professional, and technical services								
Advertising	3,169	2,365	2,279	2,226	1,723	1,684	1,485	943
Legal services	2,529	2,248	1,931	2,475	5,007	n.a.	n.a.	54
Construction, architectural, engineering	680	709	623	674	1,603	975	-295	6
Industrial engineering services	4,444	4,330	4,620	4,487	3,176	3,062	1,382	-43
Installation, maint., and equipment repair	16,018	14,407	14,023	15,731	18,809	15,782	236	287

Notes: n.a.: not available. 1. Private services exclude government and military transactions. 2. Affiliated international trade is intra-firm trade between domestic and foreign affiliates of multinational companies. 3. Unaffiliated international trade is between unaffiliated parties. Unless otherwise indicated, all figures represent estimates of the sum of affiliated and unaffiliated trade; in other words, total private trade.
Source: United States Department of Commerce, Bureau of Economic Analysis, International Economic Accounts, U.S. International Services: Cross-Border Trade 1986-2004, and Sales Through Affiliates, 1986-2003, Table 1.b: Trade in Private Services, 1992-2004 and Tables 7.16-7.19: Business, Professional, and Technical Services, 2001-2004. Accessed from: http://www.bea.gov/bea/di/1001serv/intlserv.htm.

Of the ten lesser categories of services within business, technical, and professional services, only management and consulting services and a broad "other" category show a declining balance of trade.[17] All others, including advertising; computer and information services; research, development, and testing; legal services; construction, architecture, and

[17] The declining balance of trade in management and consulting services, given the market strength of U.S.-based firms, may be surprising. However, large U.S. management consulting firms have extensive offshore operations, and in many cases have set up large back-office operations in places such as India.

engineering; industrial engineering; installation, maintenance, and repair of equipment; and operational leasing have trade balances that are roughly flat or have slightly improved between 2001 and 2004. Finally, the BEA also publishes two lesser categories within computer and information services that show the value of unaffiliated trade only: computer and data processing services and database and other information services. Both of these product categories show slight improvements in the balance of trade between 2000 and 2004. Only transactions between U.S. parents and their foreign affiliates show a declining balance of trade in computer and information services.[18]

The BEA data on services trade, taken at face value, provide a somewhat reassuring picture. They indicate that the balance of trade in a few of the services often mentioned as moving offshore, such as computer and data processing, has not suffered. But how accurate are these data? Even the near consensus view generated by the recent debate over services offshoring summarized earlier in this report assumes that services imports from countries such as India have increased sharply since 2000. One explanation is that BEA estimates understate the value of services trade. While the BEA surveys that ask firms to quantify their trade in services are mandatory, firms are exempted from reporting categories of services in which they have import transactions of less than $6M per year and export transactions of less than $8M per year. In the case of services, in particular, because firms tend to be smaller than firms engaged in goods trade, the current thresholds very likely exclude many transactions. **Because of this, we believe that the thresholds for mandatory reporting of international services transactions should be lowered.**

Another explanation for the apparent undercounting of services trade is that the BEA is not collecting data from the right companies, or is sending inappropriate surveys to the companies on its mailing lists. To test for potential undercounting of U.S. services imports, the Government Accountability Office (GAO) provided the BEA with a list of 104 firms identified from press and company reports as likely to be importing services from India. The BEA was asked to compare this list with the survey responses it had received from firms on its mailing lists. The BEA had 87 (84%) of the firms identified by the GAO on its mailing lists. The BEA stated that it had dropped some of the missing companies from its mailing lists because they had not previously met the reporting thresholds for services trade. Furthermore, only 54 (52%) of the firms identified by the GAO had received appropriate surveys from the BEA (e.g., firms with offshore affiliates were not sent the survey on affiliated trade). Finally, only 15 (14%) of the 104 firms identified by the GAO as likely to be importing services from India reported such imports (GAO, 2005b; 19). One explanation for the low level of reporting of services trade with India is that firms that had transactions valued beneath the thresholds mentioned above, while not required to do so, nevertheless filled out the BEA surveys but did not provide detail on the source or destination countries associated with their international transactions because they were not required to do so. **Again, lowering the thresholds for mandatory survey compliance is**

[18] The BEA began to publish estimates of both affiliated and unaffiliated transactions for management and consulting and research, development, and testing services in 2001 and operational leasing and computer and information services in 1997. The BEA has published estimates of unaffiliated trade in advertising, legal services; industrial engineering; installation, maintenance, and repair services since 1986. Estimates of construction, architecture, and engineering as a group have been published since 1998; prior to 1998, mining services were included in this category. The estimates of unaffiliated trade in computer and data processing and database and other information services have been published since 1986.

recommended.

Still, the BEA believes that its data on services trade is of good quality. When the BEA contacted the companies on the GAO list that were missing from its mailing lists, it did not identify any company with substantial imports of services that were not already being reported. Nevertheless, the BEA recognizes that more resources need to be allocated toward maintaining lists of survey respondents since the identity of transactors may change from year to year. The BEA has a variety of initiatives underway to improve its mailing lists and improve survey compliance (see GAO, 2005b, p. 20). The BEA also plans to merge the collection of its data on affiliated international services transactions with its data on unaffiliated international services transactions, so that a given type of service is covered in exactly the same detail, whether it is imported or exported, and whether it is with an affiliated or an unaffiliated foreign party. **We believe that these efforts are significant and very helpful, especially if combined with lower thresholds for mandatory survey compliance.**

However, we see a different and larger problem. What is most troubling for us is that the seventeen industry categories listed in the first column of Table 4 exhaust the detail on services trade collected by United States government statistical agencies. What is going on in the other service product categories that have been mentioned as moving offshore, such as the wide variety of back-office functions like accounting, customer support, and software programming? What about the interpretation of radiology images, market and legal research, and research to support financial services? Are customized software services staying onshore while only basic software coding is moving offshore, or is higher-skilled work and work related to innovation and new product creation also being imported? Because very few questions are asked, very little detail is collected, leaving us with extremely thin data on services trade, even if steps are taken to improve data quality. Contrast the seventeen descriptive categories for traded services products in Table 4 with the more than 16,000 detailed product codes for goods collected by the United States Department of Commerce and the magnitude of the data gap becomes clear.[19] It is clearly infeasible to collect as much product detail on services trade as is generated by the customs forms filled out when goods are shipped across borders. But much more detail could and should be collected.

Our first and most important recommendation, therefore, is for the Bureau of Economic Analysis to lower the thresholds for mandatory reporting, implement the North American Product Classification System (NAPCS) for the collection of product detail for traded services, and continue to use the North American Industrial Classification System (NAICS), for reporting industry detail, with more detail collected and reported. At the same time, the collection instruments for affiliated and unaffiliated trade should be made consistent and more resources should be made available for maintaining mailing lists (as is currently planned).

[19] About half of this product detail (8,000 product codes for goods) is available for 200 countries in the United Nations COMTRADE database.

Domestic trade in services – another huge data gap

The Census Bureau has developed detailed classification schemes for material inputs and manufactured products that it uses to collect information on what individual manufacturing establishments buy and sell. These product categories have been developed with a great deal of care, and government surveys have been tuned to specific sectors. For example, establishments in the plastics industry are required to provide detailed information about the consumption of chemical feedstock and the production of various kinds of plastics while establishments producing furniture are required to provide detail about the consumption of wood, metal, hardware, glue, and fabric and the production of various kinds of furniture. This pattern holds true across the manufacturing sector. The U.S. Census Bureau's Numerical List of Manufactured and Mineral Products contains hierarchically organized descriptions of the principal products and services of the manufacturing and mining industries in the United States.[20] These codes are used to collect data for the Economic Census and are used by the Bureau of Economic Analysis for the input-output matrix that underlies the national accounts. But as in international trade in services, far less detail is collected on the services products that are consumed and produced domestically. Again, there are more than 6,000 codes for physical products but fewer than 100 for services.

The lack of detail on domestic trade in services means that the Bureau of Economic Analysis largely estimates the contribution of services to the national accounts. While resulting estimation cannot claim precision, BEA analysts believe that their techniques capture the magnitude and direction of change in services accurately enough to support policy. While this may be true today, we think the view of the U.S. Census Bureau, quoted in full in the previous section, bears repeating, "If [the information gap between manufacturing and services goes] unaddressed, economic policymakers will be increasingly misinformed and misdirected about changes in the real economy, related to rates and sources of growth in output, prices, productivity, and trade." Clearly, an accelerated and sustained effort to collect more detail on domestic trade in services is required.

Our second recommendation, therefore, is for the U.S. Census Bureau to accelerate the completion the North American Product Classification System (NAPCS), and fully and rapidly deploy it in the Economic Census, at the establishment level, for both inputs and outputs.

The importance of occupational employment

Occupational shifts during the 20th Century in the United States reflect the rising importance of services. Between 1910 and 2000, professional, managerial, clerical, sales, and service workers (except private household service workers) grew from one-quarter to three-quarters of total employment (Wyatt and Hecker, 2006, p. 1). Bardhan and Kroll (2003, p. 11) note an important difference between employment in services and employment in manufacturing: changes in services employment tend to affect occupational classes, while

[20] See http://www.census.gov/prod/ec02/02numlist/02numlist.html.

changes in manufacturing employment tend to affect industry groups. Software programmers, for example, work not only in the software industry but in many other sectors as well, so tracking employment in the software-producing industry alone provides only a partial picture of what is happening to workers engaged in creating software. In comparison, steel workers tend to work in the steel industry. The implication is that we need to track employment by occupation in order to observe trends in service employment due to offshoring, or any other reason.

Qualitative research on software programming occupations suggests that the occupational mix and wage risk-reward profile of software employment in the United States have been affected by offshoring. As a first order impact, programmers of customized software have lost jobs. These programmers have either moved to product software, which is a higher risk, higher reward occupation; to system integration, which has the same risk and higher reward as custom programming but requires more training and experience; or to software installation and maintenance, which has lower risk and lower reward profile. [21] Data on employment and wages by occupation, if they are available in time series and in enough geographic and industry detail, can be used to confirm or refute such findings.

While very detailed data on employment by industry are available in the Census of Employment and Wages (CEW), the data contain very little detail about occupations. The Current Population Survey, a joint program of the Bureau of Labor Statistics and the Census Bureau, does collect data on occupations, but the sample size is small (about 50,000 households), and the occupational data are collected from individuals rather than employers, which is generally thought to lessen their accuracy.

The American Community Survey (ACS), a new Census survey to collect detailed economic and social data on households between the decennial censuses, promises to provide a much larger data set that will eventually provide extremely useful time series and geographic detail on occupational employment. About three million households are surveyed each year in the ACS across every county in the United States.[22] The survey is being rolled out in stages, and will eventually be deployed even in small communities and rural areas. [23] The ACS uses the 2002 Census Occupation Code system to collect data on occupations, which is closely related and easily comparible to the Bureau of Labor Statistics' Standard Occupational Classification (SOC) and captures most of its detail. The micro-data from the ACS, available in the Public Use Micro-Sample (PUMS) is accessible via the web without special clearance.[24] **We believe that the ACS will provide a critical data set on**

---

[21] These impressions, based on sustained qualitative research, were supplied by Dr. Rafiq Dossani of Stanford University's Shorenstein Asia-Pacific Research Center on September 5, 2006.

[22] A sister survey, the Puerto Rico Community Survey, is being deployed in Puerto Rico.

[23] According to the U.S. Census Bureau, "By 2008 data [from the ACS] will be available for all areas of 20,000 or more. For small areas less than 20,000, it will take [until 2010] to accumulate a large enough sample to provide estimates with accuracy similar to the decennial census. Beginning in 2010, and every year thereafter, the nation will have a five-year period estimate available, a resource that shows change over time, even for neighborhoods and rural areas. See: http://www.census.gov/acs/www/index.html.

[24] The Public Use Micro-Sample (PUMS) allows researchers access to the full range of responses made on individual ACS questionnaires. All identifying information is removed to ensure confidentiality. PUMS, along with micro-data from several other large public data sets housed at the U.S. Census Bureau, are available electronically using a free application called DataFerret. See: http://dataferrett.census.gov/.

earnings and occupations that will eventually allow researchers to track changes over time as the collection process matures. The high level of geographic detail in the ACS, in particular, will be very useful for policy. The only drawback of the ACS in regard to data collection on occupations, in addition to the questionable accuracy of occupational information collected from respondents in households, is that it does not connect occupations to the establishments and firms where household members are employed. This decreases the ability of researchers to link data from the ACS to data on domestic and international trade, investment, research and development, and a host of other data that is specific to firms.

The Occupational Employment Statistics Program (OES), administered by the Bureau of Labor Statistics, collects the most comprehensive establishment-level data on employment and wages by occupation. The OES program surveys approximately 200,000 establishments every six months, taking three years to collect data on 820 occupational titles in the SOC for the full sample of 1.2 million establishments. As a result, a given establishment is surveyed at most once every three years. While this methodology allows detailed area and industry estimates to be made while limiting the burden on respondents, it severely reduces the usefulness of the OES data for making comparisons over time, especially across short time periods. For this reason, "The Bureau of Labor Statistics at present does not use or encourage the use of OES data for time-series analysis."[25] The result is that we currently have inadequate means to track how the how the mix of occupations at establishments in the United States is changing, especially over relatively short time periods. According to the BLS web site, "The OES program is considering changes in methodology that would make data useful for time-series comparisons, at least at more aggregated levels, but these are only in early stages of discussion." **As part or our third recommendation (3A), we urge the BLS to make the changes to the OES methodology necessary to create time series data on all 820 occupations in the SOC by industry and geographic area.**

A second area where better occupational data could help us to understand the employment effects of services offshoring is in the activities of multinational firms. The OES program does not ask establishments about their employment outside of the United States. As a result, it is impossible to obtain detailed information on the critical question of how the mix of occupations is changing between facilities at home and abroad. The Bureau of Economic Analysis currently asks for only 2-3 occupational categories in its surveys of multinational firms: production, non-production, and on some surveys, research and development. **Therefore, in the second part of our third recommendation (3C), we urge the BEA to include more occupational categories in its surveys of multinational firms. As a start, the 23 major occupational categories in the Standard Occupational**

[25] The BLS explains: "In order to produce estimates for a given reference period, employment and wages are collected from establishments in six semi-annual panels for three consecutive years. Every six months, a new panel of data is added, and the oldest panel is dropped, resulting in a moving average staffing pattern. The three years of employment data are benchmarked to represent the total employment for the reference period. The wages of the older data are adjusted by the Employment Cost Index. This methodology assumes that industry staffing patterns change slowly and that detailed occupational wage rates in an area change at the same rate as the national change in the ECI wage component for the occupational group. The use of 6 data panels to create a set of estimates means that sudden changes in occupational employment or wages cannot be detected in the data. (From http://www.bls.gov/oes/oes_ques.htm#Ques27.)

Classification (SOC) system should be used.

What the data on occupational employment cannot tell us, even if collected and published in time series and in great detail, is *why* the changes it reveals are happening. Without adequate detail on services trade, we are left to assume that automation and offshoring, in some combination, are playing important roles in the changes we see in occupational employment and wages. This is why the rapid implementation of our first two recommendations is so critical. **We urgently need more and better data on services trade to make better use of range of data collection programs, including those on occupational employment.**

The importance of "micro-data"

There are a host of government programs that collect detailed economic data. Some of these programs, such as the Economic Census, use surveys to collect data for publication. Typically there are more detailed "micro-data" that underlie the published data. The mailing lists for these surveys can also contain valuable data on the basic characteristics of individual firms and establishments. Other government programs collect data for the purpose of administering government programs such as tax collection, compliance with environmental protection laws, and the like. For this reason such data is typically referred to as "administrative data."

One example of how administrative data has been made useful for researchers is the Census Bureau's Business Register, which is essentially the sampling frame for the Economic Census. Data included are business name, address, a unique establishment-level identifier, industry, employment, and the identity of the firm that owns the enterprise. Data about ownership allows the enterprises in the Business Register to be aggregated to the firm level. Jarmin and Miranda (2002) have assembled the Business Register into a time-series for 1976-2002, referred to as the Longitudinal Business Database (LBD). The potential of the LBD has just begun to be tapped. For example, Bernard, Jensen, and Schott (2005b) link the LBD to the universe of import and export transactions for 1993-2000, revealing a detailed picture of the characteristics of firms that do and do not trade and offering a wealth of research possibilities on how United States firms' trading activities and domestic operations are related. However, deeper historical analysis using these linked data sets cannot be done because import and export transaction data prior to 1992 were not archived. Better longitudinal data, for example, could allow researchers to connect falling costs of coordination of activities across national boundaries with shifts in overall employment or the composition of employment in specific sectors.

MICRO-DATA ARE NOT ADEQUATELY ARCHIVED AND MAINTAINED

Administrative and survey microdata are almost never published, and only in rare exceptions, such as the LBD and the Economic Census data, are they made available for use by government or academic researchers with adequate security clearance. In fact, some of these data are routinely destroyed after a specified time period, typically 5-10 years. Why is potentially valuable economic data not maintained and archived? Legislation, regulation, or

prevailing administrative practice can impose limits on how long respondent and participant data is retained. The combination of these factors puts a wealth of information about the functioning of the United States economy at risk.

We recognize there are a number of competing objectives surrounding this issue, including privacy and confidentiality, long-standing legislation and regulation, lack of fit between the goals of research and the missions of government agencies, and of course a scarcity of resources.[26] However, improvements in computer, information technology, and data storage technologies have made archiving micro-data a possibility. With prior technologies, it would have been prohibitively expensive and cumbersome to archive and maintain a fuller range of data resources.

We believe that unpublished government survey and administrative micro-data comprise a valuable public resource that should not be wasted. Our fourth recommendation, therefore, is for steps to be taken to extract as much information as possible from the data that are currently collected by government programs. An inventory of current and potential micro-data resources should be made, and as many "micro-data" sets as possible should be archived, maintained, made available, and used by both government and academic researchers.

A thorough assessment of current and potential micro-data resources has never been undertaken. However, at the request of Congress, the National Academy of Public Administration (NAPA) is currently engaged in a study that will include an assessment of the usefulness of various micro-data for understanding services offshoring.[27] We view this report as directly complementary to ours.

RESEARCH USING MICRO-DATA SHOULD BE ENCOURAGED

Over the past decade there has been a burgeoning body of research that relies on government-collected micro-data. Some of these resources have only become available recently. An example is the Longitudinal Research Database (LRD), which contains data on all manufacturing establishments that were in at least one Census of Manufactures since 1963 or one annual survey of manufactures since 1972. For 1992, the LRD incorporated data for over 378,000 manufacturing establishments (in non-census years the total is about one-sixth that amount). The LRD contains data that identify individual establishments, and a high level of detail on the manufactured inputs and products (outputs) of those establishments. Identification data include permanent plant and establishment numbers, industry codes, location, current status, and legal form of organization. Input data include total employment, number of production workers, hours worked, labor costs, materials costs, materials consumed, services and energy consumed, inventory levels, depreciable assets, and capital expenditures. Product data include receipts (value of shipments, value added, value of re-sales); production details (5-

[26] There are also practical issues regarding which versions of the files to maintain (raw or various edited versions that might exist), how to maintain "metadata" related to the data files (record layouts, imputation algorithms, etc), how to keep the data on media and in a format that is readable with current and future technologies, etc.

[27] Specifically, Congress directed NAPA to define job offshoring; examine current data and determine what additional data is needed to document offshoring; and analyze the factors accounting for offshoring, along with its impact on U.S. workers, industry and schools.

or 7-digit SIC product codes, quantities of production, value and quantity of products shipped, value and quantity of interplant transfers, and internal consumption); and exports. Research using the LRD and other micro-data resources has explored a number of issues related to offshoring, including establishment dynamics, job turnover, the effects of international trade, and productivity growth. While very valuable, these studies typically study the entire manufacturing sector and have not yet delved into the dynamics present in particular industries. The LRD, along with other micro-data resources, is housed at the Center for Economic Studies at the Census Bureau and can be accessed by researchers who have received government clearance at nine Data Research Centers around the country. [28]

Micro-data has enormous research potential. Time series data longer than the most recent 5 to 10 years can shed light on a range of research and policy questions by revealing gradual shifts in the composition of the workforce, the emergence of new industries and occupations, and long-term trends in workforce income and education in industries and places experiencing competition from low wage countries, to provide just a few examples. **As part of our fifth recommendation we recommend that new research expand and enhance the use of government micro-data such from data resources such as the LRD and LBD.**

Finally, it is important to encourage research that links various sets of micro-data. While there can be legislative and institutional barriers to sharing micro-data across agencies, reducing these barriers could enable some extremely powerful research. For example if the outbound foreign affiliate investment collected by the Bureau of Economic Analysis in its surveys of multinational firms were to be combined with the firm, establishment, and trade data collected by the U.S. Census Bureau, it would help researchers create a more comprehensive picture of the operations of U.S. firms -- both at home and abroad. The combined data could reveal domestic activity at the establishment level (with product level information, geographic information, and export information), the relationship between the establishments within the firm, the amount of trading the firm does (using the matched transaction and firm data), and the nature of the firm's foreign affiliate operations (employment, wage bill, location, local sales, trade with parent, etc). This would allow researchers to examine the relationship between domestic activity, trade, and foreign direct investment.

So far, much of the impetus for making micro-data available has come from researcher demand. Such demand will continue to be a critical driver for the availability of micro-data. The micro-data inventory that we recommend here, if pursued, will solve some of the information problems blocking wider use of government micro-data, and will go a long way toward stimulating research demand. But in the end only researcher interest and energy will be able to set the priorities for micro-data availability and provoke data agencies to engage in the hard work of archiving, cleaning, and administering large data sets for use by researchers.

A part of our fifth recommendation is to accelerate research projects that make use of the comprehensive, nationally representative, highly disaggregated "micro-data" that underlie published state and federal statistics, especially those

[28] See: http://www.ces.census.gov/index.php/ces/1.00/researchguidelines for an overview of the program and list of locations.

projects that link disparate micro-data sets and tie micro-data to data collected by researchers, either in mail or telephone surveys, or in the field.

A point that must be underlined is that nearly all current research that uses micro-data to estimate the employment and welfare effects of offshoring draw conclusions about the manufacturing sector only. Harrison and McMillian (2006) and others have used the parent and foreign affiliate data from the Bureau of Economic Analysis surveys on multinational firms to examine the relationship between affiliate activity and United States employment. Swenson (2005) has examined the permanency of offshore assembly arrangements using extremely detailed data from United States International Trade Commission (USITC) reports. Kletzer (2002) has used micro-data from the Displaced Worker Survey to explore the experiences of workers displaced from manufacturing industries associated with increased foreign competition, and has made policy recommendations based on her findings. These studies are examples of leading-edge quantitative research on the employment effects of globalization. Because of the paucity of data collected on international trade in services, however, it is problematic to extend the methods used by these researchers to services. **This is why our first and most important recommendation is to increase the level of detail collected on international trade in services.**

The importance of qualitative research

True understanding of a phenomenon as complex as services offshoring requires deep knowledge of the forces driving change at the level of specific industries, occupations, and geographic locations. Even with better quantitative information, the impact of services offshoring on the United States economy will be extremely difficult to fully comprehend or respond to without a detailed view of how the relocation of service work is intertwined with other aspects of economic change, especially the automation and computerization of service work and the prevailing characteristics of labor markets and corporate strategies in specific service industries and occupations. The best way to learn about the interaction of these complex elements of economic change is though qualitative research on the trade-offs that managers of individual firms and establishments in specific industries face and the choices they make. Ralph Gomory has referred to industry studies of this kind as "observational science."[29]

Decisions about services offshoring are inevitably made in the context of broader company strategies related to the development of new products, the pursuit of new customers and markets, the adoption of new technologies and production techniques, and the like. Distinguishing economic changes due to offshoring that displaces domestic employment from offshoring that does not — for example, when a firm establishes a presence to gain better access to a foreign market — is therefore extremely difficult to do without speaking directly with the managers making the key decisions. Even when examining the operations of a single firm, with full cooperation from management, it can be extremely

[29] Ralph Gomory is President of the Alfred P. Sloan Foundation. This comment was made in the course of remarks given at the Industry Studies Annual Conference in Cambridge, Massachusetts on December 15, 2005.

difficult, if not impossible, to precisely measure the employment effects of services offshoring. For example, Dossani and Kenney (2005b), in their case study of Company X, an electronic equipment and services firm with approximately 30,000 employees worldwide, showed that the geographic consolidation of service-related activities in India was accompanied by simultaneous consolidation of business functions and information technology platforms (see Table 5). In the words of Rafiq Dossani:

> Company X took the opportunity of preparing to outsource to India to completely re-engineer the way they did their back office work. In the process of doing this they created new job descriptions and new jobs in-house, new jobs for their local outsourcing partners, and new jobs for their offshore affiliates and partners. We tried to take a very granular view, to look at job descriptions, and follow where the work was being done, but found that this was impossible to do. So, even though we had an insider to work with and full cooperation, we were unable to actually look at job content and where that content was moved. For example, if a job consists of making an entry into a computer, and now it is made on a different platform, routed differently, supervised differently, it is not the same activity any longer.[30]

Table 5. The Context for Offshoring at Company X: Functional, Technological, and Geographic Consolidation

1)	The consolidation of shared services across geographies and departments, particularly HR, finance, engineering services and procurement, into a limited number of global hubs.
2)	The consolidation of enterprise resource planning and customer relationship management [IT] systems into common platforms using off-the-shelf technologies and minimizing the usage of legacy applications.
3)	Consolidating geographical footprints.

Source: Dossani and Kenney, 2005b, p. 25.

These challenges should not lead is to abandon our efforts to gauge the employment effects of services offshoring, only to temper our confidence in estimations based on aggregate data and to seek out the insights gained through qualitative research. In specific industries and occupations, qualitative research can provide valuable insights into the real and potential job effects of services offshoring. For example, Levy and Goelman (2005) use qualitative methods to show that only a tiny number of U.S. radiology images are currently read outside of the United States, and are convincing in the assertion that it is highly unlikely that the number will increase substantially in the future. The shift from analog to digital radiology imaging has certainly made the remote analysis of radiology images technically feasible, a fact that has spurred much hand wringing in the media about radiology jobs "moving" offshore. Tight labor markets and high salaries for radiologists, in part due to a cap on federal funding for hospital residencies, also suggest high potential for the offshore interpretation of radiology images. But because there is a need, in many cases, for close consultation between radiologist and doctors, almost all radiology images are read at or very near the site where they are taken. Moreover, the high cost of radiology imaging equipment relative to the cost of interpretation, the restriction of U.S. malpractice insurance to doctors who have done U.S. residencies and passed U.S. medical board exams, the group power of U.S. doctors to restrict competition, and Medicare reimbursement regulations, all work to

[30] Author interview with Rafiq Dossani, February 2, 2005, Stanford, CA.

keep the remote interpretation of radiology images on shore. Because of these "institutional" factors, virtually all of the very small number of radiology images that are read offshore are read by radiologists who completed their residency and passed their board certification in the United States. For example, U.S. board certified radiologist in Sydney, Australia, can work days reading images generated at night in the United States.

An understanding of such industry-specific factors, and their interaction, requires deep knowledge of specific industries and occupations that can only be gained through qualitative research methods. Our interviews and discussions indicate that there is a reasonable amount of new research on services offshoring underway using qualitative methods. However, **we recommend and acceleration and expansion of qualitative research on services offshoring and its effects.**

While it is clear that understanding service off-shoring will also require much more qualitative research on specific companies and industries, it is also clear that better use can be made of the qualitative data that is collected, such as interview transcripts and respondent voice recordings. However, most of the outputs of qualitative research are not linked to one another, or are linked very weakly at the level of analysis. As a result, two difficult issues faced by researchers using industry case study methods are knowing how representative particular companies experiences are and measuring their contribution to aggregate changes in the economy. This presents a problem if one hopes to aggregate the evidence collected separately by researchers from field research to gain broader insight. Julia Lane and researchers at the National Science Foundation have been considering this issue for some time and have suggested that some of the software technologies used by search engines and related technologies could be used to index, cross reference, and collate large amounts of detailed qualitative data arising from case studies, including text, voice recordings, and even video. By using sophisticated methods to "tag" the contents of interviews, case studies, and other qualitative materials gathered by industry researchers, it would become feasible for other researchers to compare, test, and expand their own case evidence with those of others in a way not feasible with standard methods. Not only would this allow the creation of larger, case-based data sets, it would allow one to apply concepts of replicability to the realm of qualitative research. **Because of the importance of qualitative research to understanding service off-shoring, we believe that greater attention should be paid to efforts like those at NSF to bring new approaches to the archiving, coding, sharing, and protecting the confidentiality of qualitative data (see Lane, 2005).**

The importance of combining qualitative and quantitative research methods

While we believe that understanding the details of economic change at the firm- and industry-level is necessary, informing the broader public debate requires a comprehensive picture of the aggregate scope and impact of the actions taken by firms. Thus, both industry specific knowledge and aggregate estimates of the impact of firm behavior need to be combined. **This is why our fifth recommendation involves combining the insights gained through quantitative research based on government statistics with the insights gained from research based on qualitative techniques.**

Some of the most powerful recent research on the economic effects of global integration has combined the use of government micro-data with data from surveys fielded by the researchers themselves. For example, researchers at the Harvard Center for Textile and Apparel Research (HCTAR) linked data from a detailed industry survey of apparel manufacturers conducted by HCTAR with data from the LRD to study the impact of a variety of information technology and manufacturing practices (collected in the apparel survey) with data on inventories and sales (available in the LRD). In this way the HCTAR research team was able to examine performance effects arising from the adoption and diffusion of specific types of manufacturing and technology adoption strategies. The study documented significant reductions in the level and volatility of inventories for firms adopting specific combinations of information technologies and manufacturing practices (see Abernathy et al, 1999). This type of research would have been impossible without linking industry-based surveys fielded by HCTAR to government-collected micro-data.

A recent project funded by the Alfred P. Sloan Foundation and the Census Bureau explored both the value and the method of combining quantitative and qualitative approaches. Detailed knowledge from qualitative observational research on five industries (financial services, retail food, semiconductors, software, and trucking) was integrated with analysis of the Longitudinal Household-Employer Dynamics (LEHD) database, a longitudinal employer-employee micro data set created by the U.S. Census Bureau by combining federal and state administrative data on employers and employees with core Census Bureau censuses and surveys.[31] A team of researchers used this combined approach to explore the overall impact of economic turbulence on firm productivity and survival, on the jobs provided by firms and the career paths developed by workers, and the distribution of income (Brown, Haltiwanger, and Lane, 2006). This project shows the value of an integrated approach and the need for more detailed analyses of the forces underlying economic turbulence, including globalization and trade, technological change, and deregulation and industry restructuring.

As these examples show, researchers have, in recent years, created unique methods to wed a deep understanding of industries with sophisticated use of micro-data to understand how industries and labor markets are affected by global integration. Historically, these two different methodological approaches – detailed industry research and aggregate statistical analysis – have been pursued separately, often with little reference to the knowledge and insight developed by the other. Statistical analyses of complex phenomenon such as global integration sometimes seem superficial and not 'real' enough to be entirely convincing. Detailed case and industry studies, while often persuasive in regard to specific firms or even industries, do not lend themselves to generalization or measures of national impact. Combining the two approaches in a way that leverages each approach's strengths will significantly increase the quality and usefulness of research in this area. For the use of micro-data to be productive, it is crucial that research teams have both a deep understanding of how specific industries operate globally and expertise in the use of micro-data. Given the time required to develop expertise and conduct research using each of these methods, combining quantitative and qualitative research methods typically requires the formation of interdisciplinary teams. All research methodologies have their strengths and weaknesses, as summarized in Table 6. Combining methods can help mitigate the weaknesses of different

[31] See http://lehd.dsd.census.gov/led/.

methodologies.[32]

Table 6. Strengths and weaknesses of industry-level research methodologies

Research methodology	Strengths	Weaknesses
Qualitative case studies	• Rich detail • Can be forward-looking • Questions selected by researchers • Useful for generating hypotheses that can be tested subsequently	• Not generalizable • Difficult to replicate and update • Not well suited for econometric analysis • Difficult to share data with other researchers
Researcher-generated surveys	• Moderate detail • Questions can be designed for econometric analysis • Questions selected by researchers	• Industry-specific questions are difficult to generalize and replicate in other industries • Backward looking • Data sets generally not public • Potential problems with response rates
Researcher-generated data from secondary sources (e.g., press reports and job postings from the Internet)	• Rich to moderate detail • Questions selected by researchers	• Not generalizable • Difficult to replicate and update • Econometric analysis difficult • Backward looking
Mining large public micro-data sets	• Well suited for econometric analysis • Some data sets are public	• Little detail • Backward looking • Data may not contain necessary variation to test key hypotheses. • Questions not selected by researchers

To achieve results, it will be important for researchers to be open and creative methodologically. New research should supplement micro-data that underlies published economic statistics with data generated through a range of other sources, including surveys fielded by researchers, qualitative research into the process of services automation and offshoring, as well as the burgeoning data that is becoming available from public sources, especially from the Internet. **The best approach to answering difficult questions about economic and social consequences of services offshoring will be to encourage new research that uses a combination of methodological approaches and data sources. Our fifth recommendation, therefore, is to encourage the formation of inter-disciplinary research teams and the application of novel techniques for working with and presenting confidential data while preserving confidentiality.**

[32] For example, interview respondents in qualitative research can be selected randomly, questions can be standardized, and the results can be coded and quantified. Interviews can be conducted with the largest firms in an industry to cover a high share of activity. The higher the number of researcher-generated surveys sent, the more generalizable the results. On the other side of the spectrum, with clearance from public agencies, researchers can gain access to the confidential micro-data behind public data sets to obtain detailed information about individuals, specific workplaces, and firms. Unfortunately, while these steps mitigate some weaknesses, they create others. For example, coding and quantifying qualitative data reduces its richness, and micro-data is typically useful only to the specific researchers that go though the substantial effort required to put them into usable form.

FIVE RECOMMENDATIONS FOR IMPROVING DATA COLLECTION AND RESEARCH METHODS RELATED TO SERVICES OFFSHORING

Updating government statistical programs so that they reflect the importance of services, as well as related trends such as outsourcing and offshoring, will require significant new long-term funding and continued commitment and creativity on the part of the professionals working in federal and state data agencies. Although much progress has been made, there are a host of programs, procedures, and methods that could be improved to provide better data on services, so priorities must be set.[33] We recognize that direct and comprehensive measures of the economic effects of services offshoring, in isolation from other factors, will remain extremely difficult if not impossible to obtain. We must inevitably rely on estimations, the quality of which depends in large part on the quality of underlying data. Poor data quality and slim detail requires researchers to make assumptions and apply estimation techniques to substitute for real data. The larger the assumptions are, and the more elaborate the estimation techniques used, the more likely that research findings will be called into question, or contradicted by research applying different techniques to the same or different data. Such uncertainties degrade the debate and undermine sound policy. While in the past data gaps have been filled with targeted surveys, on e-commerce, for example, we believe that services, which — to repeat — account for nearly 85% of private sector GDP, are important enough to warrant fundamental improvements to our statistical system. The main problem, as we see it, is a lack of detail in the current data on services trade.

Why is detail in services trade statistics important? Without vastly expanded detail, we will continue to have very little idea which service sectors are under pressure from import

---

[33] There have been some calls for the Mass Layoff Survey Program to be expanded through a reduction of the threshold for administering the survey from 50 unemployment insurance claims filed in a 30-day period to 25, and for the data to be published annually instead of quarterly to allow the more geographic and industry detail to be published from the larger annual data set (Lieberman, 2004; 31-32). Presumably, an expanded survey plus a shift to annual reporting would allow the publication of more detail about industrial sectors (e.g., services) and geographic locations experiencing mass extended layoffs. While it is not our priority, we support this recommendation. The Lieberman report also recommends that the Department of Labor publish more data from the Trade Adjustment Assistance (TAA) program and that TAA benefits be extended to eligible workers in service industries. Besides extending TAA coverage to a much larger potential pool workers who might lose their jobs because of import competition (including from the movement of work offshore), data would presumably be generated on the number and characteristics of workers, and the kind of industries affected by services offshoring. Putting the merits of an expanded TAA Program aside, one is left to wonder what criteria would be used to establish that international trade has negatively impacted a service company. As we have stated repeatedly in this report, there is a near absence of detailed statistics on international trade in services. This point underlines again the importance of better basic economic data on services trade for policy. **For this reason our first and second recommendations are to improve the quality of basic economic data, especially on traded services, and not to improve programs that seek to collect direct measures of job loss due to services offshoring.**

competition, and which sectors, companies, and products are succeeding through exports. There will continue to be no mechanisms to match flows in services trade to the firms and establishments that generate value in the economy by producing services or to the workers that are employed (or unemployed) by these companies or to the regions where they operate. Without more detailed information on services trade, both domestic and international, our view of service industries and services offshoring will continue to be severely limited.

While it will be infeasible for some time to collect the same level of product detail in services that is available in the manufacturing sector, the United States data collection system should have the collection of far more detailed data as a long-term goal and should be provided with resources to move aggressively in that direction. For the purposes of evaluating the role that services offshoring — and trade in services more generally — plays in the United States economy, this is the most pressing data need. While service firms will face additional burdens to respond to the more detailed surveys, it is of crucial importance to understand what is happening in a large sector like services. Our five recommendations are summarized in Table 7.

Table 7. Summary of Recommendations

1) Collect more detail on international trade in services.
The Bureau of Economic Analysis (BEA) should collect more detail on services products that are traded internationally (affiliated and unaffiliated services imports and exports). The BEA currently collects data on only 17 categories of traded services products. In contrast, import and export statistics for the United States are currently available for more than 16,000 goods. Without a more detailed view of which services are traded internationally, it will remain impossible to determine which sectors experience pressure from import competition. As a result, we cannot know where in the economy to look for the effects of services offshoring with any precision. This in turn renders other data on services less useful.
2) Collect more detail on domestic trade in services.
The U.S. Census Bureau should accelerate its efforts to collect more detailed statistics on services traded within the United States (services inputs and outputs). These more detailed statistics will help to provide a better view of the role that services play in the economy of the United States. Services account for more than 85% of U.S. private sector GDP, but we have very little information on the services that are bought and sold by companies.
3) Collect more detail and publish time series data on occupational employment.
Because service work plays a role in all industries, adequate data on employment by *occupation* is necessary to determine the employment and wage effects of services offshoring. We recommend two concrete steps in this regard:
3A) The Bureau of Labor Statistics should publish consistent time series on employment by occupation from the Occupational Employment Statistics (OES) program. If possible these data should be published, by industry, at the national, state, and metropolitan levels. Time series data will allow policy-makers to track employment trends in the occupations most vulnerable to job loss from services offshoring.
3B) The Bureau of Economic Analysis should collect data on more occupational categories in its surveys on the activities of U.S.-based multinational firms. More detail on the occupations created by multinational firms, at home and abroad, will provide a clearer picture of the employment effects of services offshoring.
4) Archive and provide access to more micro-data resources
Steps should be taken to extract as much information as possible from the data that is currently collected by government programs. An inventory of current and potential micro-data resources should be made, and as many "micro-data" sets as possible should be archived, maintained, made available, and used to both government and academic researchers. Micro-data are the data that support government administrative programs and underlie published statistics. In general, quantitative research based on micro-data can provide a better and more detailed view of services offshoring and its effects than research based on published statistics.
5) Accelerate research that combines quantitative and qualitative research methods.
No single approach or data set can hope to bring the complex and dynamic phenomenon of services offshoring into complete focus. An interdisciplinary, collaborative approach is needed to combine insights from data collected by government programs with insights from researcher-generated surveys and field interviews. Quantitative methods allow researchers to estimate the magnitude and speed of economic change and to implement causality tests, while qualitative methods can provide a rich and nuanced picture of the complexity, context, and dynamics of services offshoring.

Recommendation #1: Collect more detail on international trade in services

The Bureau of Economic Analysis (BEA) should be provided with adequate resources to collect significantly more detail in its surveys of services trade. The BEA currently collects and publishes approximately 17 categories of traded services products. By contrast, approximately 16,000 product categories are collected by the Department of Commerce for traded goods. The thresholds for mandatory reporting should be lowered, the North American Product Classification System (NAPCS) should be implemented for the collection of product detail for traded services, and the North American Industrial Classification System (NAICS) should continue to be used for reporting industry detail, with more detail collected and reported. At the same time, the collection instruments for affiliated and unaffiliated trade should be made consistent (as planned by the BEA). The BEA should also be provided with adequate resources to expand and better maintain its mailing lists and to provide more guidance and training for survey respondents. Information sharing between the BEA and the Bureau of Census for the purposes of identifying firms that engage in services trade and linking micro-data sets from the two agencies should be facilitated.

Recommendation #2: Collect more detail on domestic trade in services.

The U.S. Bureau of Census should be provided with adequate resources to ask for more detail from firms in their surveys on domestic transactions in services (inputs and outputs). Specifically, the detailed definitions for services products that have just been created in the North American Product Classification System (NAPCS) should be used to collect more information on service sector inputs and outputs. The U.S. Census Bureau should accelerate the completion of NAPCS. While there are plans to use the preliminary NAPCS product lists in the 2007 Economic Census to collect data on service outputs, there are no current plans that we know of to collect additional detail on services inputs. We urge the Census Bureau also to use NAPCS in the 2007 Economic Census for the collection of inputs, even if only in a limited set of pilot surveys. These data should be collected at the establishment level (as they are in the manufacturing sector), rather than using firm-level collection instruments, because this provides a much more precise view of the sectoral and geographic characteristics of economic activity.

Recommendation #3: Collect more detail and publish time series data on employment by occupation.

We currently do not have the ability to adequately track employment by occupation at the establishment level over time or by geographic location. We recommend two remedies:

- 3A) The Bureau of Labor Statistics (BLS) should publish occupational data from the Occupational Employment Statistics (OES) program in time series, by industry, at the state and metropolitan levels, in order to allow the development of geographically targeted trade adjustment policies. If there are not enough data available to protect the confidentiality of firms, the data should be published annually or the sample size increased. Time series data will allow policy-makers, researchers, universities, students, and workers to track trends in employment and earnings in service occupations under pressure from import competition.

- 3B) The Bureau of Economic Analysis (BEA) should collect data on more occupational categories in its surveys on the activities of U.S.-based multinational firms. To begin, the 23 major occupational categories in the Standard Occupational Classification (SOC) system should be used to collect these data. More detail on the occupations created by multinational firms, at home and abroad, will provide a clearer picture of the employment effects of services offshoring.

Recommendation #4: Archive and provide access to more micro-data resources

An inventory should be made of government administrative data and adequate resources should be made available to the statistical system agencies (U.S. Census Bureau, Bureau of Labor Statistics, and Bureau of Economic Analysis) and key administrative agencies (Internal Revenue Service and Social Security Administration) to archive and maintain historical data series. These data should be made available to researchers with the appropriate clearance through established programs at the U.S. Census Bureau (Census Data Research Centers), the Bureau of Labor Statistics, and the Bureau of Economic Analysis. Where feasible, these resources should be made available to researchers electronically.

- The first priority should be given to maintaining universal files, particularly sampling frames with all identifying information (EIN, SSN, name, address, etc) such as the business registers at Census and the Bureau of Labor statistics, the Decennial Census of Population Data at Census, the 1040 tax filings at the Internal Revenue Service and the Social Security Administration. The use of these data by researchers requires adequate methods to maintain confidentiality.
- The second priority should be given to maintaining rich survey collections from broad samples such as the Economic Censuses, and the Bureau of Labor Statistics' surveys on occupations and employment.
- The third priority should be given to maintaining price information, including the data that underlie the Consumer Price Index (CPI), Producer Price Index (PPI), and import/export price indices programs such as the Consumer Expenditure Survey.
- The fourth priority should be given to maintaining specialized surveys from small samples, such as R&D surveys, technology and innovation surveys, e-commerce surveys.

Recommendation #5: Accelerate research that combines quantitative and qualitative research methods.

New research should be encouraged that combines quantitative and qualitative research, and data from various sources. Qualitative sources are valuable in developing hypotheses and identifying elements that are not measured by published data, custom-generated data such as surveys can be tailored directly to a specific research question, while the huge universe of micro-data allows application of findings to a much broader population.

Specifically, we recommend that new research on services offshoring:

- integrate deep qualitative knowledge about global industries, technologies, and jobs with rigorous quantitative analysis;
- expand and enhance the use of government micro-data such from data resources such as the LRD, LBD, and LEHD;
- link existing databases with one another to generate better measures of offshoring and its effects;
- accelerate and expand qualitative research on services offshoring and its effects;
- develop new techniques for archiving, coding, and protecting the confidentiality of qualitative data;
- encourage collaboration and dialogue between researchers using qualitative and quantitative techniques.

CONCLUDING REMARKS

We recognize that the timely implementation of the five recommendations contained in this report will involve significant costs in two areas. First, survey development, survey administration, data analysis, the provision of confidential access to micro-data, and data publication all require significant human, capital, and monetary resources. We do not specify these costs in advance. Our goal is to articulate a set of priorities to stimulate discussion. This discussion will require the development of cost estimates. These estimates, in turn, will help to inform the discussion and influence the implementation of the recommendations.

The second area of cost is the cost to survey respondents, busy people in companies who have to fill out tedious government surveys. The fact that many firms, especially in service industries, are small, increases these costs in relative terms. Moreover, services can be much more difficult to quantify and value than goods, a challenge that, if not met through careful survey development, can both increase respondent burden and reduce data accuracy. Current accounting practices exacerbate this problem, since firms are typically not required to provide a high level of detail on purchased services on tax forms. Similarly, firms typically are not required to fill out government forms whenever they make international transactions in services, as is the case in goods. In other words, for survey respondents, the required data may not be as close at hand as it is for goods.

We also recognize that the implementation of most of our recommendations will take time. Before any survey can be administered it must be developed. The development of proper surveys requires input from potential respondents, followed by testing and refinement based on the results of trial runs. These critical steps cannot be bypassed because appropriate surveys reduce the burden on respondents and lead to more accurate data. There are few shortcuts.

These challenges, however, should not lead to an inadequate response to the definite changes that are occurring in the composition of economic activity. The rich detail that is currently available for traded goods and manufacturing industries did not emerge overnight. It came from a long and sustained interaction between data collection agencies and respondents, along with real penalties for non-compliance. If the economic wellbeing of the United States is to rest on services for the foreseeable future, as seems likely, this same process must play out in the realm of services. Our data collection regime cannot remain tuned to the realities of the previous century. Without better data on services, and more effective use of those data, our discussions about economic change, and responses to those changes, can only be unproductive and divisive.

The experts who manage and work in our data agencies are highly talented, motivated, and capable. They understand the challenges and the solutions better than we. However, they are also under-funded and overburdened. The central question is whether the political will exists to support these professionals adequately in their efforts to meet the challenges posed by the rising importance of services in the national and international economy. We certainly hope so.

REFERENCES:

Abernathy, Frederick H, John T. Dunlop, Janice H. Hammond, and David Weil (1999), A Stitch in Time: Lean Retailing and the Transformation of Manufacturing --Lessons from the Apparel and Textile Industries. Oxford University Press: New York.

Aspray, William; Mayadas, Frank; and Vardi, Moshe (eds.) 2006. "Globalization and Offshoring of Software." Association for Computing Machinery, Job Migration Task Force, March. http://www.acm.org/globalizationreport/.

Autor, David; Katz, Lawrence; and Kearney, Melissa. 2006. "The Polarisation of the U.S. Labour Market." NBER Working Paper No 11986.

Bardhan, Ashok Deo; and Jaffee, Dwight M. 2005. "Innovation, R&D and Offshoring." Fisher Center for Real Estate & Urban Economics, Research Report #1005, http://repositories.cdlib.org/iber/fcreue/reports/1005.

Bardhan, Ashok Deo; and Kroll, Cynthia. 2003. "The New Wave of Outsourcing." Fisher Center for Real Estate & Urban Economics, Research Report #1103, November 2, http://repositories.cdlib.org/iber/fcreue/reports/1103.

Batt, Rosemary; Doellgast, Virginia and Kwon, Hyunji. 2005. "A Comparison of Service Management and Employment Systems in US and Indian Call Centers." Paper prepared for the Brookings Trade Forum 2005: Offshoring White-Collar Work — The Issues and the Implications, Susan M. Collins and Lael Brainard (eds). November 10, Washington DC. http://www.brookings.edu.

Berger, Suzanne, and the MIT Industrial Performance Center. 2005. How We Compete. New York: Doubleday.

Bernard, Andrew B., J. Bradford Jensen and Peter K. Schott. 2005a. "Survival of the Best Fit: Exposure to Low-Wage Countries and the (Uneven) Growth of U.S. Manufacturing Plants," Journal of International Economics.

Bernard, Andrew B., J. Bradford Jensen and Peter K. Schott. 2005b. "Importers, Exporters and Multinationals: A Portrait of Firms in the U.S. that Trade Goods," NBER Working Paper 11404.

Bhagwati, Jagdish. 2004. "The Muddles over Outsourcing". Journal of Economic Perspectives, Fall.

Bivens, L. Josh. "Truth and Consequences of Offshoring; Recent studies overstate the benefits and ignore the costs to American workers." Economic Policy Institute Briefing Paper #155, August 2. See: http://www.epinet.org/content.cfm/bp155.

Blinder, Alan S. 2005. "Fear of Offshoring." CEPS Working Paper No. 119, Princeton University, December.

Breznitz, Dan. Forthcoming 2007. Innovation and The State. Yale University Press

Bronfenbrenner, Kate; and Luce, Stephanie. 2004. "The Changing Nature of Corporate Global Restructuring: The Impact of Production Shifts on Jobs on The US, China, and Around the Globe." Report Submitted to the US-China Economic and Security Review Commission, October 14. See: http://www.news.cornell.edu/releases/Oct04/jobs.outsourcing.rpt.04.pdf.

Brown, Clair; Haltiwanger, John, and Lane, Julia. Forthcoming 2006. Economic Turbulence: The Impact on Workers, Firms, and Economic Growth. Chicago: University of Chicago Press. See: www.economicturbulence.com.

Dossani, Rafiq, and Kenney, Martin. 2003. "Lift and Shift; Moving the back office to India" Work in Progress (Sept.). Information Technologies and International Development, Volume 1, Number 2, Winter, pp. 21–37. Massachusetts Institute of Technology, Cambridge, MA.

Dossani, Rafiq, and Kenney, Martin. 2004. "The Next Wave of Globalization? Exploring the Relocation of Service Provision to India." Berkeley Roundtable on the International Economy Working Paper 156, September. University of California Berkeley, Berkeley, CA.

Dossani, Rafiq, and Kenney, Martin. 2005a. "Offshoring: Determinants of the location and value of services" Briefing paper. Sloan Workshop Series in Industry Studies. Asia/Pacific Research Center Conference, Stanford University, August 13, Palo Alto, CA.

Dossani, Rafiq, and Kenney, Martin. 2005b. "Moving Services Offshore: A Case Study of an U.S. High-Technology Firm." Report was prepared for the European Union - U.S. Department of Labor seminar *Offshoring of Services in ICT and Related Services.*

Dudley, Bill; Hatzius, Jan; and McKelvey, Ed. 2003. "US Economics Analyst," Goldman Sachs newsletter, Issue No. 03/38, Sept. 19.

Engardio, Peter and Einhorn, Bruce. 2005. "Outsourcing Innovation." Business Week, March 21, pp. 46-53.

Engardio, Peter; Bernstein, Aaron; and Kripalani, Manjeet. 2003. "Is Your Job Next?" Business Week, February 3, pp. 50-60.

Freeman, Richard. 2005. "China, India and the Doubling of the Global Labor Force: Who pays the price of globalization?" The Globalist, June 3.

Garner, Alan C. 2004. "Offshoring in the Service Sector: Economic Impact and Policy Issues." Federal Reserve Bank of Kansas City Economic Review, Third Quarter.

Gereffi, Gary, John Humphrey, and Timothy Sturgeon. 2005. "The Governance of Global Value Chains." Review of International Political Economy, 12:1.

Global Insight. 2004. "The Impact of Offshore IT Software and Services Outsourcing on the U.S. Economy and the IT Industry" (March). Report prepared for the Information Technology Association of America, http://www.itaa.org.

Gomory, R.E., and W.J. Baumol. 2001. Global Trade and Conflicting National Interests. Cambridge, Mass.: MIT

Grimes, Anne. 2004. "Venture Firms Seek Startups that Outsource." Wall Street Journal. Section B1, Column 5, April 2.

Groshen, Erica, Hobijn, Bart and McConnell, Margaret. 2005. "U.S. Jobs Gained and Lost through Trade: A Net Measure." Federal Reserve Bank of New York Current Issues, Volume 11, Number 8, August. www.newyorkfed.org/research/current_issues.

Guha, Krishna. 2006. "Bernanke Calls for Fairer Globalization." *Financial Times.com.* August 25, 2006. http://www.ft.com/home/us.

Harrison, Ann E. and McMillan, Margaret S. 2006. "Outsourcing Jobs? Multinationals and U.S. Employment." NBER Working Paper 12372. National Bureau of Economic Research, Cambridge, MA. July. http://www.nber.org/papers/w12372.

Hira, Ronil, and Hira, Anil. 2005. Outsourcing America: What's Behind Our National Crisis and How We Can Reclaim American Jobs. New York: AMACOM Books.

Hira, Ronil. 2005. "Impacts and Trends of Offshoring Engineering Tasks and Jobs." The Bridge. National Academy of Engineering, Globalization and Engineering 35:3, pp. 22-29.

Jarmin and Miranda 2002. "The Longitudinal Business Database." Mimeo. Census Bureau. July 16. Accessed at www.ces.census.gov/paper.php?paper=101647, October 15, 2002.

Jensen, J. Bradford and Lori G. Kletzer. 2005. "Tradable Services: Understanding the Scope and Impact of Services Offshoring," in Susan M. Collins and Lael Brainard, eds. Offshoring White-Collar Work - Issues and Implications, Brookings Trade Forum, Washington DC.

Kletzer, Lori. 2002. Imports, Exports, and Jobs: What Does Trade Mean for Employment and Job Loss? Kalamazoo, Michigan, W.E. Upjohn Institute for Employment Research.

Kroll, Cynthia A. 2005. "State and Metropolitan Area Impacts of the Offshore Outsourcing of Business Services and IT." Fisher Center for Real Estate & Urban Economics, Working Paper 293. http://repositories.cdlib.org/iber/fcreue/fcwp/293.

Lane, Julia. 2005. "Optimizing the Use of Micro-data; an Overview of the Issues." Paper presented at the 2005 American Statistical Association meetings, Minneapolis, MN. Available at SSRN: http://ssrn.com/abstract=807624.

Levy, Frank, and Goelman, Ari. 2005. "Offshoring and Radiology," in Susan M. Collins and Lael Brainard, eds. Offshoring White-Collar Work - Issues and Implications, Brookings Trade Forum, Washington DC.

Levy, Frank, and Richard J. Murnane. 2004. The New Division of Labor : How Computers Are Creating the Next Job Market. Princeton University Press, Princeton, NJ.

Mahoney, Melissa; Milberg, William; Schneider, Markus; and Von Arnim, Rudi. 2006. "Spurring Growth Dynamics from Services Offshoring." The New School, Schwartz Center for Policy Analysis, Policy Note, February. www.newschool.edu/cepa.

Mann, Catherine. 2003. "Globalization of IT services and white-collar jobs: the next wave of productivity growth." Policy Brief, Institute for International Economics. Washington, D.C.: IIE.

Mann, Catherine; and Kirkegaard Jacob. 2006. Accelerating the Globalization of America: The Next Wave of Information Technology. Institute for International Economics, June 15.

McKinsey Global Institute. 2003. "Offshoring: Is it a win-win game?" Global Insight. 2004. "The impact of offshore IT software and services outsourcing on the U.S. economy and the IT industry." Report to the Information Technology Association of America (ITAA).

Mieszcowski, Katharine. 2003. "Moving to India Is Not a Luxury. It Is a Necessity." Salon.Com, Dec. 17, 2003.

Pine, Joseph P. and Davis, Stan. 1999. Mass Customization, the New Frontier in Business Competition. Cambridge, MA: Harvard Business School Press.

Price, Lee, and Bivens, Josh. 2004. "High-paying software jobs being moved abroad." Economic Snapshots. Economic Policy Institute, Washington, D.C. http://www.epi.org/content.cfm/webfeatures_snapshots_archive_03242004.

Samuelson, Paul A. 2004. "Where Ricardo and Mill rebut and confirm arguments of mainstream economists against globalization." Journal of Economic Perspectives, Vol. 18, No. 3.

Sargent, J.F. and Meares, C.A. 2004. "Workforce Globalization in the U.S. IT Services and Software Sector." Office of Technology Policy, U.S. Department of Commerce. ACM Job Migration Task Force Meeting, Washington, DC (Dec.).

Swenson, Deborah. 2005. "Overseas assembly and country sourcing choices" Journal of International Economics. 66:1, 107-130.

Sturgeon, Timothy. 2002. "Modular Production Networks. A New American Model of Industrial Organization." Industrial and Corporate Change 11, 3: 451-496.

United Nations Conference on Trade and Development. 2004. "World Investment Report 2004, The Shift Towards Services." United Nations: New York and Geneva.

United States Bureau of Labor Statistics. 2006. "Business Employment Dynamics Database." http://www.bls.gov/bdm/home.htm.

United States Bureau of Labor Statistics. 2006. "Mass Layoffs Summary, Extended Mass Layoffs in the Fourth Quarter of 2005 and Annual Averages For 2005." Press Release USDL 06-226, February 9. http://www.bls.gov/mls/.

United States Department of Labor. 2006. "Extended Mass Layoffs in the Fourth Quarter of 2005 and Annual Averages for 2005." Press Release #06-226, Thursday, February 9. Downloaded from ftp://ftp.bls.gov/pub/news.release/mslo.txt.

United States Department of Labor. 204. "Worker Displacement, 2001-2003." Press release 04-1381, July 30.

United States Government Accountability Office. 2005b. "International Trade, U.S. and India Data on Offshoring Show Significant Differences," Report to Congressional Committees, October, GAO 06-116.

Waters, Richard. 2006. "EDS to move more jobs to low-cost locations." Financial Times. August 2.).

Weisman, Jonathan. 2004. "Bush, Adviser Assailed for Stance on 'Offshoring' Jobs," The Washington Post, February 11, p. A06.

Wilson, Ron. 2003. "Venture Capitalist Explains New Rules for IC Startups," EETimes, January 16.

Wyatt, Ian and Hecker, Daniel. 2006. "Occupational changes during the 20th century." Monthly Labor Review, March, pp. 35-57. Washington, DC: Bureau of Labor Statistics. See: www.bls.gov/opub/mlr/2006/03/art3full.pdf.

APPENDIX A: WORKING GROUP BIOGRAPHIES

- **Timothy J. Sturgeon, Industrial Performance Center, MIT (Working Group Coordinator, Lead Author).** Dr. Sturgeon is a Senior Research Affiliate at the Industrial Performance Center (IPC) at the Massachusetts Institute of Technology (MIT), where he studies a variety of global industries. He is also co-organizer of the Global Value Chains Initiative (http://www.globalvaluechains.org), principally funded by the Rockefeller Foundation, and a Research Fellow at the Institute for Technology, Enterprise, and Competitiveness (ITEC COE) at the Doshisha Management School in Kyoto, Japan. Prior to these activities, Tim held a Research Associate position at MIT for four years, during which he served as Executive Director of the IPC's Globalization Study (http://globalization.mit.edu), and Globalization Research Director for the International Motor Vehicle Program at the Center for Technology, Policy and Industrial Development. Prior to this, Tim served for two years as Director of the MIT/Carnegie Mellon Project on Globalization and Jobs in the Automotive Industry, funded by the Alfred P. Sloan Foundation. Tim came to MIT from the University of California at Berkeley, where he was a Research Specialist at the Berkeley Roundtable on the International Economy for five years while earning his Ph.D. in Economic Geography. Tim's work has been published in a variety of scholarly journals, edited volumes, and industry trade magazines.
- **Frank Levy, Department of Urban Studies and Planning, MIT (Principal Investigator and steering committee chair).** Frank Levy is the Daniel Rose Professor of Urban Economics at M.I.T.'s Department of Urban Studies and Planning. Before joining M.I.T. in 1992, Levy taught at the University of California at Berkeley and the University of Maryland at College Park and worked at the Urban Institute. Levy has written on trends in living standards, on education and most recently on the impact of computers and globalization on the economy. His 1999 book, *The New Dollars and Dreams* is a widely reviewed history of the U.S. income distribution since World War II. With his colleague, Richard J. Murnane of the Harvard School of Education, Levy co-authored Teaching the New Basic Skills, published in 1996 by the Free Press. Levy and Murnane's recent book, The New Division of Labor (Princeton University Press/Russell Sage Foundation, June 2004) examines how computerized work and outsourcing have changed the U.S. labor market and has been positively reviewed in places including The Financial Times, The Economist, The New York Post, The Washington Post *and The Jim Lehrer News Hour.* Levy received his B.S. degree in economics from MIT (1963) and his PhD in economics from Yale (1969).
- **Clair Brown, Department of Economics and Center for Work, Technology, Institute for Industrial Relations, UC Berkeley**. Dr. Brown is Professor of Economics and Director of the Center for Work, Technology, and Society at the University of California, Berkeley. Prof. Brown has published research on many aspects of the labor market, including high-tech workers, labor market institutions, firm employment systems and firm performance, wage determination, and the standard of living. The industries she has studied include semiconductors, telecommunications, consumer electronics, automobiles, and high-tech start-ups. Brown heads the human resources group of the Sloan Semiconductor Program at U.C. Berkeley. Their research has analyzed how the labor market for engineers has been changing, and how semiconductor companies create and capture value. Research on the firm employment systems and macroeconomic institutions in the United States and Japan is presented in Work and Pay in the United States and Japan (with Nakata, Reich and Ulman; Oxford University Press, 1997). The semiconductor report, chapters from her books, and papers can be found at http://iir.berkeley.edu/worktech/. Currently Brown is writing a book (with Dr. Greg Linden) on the evolution of the semiconductor industry.

- **J. Bradford Jensen, Institute for International Economics.** Dr. Jensen has been Deputy Director of the Institute for International Economics since 2003. Before joining the Institute, he served as director of the Center for Economic Studies at the US Bureau of the Census (1999-2003). He served on the faculty of the H. John Heinz III School of Public Policy and Management at Carnegie Mellon University (1997-99) and was a research economist at the Census Bureau (1993-97). Jensen pioneered the use of plant-level micro-data to investigate the impact of trade on the US economy. His research focuses on international trade, competitiveness and productivity growth, and wage inequality. His work has been published in the American Economic Review, the Review of Economics and Statistics, the Journal of International Economics, and the Brookings Paper on Economic Activity. He has also contributed chapters to several conference volumes.
- **David Weil, Department of Finance and Economics, Boston University School of Management and Kennedy School of Government, Harvard University.** Dr. Weil is Professor of Economics at Boston University School of Management and a Research Fellow and Co-Director of the Transparency Policy Project based at the Taubman Center for State and Local Government, John F. Kennedy School of Government, Harvard University. Professor Weil's research focuses on regulatory policy generally and in particular the labor market policy, occupational safety and health, and industrial and labor relations and workplace representation. He has published widely in these areas, and has also served as an advisor to the U.S. Department of Labor, the Occupational Safety and Health Administration, and other government agencies on a variety of projects. He is currently leading a study for the U.S. Department of Labor regarding assessing the performance of labor standards regulation in the U.S. He is also undertaking a study with colleagues at the Kennedy School of Government on the use of mandatory information disclosure as a regulatory tool. His research in this area has been supported by the U.S. Department of Labor, the National Science Foundation, the National Institutes of Health, the National Institute of Occupational Safety and Health, the Ash Institute on Democratic Governance at the Kennedy School of Government, the Center to Protect Workers Rights, and the Smith Richardson Foundation.

APPENDIX B: IN-PERSON AND TELEPHONE INTERVIEWS, JANUARY 2005-AUGUST 2006

In-person interviews

- Bardhan, Ashok, University of California, Berkeley, Fisher Center for Real Estate
- Batt, Rose, Cornell University Industrial Relations
- Bernard, Andrew, Tuck School of Management, Dartmouth College
- Bohn, Roger, University of California, San Diego, IR/PS
- Brown, Clair, Department of Economics and Center for Work, Technology, Institute for Industrial Relations, University of California, Berkeley
- Cohen, Steven, University of California, Berkeley, Berkeley Roundtable on the International Economy
- Dossani, Rafiq, Shorenstein Asia-Pacific Research Center, Stanford University, Sloan Industry Studies Affiliate
- Eischen, Kyle, University of California, Santa Cruz, Center for Global, International and Regional Studies
- Feenstra, Robert, Department Of Economics, University of California, Davis, and NBER
- Haggard, Stephan, University of California, San Diego, IR/PS
- Hanson, Gordon, University of California, San Diego IR/PS; NBER
- Hira, Ronil, Department of Public Policy, Rochester Institute of Technology, Sloan Printer Industry Center
- Jensen, J. Bradford, Institute for International Economics
- Katz, Harry, Cornell Industrial Relations
- Kenney, Martin, University of California, Davis, Department Of Human and Community Development, Sloan Affiliate
- Kletzer, Lori, University of California, Santa Cruz, Department Of Economics
- Kozlow, Ralph, International Economics, US Bureau Of Economic Analysis
- Kroll, Cynthia, University of California, Berkeley, Fisher Center for Real Estate
- Lane, Julia, U.S. Census Bureau and National Science Foundation
- Lawrence, Robert Z., John F. Kennedy School of Government.
- Levy, Frank, MIT Department of Urban Studies and Planning.
- Mann, Catherine, Institute for International Economics
- Mesenbourg, Thomas, Economic Programs, U.S. Census Bureau
- Rothenberg, Sandra, Rochester Institute of Technology, Sloan Printer Industry Center
- Swenson, Deborah, University of California, Davis Economics Department
- Weil, David, Boston University School of Management, Finance / Economics and Kennedy School of Government, Harvard University
- Zysman, John, University of California, Berkeley, Berkeley Roundtable on the International Economy

Telephone Interviews

- Carey, Patrick, Bureau of Labor Statistics
- Mohr, Michael, Economic Programs, U.S. Census Bureau
- Yager, Loren, International Affairs and Trade, Government Accountability Office.

APPENDIX C: WORKSHOP PARTICIPANTS, OCTOBER 25, 2005

- Brown, Clair, Department of Economics and Center for Work, Technology, Institute for Industrial Relations, University of California, Berkeley
- Hira, Ronil, Department of Public Policy, Rochester Institute of Technology, Sloan Printer Industry Center
- Jansen, Ronald, International Trade Statistics Section, United Nations Statistics Division
- Jensen, J. Bradford, Institute for International Economics
- Kenney, Martin, Department of Human and Community Development, UC Davis
- Kletzer, Lori, Department of Economics, UC Santa Cruz
- Kroll, Cynthia, Fisher Center for Real Estate, University of California at Berkeley
- Lane, Julia, U.S. Census Bureau and National Science Foundation
- Levy, Frank, Department of Urban Studies and Planning, MIT
- Lynch, Lisa, The Fletcher School, Tufts University
- Mann, Catherine, Institute for International Economics
- McFate, Katherine, Rockefeller Foundation
- Pesyna, Gail, Alfred P. Sloan Foundation
- Price, Lee, Economic Policy Institute
- Richardson, David, Department of Economics, Maxwell School, Syracuse University
- Smith, Scudder, Trade Measures
- Sturgeon, Timothy, Industrial Performance Center, MIT
- Weil, David, Finance / Economics, Boston University School of Management, and Kennedy School of Government, Harvard University