

U.S Jobs Shipped Abroad: A New Measure

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1. Introduction

Much of the discussion surrounding the weak performance of the U.S. labor market during this recovery focuses on service jobs being moved from the U.S. to India, China and other developing countries. Examples abound of companies using overseas call centers, computer programmers, help desk workers, accountants, etc., while closing down whole departments here. Some private research firms have obtained estimates of the jobs lost to outsourcing, and the concurrent growth in outsourcing with a weak current labor market recovery have led many to conclude that outsourcing is bad for the U.S. labor market.¹ The concern that U.S. workers are losing jobs to foreign competition is not a new one and indeed the recent period is just one of many in the history of the U.S. economy in which the impact of international trade on U.S. workers has been of concern.

This edition of *Current Issues* explores the relationship between trade and job creation in the U.S. In doing so, we highlight two important issues. First, foreign outsourcing (or offshoring) is essentially analogous to importing intermediate inputs that might instead have been produced here. In that sense, offshoring can be treated just as any other good that we import. Second, a careful analysis of the effect of recent trade patterns on U.S. labor markets requires that we measure not only the jobs lost to imports but also the jobs created through the production of our exports. Our strategy is to obtain a measure of the net effect of trade on U.S. job creation—we label this effect “jobs embodied in net imports”—and to examine the behavior of this measure over the last two decades. Because we consider both the U.S. jobs embodied in the goods and services that are imported into the U.S., as well as the U.S. jobs that exist due to the production of exports from the U.S., our estimate of jobs moving abroad is more complete than those found in previous studies.

We have three main findings. First, our comprehensive estimate of jobs embodied in U.S. net imports is very small relative to total employment in the U.S. (at maximum 2.5%), both historically and in the current period. We also see that this estimate is sometimes positive and sometimes negative and thus international trade does not mechanically imply that the U.S. loses jobs. Second, we do not find an acceleration in the pace of growth of jobs embodied in net exports since 2001. Since 2001 the average increase in U.S. jobs sent abroad is about 30 thousand per month. However, this represents a deceleration compared to the average of 45 thousand jobs a month during the period from 1997 to 2001. Finally, our results suggest that surges in jobs being “shipped abroad” (in the sense that more jobs are lost to imports than are created by the production of exports) are not clearly associated with weakness in the U.S. labor market but instead seem to reflect other factors, such as the strength of the dollar, and the federal government budget deficit.

¹ Two of the most quoted related studies are Goldman Sachs (2003) and Forrester Research (McCarthy 2003).

Even though we find that trade has only a small effect on overall job creation in the U.S., it is inevitable that some workers are temporarily or even permanently dislocated as a result of changing trade flows. The last section of this *Current Issues* discusses the costs and policy challenges of international trade as they relate to the U.S. labor market.

2. Three common impressions

We begin by reviewing three common impressions that are explicit or implicit in the argument that jobs sent abroad account for a large part of the recent weak performance of the U.S. labor market. These three assertions can be summarized using a hypothetical example.

Consider Dan, a recently laid-off, unemployed programmer. News of Dan's situation might lead you to believe that (i) there was a surge in imports relative to exports during the recent downturn, (ii) that he was laid off because his work was sent abroad, and (iii) that programming companies like his account for a disproportionate share of job losses. Our evidence suggests, however, that these three assertions are either misplaced or exaggerated.

Did imports or imbalances surge during this downturn?

The first common impression is that imports are making unprecedented new inroads in many industries at once, and particularly the services. Real trade volumes suggest otherwise. Imports in durable, non-durable manufactured goods and services all increased during the recent downturn, but there is no apparent break from trend. (See figure 1.) Similarly, net exports from each of these sectors decreased, but again, there was no obvious break from trend since 2000. Thus, increased trade is certainly a constant source of structural change in the economy, but there is no evidence—at this high level of aggregation—of any particular spurt in imports or trade deficits in these three key sectors during the last four years. That is, faster growth in some particular industries has been balanced by slower growth in others, so overall growth rates are consistent with previous trends.

Did jobs shipped abroad cause a surge in layoffs?

The second impression is that an unprecedented number of plants and offices are being closed down, as their jobs are sent overseas. Such a large-scale displacement could pose a serious problem for labor market adjustment. In fact, according to the Business Employment Dynamics data², the rate of job destruction (as a percentage of employment) did shoot up briefly from 7.5% (Q2 2000) to 8.3% (Q3 2001) during the recession. Since then, however, it has dropped to 6.7%, lower than the job destruction rates seen over the course of the 1990s expansion. (See figure 2.) This evidence refutes the assertion that shipping jobs overseas has caused a surge in layoffs.

Instead, the dearth of jobs since the business cycle peak is due to the fact that job creation rates that have fallen dramatically from 8.4% in Q4 1999 to a recent low of 6.9% in Q1 2003. Thus, the role of trade, if that is the driver of this change, must be working to suppress job creation rather than cause more layoffs. Corroborating evidence come from the Bureau of Labor Statistics Mass Layoff Survey, which does not find a recent spike in mass layoffs, for any reason including foreign

² More information about the relatively new Business Employment Dynamics data series is available at <http://www.bls.gov/bdm/home.htm>.

competition.³ That is, job growth is slow because firms are hiring many fewer workers than they were during the expansion, not because they are laying them off more rapidly.

Have sectors with high or growing trade lagged most in job creation during the recovery?

The third impression is that sectors that are heavily or increasingly exposed to trade suffered disproportionate job losses during the recession and early recovery. The evidence on this assertion is mixed at best.

One way to check this is to compare the recession's job loss rates in trade-sensitive and insensitive industries to their trend growth rates (figure 3).⁴ Starting with goods-producing industries, the heavily traded manufacturing sector lost a disproportionate share of jobs during the downturn, consistent with this view. However, natural resources did not, and the non-traded construction jobs were disproportionately affected. Turning to services, the results are even less consistent. Business services also have seen above-average job losses this downturn, in line with reports of where trade is making new inroads. However, finance, insurance, wholesale trade and management and engineering jobs are doing relatively well, despite outsourcing concerns. Among the non-traded services industries, there is also considerable variation in payroll shortfalls compared to trend (particularly in leisure and hospitality), despite the lack of sending jobs abroad.

Thus, while Dan's spell of joblessness is common for U.S. workers because of our high rate of job churning, his layoff does not appear to signal an epidemic of trade-related job destruction. Most layoffs occur for reasons unrelated to trade. In some sectors, trade-related issues dominate, while in many others different factors are at work, including technological change, investment overhangs, and changing consumption patterns.

3. Measuring U.S. equivalent jobs embodied in trade

U.S. firms make the decision to use foreign labor for a variety of reasons. For example, during the tight labor market of the late 1990's, some firms used foreign workers as a way to expand when they could not find qualified U.S. workers. At other times, jobs that moved abroad were replaced by jobs elsewhere, stemming from increased exports.

The discussion is often couched in terms of the one-sided question "how many jobs are we losing to foreign workers?" For two important reasons, this is not a useful way to think about this issue. First, the use of foreign labor to produce a good or service is essentially analogous to purchasing the imported good or service itself. Thus, using foreign labor is just another form of international trade rather than a new phenomenon. Second, given that trade flows in both directions, we want to consider exports as well as imports in trying to assess the effect of (increased?) trade on U.S. jobs. Thinking about it in this way leads us to ask the more essential question of "what have been the job implications (separate from welfare implications) of recent overall movements in U.S. net exports?"

We answer this question by computing the number of U.S. equivalent jobs *embodied* in trade. That is, we ask how many U.S. workers, at current wages, prices, and productivity levels, would be needed to produce the goods and services that are imported? Furthermore, we also ask the opposite

³See Bureau of Labor Statistics June 2004 <http://www.bls.gov/news.release/pdf/reloc.pdf>

⁴For the recession period we use March 2001 through April 2003, the last month for which Standard Industrial Classification (SIC) industry detail is available. Although job growth did not resume until in August 2003, 96 percent of the downturn's losses occurred during this period. We use July 1991 through February 2001 to determine the previous annualized trend by industry.

question about exports. That is, how many U.S. jobs are embodied in the goods and services that the U.S. exports? We can track these numbers over time to look for any recent acceleration.

We call the net number of jobs resulting from these two questions “number of U.S. equivalent jobs embodied in trade.” In order to see why it is important to look at both imports as well as exports, consider the following two examples.

The first is the one of Dan, the unemployed software programmer whom we considered before. Suppose his company fired him and hired programmers in India to replace him. In that case, if the company sells the software in the U.S. the firing of Dan will mean the loss of a U.S. job and an increase in U.S. software imports (a component of services imports) from India. On the other hand, if the company sells the software abroad, then Dan’s job loss would be reflected in lower U.S. software exports. Hence, a U.S. job sent abroad is reflected either in an increase in imports or a decrease in exports.

To consider how jobs are brought into the U.S. by trade, we introduce Denise, a consultant employed in the U.S. Denise works on two projects at the moment. In the first project she advises an American company on how to penetrate the Asian market place. The clients had first hired an Asian consultant but realized soon that they preferred Denise, with her U.S. business school education, for the job at hand. Hence, Denise’s first project reduces consultancy services imports into the U.S. Denise’s second project is for a European company that considers launching a product in the U.S. This part of Denise’s job contributes to consultancy services exports. Thus U.S. jobs that are the result of U.S. trade, like Denise’s, can either decrease imports or raise exports.

The gist of the above two examples, illustrated in figure 4, is that to count the *net* number of U.S. equivalent jobs embodied in trade, we must estimate how many U.S. jobs would be needed to produce U.S. net imports (that is, imports minus exports) domestically.

We emphasize that the answer to this question is not the same as the number of jobs that would be added to payroll employment if we were to produce all net imports in the U.S. The answer to the latter question involves taking into account any reallocations of labor arising from wage, price, and productivity effects of trade. We hold all these factors fixed in our analysis.

The details of our methodology are spelled out in Box 1. In a nutshell, our analysis boils down to calculating the following estimate of jobs embodied in trade:

$$\left[\begin{array}{c} \text{change in U.S. output} \\ \text{needed to replace U.S.} \\ \text{net imports} \end{array} \right] \times \left[\frac{\text{U.S. employment}}{\text{U.S. output}} \right]. \quad (1)$$

The first term of this expression is calculated using the U.S. input-output tables. These tables allow us to account for both the direct jobs and the support jobs needed to produce U.S. net imports. Including support jobs takes into account the “multiplier-effect” of job losses.

Putting imports and exports together, we get net imports of jobs in figure 5. In 2002, net trade in durable manufactured goods was equivalent to importing 2.4 million jobs to the U.S. Nondurable net trade volumes were equivalent to importing 1.2 million jobs. In stark contrast, services trade ran a surplus, so we exported output equivalent to 1.3 million jobs. In trends, services do show the strongest evidence of a trend reversal. In 1997, the peak year by this measure, services trade was equivalent to 2.4 million jobs on US payrolls. Since then, services trade’s contribution in terms of payroll jobs has fallen by 1.1 million jobs. All three of these series began to decline in 1997, coinciding with a strong U.S. dollar and a tight U.S labor market. Manufacturing’s contributions also declined over 1997-2003, by 1.5 million jobs. Thus, the change in imports of service jobs was

almost as high as that of total manufacturing. Note that the fall-off in job creation shown in figure 3 began in 2000--a full three years after the pick-up in jobs shipped overseas.

The overall trend revealed in figure 5 is as follows. Since 1997 the number of jobs embodied in net imports has risen by 2.9 million, which amounts to about 40 thousand jobs a month. The flow from 1997 to 2001 was about 45 thousand jobs a month. This fell to about 30 thousand jobs from 2001 to 2003.

Another way to put these effects in perspective is to add the equivalent jobs from net imports of the three sectors together and divide by total payrolls. (See figure 6.) Relative to the size of the whole economy, the number of jobs in net trade is quite small—never more than 2.5 percent. However, the most recent number of 2.4%, for 2003, represents the maximum over the period observed. This, then, may help also explain the focus on the role of trade on payroll jobs. The current trends established themselves while the labor market was tightening, and domestic job creation was high. As job creation slowed dramatically after 2000, the continuation of this trend of shipping jobs overseas became much more noticeable.

In order to provide some perspective on the importance of measuring the jobs embodied in both imports and exports, Figure 7 plots jobs embodied in total gross imports along with the jobs embodied in net imports as shown in Figure 5. The comparison is striking—the number of jobs “lost” through gross imports is nearly five times as large as the number we find for net imports. Thus, omitting the jobs created through export production from the analysis substantially overstates the costs of trade for the U.S. labor market.

Comparison with previous studies on U.S. jobs sent abroad

How does our number of 30 thousand jobs per month embodied in changes in trade flows compare to other estimates? Forrester Research (McCarthy 2003) and Goldman Sachs (2003) provide two commonly cited recent estimates of the number of jobs being sent abroad in services. Forrester estimates that, during the period 2000-2015, 17,000 service industry jobs per month will go overseas. Goldman Sachs estimates that number for the period 2000-2002 at 25,000 per month and adds to that 14,000 manufacturing jobs. Put on this monthly basis and compared to normal job flows in the US economy, these estimates are not large enough to account for the recent (2001 to 2003) shortfall of jobs. The estimates in these studies differ from ours in several important dimensions, which reflect some of the difficulties with measures of offshoring discussed in GAO (2004).

First, they capture only the import side of transactions and, therefore, only provide an estimate of the *gross* flow of U.S. jobs relocating abroad. U.S. service industries, however, run a trade surplus that has generally been maintained as volumes have grown. By only focusing on the gross flows, these studies thus provide a one-sided analysis that over-emphasizes U.S. jobs being sent abroad compared to foreign jobs moving to the U.S. Thus, their numbers should be compared to gross job losses of 7-7.5% of employment (or 9 to 10 million jobs) per quarter in Figure 3, not to the net flows of jobs that were close to zero.⁵

Second, these numbers fail to capture the “multiplier-effect” that we account for using input-output tables. That is, these studies ignore the many support jobs (e.g., payroll services) that disappear as production jobs are sent abroad. Similarly, they ignore U.S. jobs that exist because of

⁵ For example, the Goldman Sachs total of 39,000 jobs per month adds up to 117,000 jobs per quarter, or just 1.3 percent of 9 million gross jobs destroyed per quarter as recorded in the BED.

trade related activities, mainly in the retail, wholesale and transportation sectors. These are jobs indirectly affected by trade. However, when we take this multiplier effect into account in our *net* effect, we end up with an estimated number of jobs sent abroad that is comparable to these two other studies.

Finally, these studies provide no historical context. Trade in services did not start a few years ago. Hence, studies of current rates job flows overseas cannot tell the extent to which their estimates represent an acceleration or a continuation of trend. Our analysis, however, provides this historical context and finds little or no evidence of a post-recession break in the trend of jobs sent abroad.

4. Impacts and issues raised by trade

The results presented above should not be interpreted as the estimating the whole impact of offshoring of jobs. Although they represent an improvement over previous estimates of jobs sent abroad, they still solely focus on the effects of trade on the number of jobs now, holding many considerations fixed. This perspective has two key limitations. First, even though these numbers include the effect of exports on jobs, they continue to ignore the benefits of trade in terms of raising wealth. Second, even if the net number of jobs changes little and overall wealth rises, trade could raise some important policy challenges for the U.S.

The uncounted benefits of trade

One of the classic results in economics is that trade allows countries to specialize and thereby achieve gains over what they could produce alone. To this, we can add the notion of product cycles. Over time, products start as experiments and evolve into commodities when their design and manufacture becomes routine. During their early experimental stages, a lot of innovation is needed to produce them. Since the U.S. has the highest rate of international patenting per capita in the world⁶, we can think of the U.S. as specializing in innovation. Products start here. Then, as the products mature and no longer need as many innovative inputs, we lose some of our comparative advantage in producing them. Our highly skilled workers are too expensive to be internationally competitive in the routine production of many commodities. So, when a product or service becomes a commodity, the most routine jobs involved in its production can be sent overseas.

The U.S. workers displaced as jobs go overseas move on to the next new product or elsewhere in the economy. Competition among producers lowers the price of the good, raising the purchasing power (i.e., wealth) of consumers and thus, their demand for that good or others. This process is the source of the new jobs that absorb the displaced workers. That is, the decline in prices for newly commoditized products allows consumers (here or abroad) to spend more money on other products or services. Seen this way, our ability to continue sending jobs overseas is a sign of our continuing success as innovators.

Furthermore, the process creates wealth in the developing countries that take over production. Since wealthier countries are more stable and are better customers for US products, we benefit further. Through the lens of this understanding, the new imports in services we have seen recently reflect the maturation of some service products, which account for major share of our employment

⁶Evidence on patenting per capita appears in Porter & Stern (2001), which also ranks the U.S. first in a “National Innovative Capacity Index.”

and output. Workers who leave the maturing industries will be reallocated to producing the next big thing, some other exportable product, or a non-traded good or service.

Costs and policy challenges

While this analysis suggests that trade plays only a small role in the recent performance of the U.S. labor market and is likely to be beneficial to overall economic activity, the recent flurry of concern is indicative of the serious costs incurred by some workers whose jobs are sent abroad. Even if expanding trade does not change the total number of jobs by much, it is likely to raise the economy's job turnover rate. That is, more trade could expose more workers to the risk of displacement as more products become tradeable, new countries enter the competitive market, and exchange rates fluctuate (see Klein, Schuh and Triest 2003).

Although displacements due to recent changes in trade flows appear to be a small component of total recent displacements⁷, the costs to individual or groups of workers of such displacement can be quite high. No matter the source, the brunt of the costs of structural change are born by displaced workers and often the communities in which they live.

While many displaced workers move on to new work with few problems, others spend a long time out of work or must take a cut in pay (see Kletzer 1998, 2001; and Farber 2003). The unemployment spells and income losses tend to be higher for older and less educated workers, regardless of the industry they leave or the reason why they are being displaced. Since workers in the 'newly-traded' service industries are, on average, higher-skilled and younger than those in manufacturing, the costs of displacement to service industry workers are likely to be lower than those borne by the typical manufacturing worker. Nevertheless, they may be substantial.

Policies to mitigate costs of displacement to workers focus on compensating them or enhancing their skills, mobility or search efficiency. Proposals for compensation and retraining include redesign or extension of the Unemployment Insurance system to include wage insurance (see Kletzer and Litan 2002) or retraining, such as found in, for example, Trade Adjustment Assistance (TAA). TAA subsidizes up to two and a half years of job training, provides temporary allowances for job search and relocation, and supports income and (more recently) health insurance benefits for eligible manufacturing workers who have been displaced by trade.⁸ Skills training initiatives emphasize the need for good education before labor market entry, since that helps lower risk of displacement and its costs, as well as training on the job and after displacement.

All of programs above are intended to minimize the costs of displacement to workers in an environment with a high degree of churning.

5. Bottom line

Our results suggest that U.S. jobs sent abroad do not account for a major part of the payroll shortfall since the beginning of the last recession in 2001. We estimate that since 2001 on average 30 thousand jobs a month are embodied in the rising U.S. trade deficit. This rate actually represents a slowdown from the higher rate of 45 thousand jobs lost per month we experienced from 1997 to 2001. Thus, our interpretation is that because job creation in all sectors has been low recently,

⁷ Other reasons for job displacement include slow economic conditions, technological change, shifts in consumer preferences, and shifts in market share among firms.

⁸ Bills to extend TAA to service industry workers have recently been introduced in the House and Senate.

displaced workers have had a more difficult time finding new or comparable employment. Modern trade theory suggests that the extension of trade to new activities probably signals that we are succeeding in exploiting our comparative advantage in innovative activities and helping create wealth both in the U.S. and abroad. Nevertheless, recent trade developments have likely added a source of insecurity for workers that previously considered themselves insulated from international competition.

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Box 1. Technical details

We use the sequence of U.S. Input-Output tables for 1983-2000, by Chentrens and Andreassen (2003), to calculate the amount of nominal output for each of our sectors required to replace U.S. net imports.

We do so by calculating the industry-by-commodity requirements matrix, as explained in Chentrens and Andreassen (2003). This matrix provides us with an estimate of the amount of industry output required per dollar of each good or service supplied to final users.

We then multiply this requirements matrix by the amounts of net imports of goods and services. That is, we assume that the net imports, initially assumed to flow to U.S. final users, are now produced in the U.S. The result of this calculation provides us with an estimate of the amounts of output required from each sector, at current factor prices, to replace net imports. This is essentially the first ratio of equation (1).

We then calculate the number of jobs embodied in these output levels by multiplying them by the number of workers per dollar of output for each sector, which is the second part of (1). The employment data are taken from the Bureau of Labor Statistics' Current Employment Statistics.

Because we did not have any input-output tables for the years after 2000, we used the 2000 requirement matrix to calculate the jobs embodied in trade for 2001 through 2003. Using requirement matrices for other years than 2000 for this calculation yields very similar results. It is important realize that our results are conditional on the assumption that there are no drastic changes in the requirements matrix after 2000.

Just like other analysis based on input-output tables, our analysis is limited by the assumptions that underlie these tables. First of all, our analysis here assumes constant factor input shares to calculate the input requirements for each industry. Secondly, the data do not allow us to account for differences in quality between traded and non-traded goods.

Our results are all based on the Standard Industry Classification (SIC) system, because this is the system used to define the sectors in the input-output tables that we use. Results for 2003 are based on April employment figures. This is the last month for which SIC based employment data were published. The import and export data that we use are based on the North American Industry Classification System (NAICS), because no SIC based trade data are available after 1999. Before 1999, the difference between SIC and NAICS based trade data did not imply important quantitative and qualitative differences in our results.