# Trade, Employment, and Wages: What Does the Evidence Show?

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# Summary

There is a disconnect between economists and popular opinion on the merits of free trade. Economic theory concludes that free trade is mutually beneficial because it allows countries to focus on producing the goods for which they have a comparative advantage. By contrast, many people believe that free trade is harmful because it destroys American jobs or lowers wages. This report looks past theory at the empirical evidence to see which side of the argument is supported by the data.

Economists do not deny that some American workers will lose their jobs because of import competition. Greater imports will cause gross job loss, but theory predicts the job loss will be offset by gross job gains among exporters, recipients of foreign capital inflows (in the case of a trade deficit), and the economy as a whole because of general increases in efficiency caused by comparative advantage. The result, economists believe, would be no net change in total employment.

This report uses regression analysis of quarterly national data from 1948 to 2005 (and a sub-sample from 1980 to 2005) to answer three questions. First, do higher imports systematically correspond to periods of high unemployment or low employment growth? Second, do higher trade deficits correspond to high unemployment or low employment growth? Third, do higher imports or trade deficits correspond to weak growth in average worker compensation?

The findings of this report generally support economists' views on trade and employment for several reasons. First, most of the findings on the link between imports and unemployment, or trade deficits and unemployment, are statistically insignificant. That is, by the accepted standards of research, it cannot be ruled out that imports and the trade deficit had no effect on unemployment at all. Second, the regressions generally had low R-squared values, which means that imports and trade deficits explain very little of the variation in unemployment. Third, when the relationship between the variables was statistically significant, it was too small to be economically meaningful and, in some cases, moved in the opposite direction from the relationship assumed by some free trade opponents. For example, a one percentage point increase in imports as a share of GDP *reduced* the unemployment rate by 0.10 percentage points, all else equal.

The relationship between trade and average worker compensation tended to be statistically significant, but these regressions also had low R-squared values and were too small to be economically meaningful. The effect of imports on worker compensation was the opposite of that predicted by some free trade opponents. Trade deficits, on the other hand, were associated with low growth in worker compensation, but the effect was small (a one percentage point increase in the trade deficit as a share of GDP reduced worker compensation by 0.79%-1.17%, all else equal.) It should be noted that average worker compensation does not address the question of how trade affects wage inequality among workers of different income levels. It does, however, address the question of how national income is divided between workers and owners of capital. This report will not be updated.

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# Introduction

Economists are nearly unanimous that free trade raises economic well-being overall. For example, 93% of economists surveyed in the early 1990s generally agreed with the proposition or agreed with provisos that "tariffs and import quotas usually reduce economic welfare."[1] The general public tends to have a different view of trade. In polls taken in June 2005 and around the time the economists' survey was published, 48% of the public believed that trade was a threat to the economy, while 44% believed it was an opportunity for economic growth.[2]

The economic case for free trade starts with the principle of comparative advantage, which can be summed up with the adage "focus on what you do best." The insight behind comparative advantage is that even if country A is better than country B at producing everything (called an "absolute advantage"), there will still exist some goods that country B is less bad at producing, and if it produces and trades those goods with country A, both countries can consume more than if each tried to produce all types of goods by itself. This principle applies not just to trade between countries, but every market transaction that occurs between individuals. In one famous example, it explains why Michael Jordan does not mow his own lawn. Although his athletic ability allows him to mow faster than anyone he can hire, he is better off paying someone else to do it and spending the time he saved on basketball or endorsements.[3]

This logic is considered so airtight by economists that little empirical research has been done lately to try to confirm it. But theory makes little impression on a worker who is told that he or she has lost his or her job to overseas competition. This report looks at empirical evidence of what has happened historically to trade and employment. In evaluating this evidence, it is important to distinguish between the gross effects of trade on employment and the net effects. Economists would not dispute that trade causes some workers in the U.S. economy to lose their jobs. But they contend that other jobs are created by trade and the efficiency gains that result from trade, so that trade has no net effect on employment.[4] This report analyzes empirical evidence and finds support for economists' contention that trade has no net quantitative effect on employment. (This report focuses on the nation's overall welfare, and does not address the issue of trade's effect on gross employment flows. That is, it does not analyze whether workers in certain regions, income cohorts, or sectors of the economy benefit or suffer from trade more than others.[5]) Congress may find this evidence useful in considering any future free trade agreements that result from ongoing bilateral and multilateral negotiations.[6]

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[1] Richard Alston, J.R. Kearl, and Michael Vaughn, "Is There a Consensus Among Economists in the 1990s?" *American Economic Review*, May 1992, p. 203.

[2] Dennis Jacobe, "More Americans See Threat, Not Opportunity, in Foreign Trade," Gallup Poll News Service, Aug. 2, 2005. Between 1992 and 2005, Gallup asked this question eight times. During that time, the share of respondents who believed that trade was a threat varied between 35% and 48%.

[3] For a full exposition on the theory of trade and comparative advantage, see CRS Report RL32059, *Trade, Trade Barriers, and Trade Deficits: Implications for U.S. Economic Welfare*, by Craig K. Elwell.

[4] The concept of gross and net job loss is discussed more fully in CRS Report RL32194, *Job Loss: Causes and Policy Implications*, by Marc Labonte.

[5] For sectoral evidence, see CRS Current Legislative Issue *U.S. Industries and Trade,* http://beta.crs.gov/cli/cli.aspx?PRDS_CLI_ITEM_ID=549. See also Ana Revenga, "Exporting Jobs? The Impact of Import Competition on Employment and Wages in U.S. Manufacturing," *Quarterly Journal of Economics*, vol. 107, no. 1, Feb. 1992, p. 255.

[6] For the current status of multilateral negotiations, see CRS Report RL32060, *World Trade Organization Negotiations: The Doha Development Agenda*, by Ian F. Fergusson. See also CRS Report RL31932, *Trade Agreements: Impact on*
(continued...)

Whether it is desirable to undertake an activity that creates winners and losers is a value judgement that cannot be answered by economic theory. (However, it is useful to note that all market activity, including competition among domestic firms and technological innovation, creates winners and losers.) Most economists argue that, in principle, nobody need be made worse off from trade since the gains from trade allow the winners to compensate the losers and still be better off themselves. Of course, effective compensation is difficult to design in reality. The Trade Adjustment Assistance Program is one real world example of how such compensation can be structured.[7] Economic theory cannot address the question of how much assistance those workers who are harmed by trade deserve to receive; that is a social issue.

# Evidence on Trade and Jobs

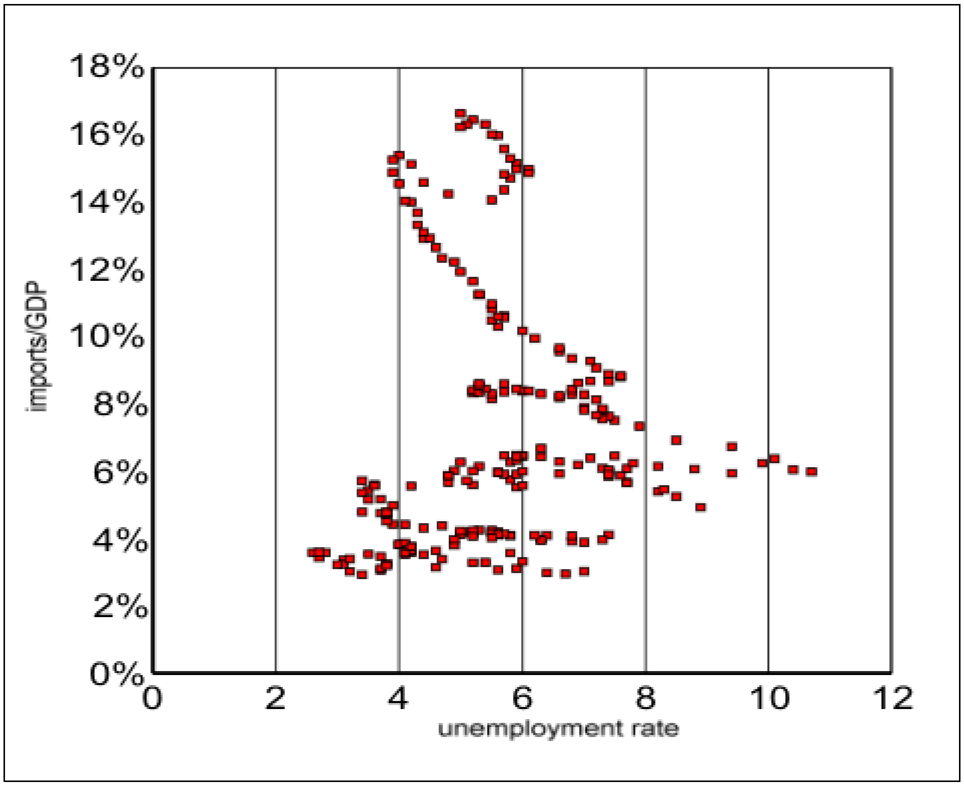
The argument that imports cause net loss in employment in the economy overall can be evaluated at the simplest level by looking at the data in **Figure 1**. Imports have been growing steadily as a share of GDP over the past 50 plus years, but unemployment has not. Imports and unemployment were both very low in the 1950s (the data in the bottom left-hand corner of the chart). Trade opponents might blame imports for the rise in unemployment in the 1970s and 1980s. But since the 1990s, unemployment has steadily fallen while imports have continued to rise (the data in the upper part of the chart.) If imports are to blame for job loss, why didn't the relationship hold over time?

(...continued)

*the U.S. Economy*, by James K. Jackson.

[7] See CRS Report RS22718, *Trade Adjustment Assistance for Workers (TAA) and Alternative Trade Adjustment Assistance for Older Workers (ATAA)*, by John J. Topoleski.

**Figure 1. Imports and Unemployment, 1948-2005**




**Source:** Bureau of Labor Statistics and Bureau of Economic Analysis

**Note:** Imports are measured as a share of GDP. Each data point represents a quarter between 1948 and 2005.

Simple graphing cannot identify the relationship between the two variables with any quantitative precision. To do that, this report uses the standard tool of empirical research in economics, regression analysis (see the appendix for more details). Regression analysis relies on finding a large enough sample and looking at variations in employment levels and trade levels across each unit of the sample, while holding other causes of variation constant, to estimate how much employment will change when trade levels change.[8] The units making up the sample will be the U.S. economy as a whole over time, measured quarterly. If the argument made by some trade opponents were correct, it would be found that in quarters when imports were high, unemployment would be high. If the relationship were strong enough, it would be said to statistically significant, which means that by commonly accepted standards of research, the relationship is strong enough to rule out that it was caused by random chance. Alternatively, if economists were correct that trade has no net effect on overall employment, then a statistically insignificant relationship between the two variables would be expected. Economic time series variables often have a rising trend over time. Therefore, the effect of the trend in pertinent

[8] Economists would consider trade and employment to be two endogenous variables in a larger system of equations describing economic activity on the whole. Therefore, one could not consider employment to be simply caused by trade since they are jointly determined. Solving this system of equations would be incomprehensible to lay readers and does not directly address the concerns of trade opponents, so the method will not be employed here. Technically, the results in this report can be considered to show whether periods of high imports or trade deficits are systematically associated with periods of high unemployment or low worker compensation.

variables used in this report has been eliminated by "differencing" the data (looking at changes in values, rather than the values themselves) so that spurious correlation does not occur.[9]

Using a sample of all available data, spanning from 1948:2 to 2005:4, **Table 1** shows the effect of trade, measured as imports as a share of GDP, on the unemployment rate. In a simple bivariate regression between unemployment and imports using the ordinary least squares method, shown in the first row of the table, the relationship is not significantly different from zero and is in the opposite direction of what some trade opponents claim. Taken literally, these results (called an estimate of a beta coefficient) suggest that when imports rise by 1% of GDP, unemployment falls by 0.05 percentage points. The results are statistically insignificant, however, despite a relatively large sample size, which means the variables are so weakly related that zero effect cannot be ruled out. The R-squared measure for this regression is zero, which means that the independent variables (in this case, just imports) explain none of the movements in unemployment.[10]

For these estimates to be valid, the relationship between trade and employment must not be fundamentally altered over time. Some might argue that looking at a more recent period would give a better idea of the effect today since the economy has changed over time. For example, economic variables such as employment and imports are less volatile now than they were several decades ago, and the exchange rate changed from a fixed regime to a floating regime in 1971. Therefore, all of the regressions in this report are also estimated over a sub-sample of 1980-2005. Over that sub-sample, the estimated effect of imports on unemployment is larger (the beta coefficient is now 0.69), but still statistically insignificant.

**Table 1. Imports and Jobs**

(Independent variables: imports/GDP, recession when noted)

| Dependent Variable | Time Period | Beta Estimate | Statistical Significance | R-Squared | Model Type | Dummy Variable for Recession? |
|---|---|---|---|---|---|---|
| unemployment rate | 1948:2-2005:4 | -0.05 | No | 0.00 | least squares | no |
| | 1980:1-2005:4 | -0.69 | No | 0.01 | | |
| employment-population ratio | 1948:2-2005:4 | 0.30 | At 1% level | 0.04 | least squares | no |
| | 1980:1-2005:4 | 0.42 | At 1% level | 0.12 | | |
| unemployment rate | 1948:2-2005:4 | -0.10 | At 5% level | 0.96 | autoregression (w/ 2 lags) | yes |
| | 1980:1-2005:4 | -0.27 | No | 0.98 | | |

9 For example, the average height of Americans and the U.S. stock market are two variables that have trended upwards over time. A naive correlation would claim that height causes stock prices. But it would be expected that if changes in height and changes in the stock market were compared, correlation would break down.

10 The R-squared measure can be as low as zero and as high as one. If the R-squared was one, it would mean that the independent variables could explain all of the movement in the dependent variable.

| Dependent Variable | Time Period | Beta Estimate | Statistical Significance | R-Squared | Model Type | Dummy Variable for Recession? |
|---|---|---|---|---|---|---|
| unemployment rate | 1948:2-2005:4 | 0.24 | No | 0.17 | distributed lag model (w/ 2 lags) | yes |
| | 1980:1-2005:4 | 0.04 | No | 0.22 | | |

**Source:** CRS calculations

**Notes:** Employment-population ratio and import-GDP ratio have been differenced. Beta estimate for distributed lag model is the sum of the two lagged beta coefficients.

To test the robustness of the results, it is useful to look at different measurements of labor markets and see if similar results are found. When employment (as a fraction of the total adult population, to control for population growth) is substituted for the unemployment rate, the effect is highly statistically significant[11]—but causes employment to rise, not fall. Now, an increase in imports equal to 1% of GDP causes a 0.30 percentage point rise in the employment-population ratio using the entire sample, and this result is statistically significant at the 1% level. The R-squared for this regression is also extremely low (0.04), so the regression can only explain 4% of the change in employment over time. Similar results are found over the more recent sub-period.

The regressions presented so far are simplistic, and a few modifications can make them more realistic, and hopefully more accurate. First, the regressions presented above assumed that nothing affects unemployment except imports. In reality, there are many other variables that one would expect to affect unemployment. While it is beyond the scope of this report to consider them all, a very simple one can be added—a dummy variable for whether or not the economy is in a recession. If it is accepted that higher imports do not tend to cause recessions, then it can be controlled for the predictable effect of a recession on unemployment to analyze whether the remaining variation in the unemployment rate can be explained by changes in imports. This small change can make a large difference. For example, when a recession variable is added, the effect of imports on the employment-population ratio is no longer statistically significant and the effect is only one-third as large (for brevity, these results are not presented in **Table 1**).

Second, regression analysis is based on the assumption that the units in the sample are independent of each other—one unit is not systematically influenced by another. For many time series, this is not the case. Two different methods are used next to correct for this fact. Because labor markets adjust slowly, the unemployment rate this quarter can help predict what the unemployment rate will be in the next quarter. This can be controlled for using the first method, called autoregression. Empirically, if it can be controlled for the effects that the unemployment rate had over the last two quarters on unemployment in the current quarter (empirical tests suggests that the statistically significant effects come within two quarters), it can then be evaluated whether the remaining variation in unemployment is caused by imports. As seen in **Table 1**, when this is done, the effect of imports on unemployment doubles and becomes significant at the 5% level.[12] (The relationship becomes statistically insignificant when confined

[11] Significance at the 1% level means that in 99 out of 100 cases the effect of imports on employment would not be zero.

[12] Although the results are not presented for the sake of brevity, the effect of imports is statistically insignificant if the employment-population ratio is used as a dependent variable instead of the unemployment rate. Also, the results presented in the table include the recession dummy variable and two lags, but the results are not qualitatively different (continued...)

to the 1980-2005 period, however.) Most likely, the regressions are showing that higher imports are associated with lower unemployment because causation runs in the opposite direction—when the economy is booming and unemployment is low, import demand rises. The R-squared for this regression is very high, 0.96, which illustrates that past unemployment rates are a much better determinant of current unemployment than trade.

Also imagine that the effects of imports on unemployment do not all occur immediately. Perhaps, because labor markets adjust slowly, the effects of a change in imports on unemployment take a few quarters before they are fully felt. Using the second method, a distributed lag model, this hypothesis can be investigated. Measuring the effect of imports on unemployment over the next two quarters leads to higher imports causing unemployment to rise, but the results are not statistically significant.[13] The R-squared is low (0.16).

# Evidence on Trade Deficits and Jobs

Other opponents of trade concede that balanced trade can be beneficial, but argue that trade is harmful to jobs when it results in a trade deficit. They reason that because Americans are buying imports, jobs are being destroyed, but because foreigners are not buying American products in exchange, no American jobs are being created. Economic theory suggests that trade deficits create jobs in the interest-sensitive sectors of the economy because a trade deficit is matched by foreign capital inflows that reduce domestic interest rates. Lower interest rates stimulate spending on U.S. capital investment, residential investment, and interest-sensitive consumer durables. Again, the net effects of the jobs created and lost from a trade deficit would be expected to roughly balance, assuming the change in the trade deficit was smooth. Economic theory also suggests that a trade deficit is more likely to occur when overall spending in the economy is strong, since this is when the demand for borrowing would be greater. If the trade deficit is caused by strong aggregate spending (demand), by definition, it would be associated with high employment.[14]

Turning to the data in **Figure 2**, it can be seen at first glance that the largest trade deficits during the past 5½ decades have been associated with lower-than-average unemployment rates. Most of these large trade deficits were recent. Most of the quarters in which trade deficits exceeded 2.5% of GDP have occurred since 1999; during that period the unemployment rate has varied from 3.9% (the lowest rate in 30 years) to 6.1%. The highest unemployment rates over the sample were mostly associated with trade deficits much smaller than the recent ones, and also included a few periods with small trade surpluses.

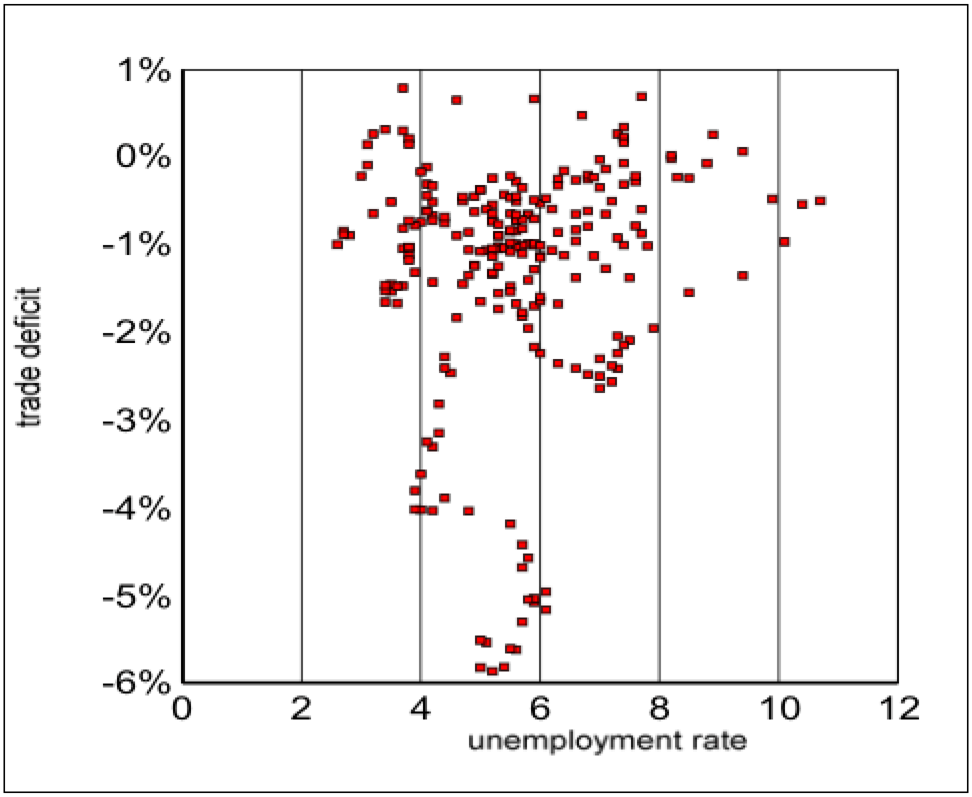
(...continued)

if the recession variable is omitted, a linear trend is controlled for, or four lags are used instead of two.

[13] The relationship is the opposite, but still statistically insignificant, if the employment-population ratio is used as a dependent variable instead of the unemployment rate. It is also insignificant if the recession variable is omitted. Different lag lengths were used, and the relationship was insignificant in each case.

[14] For more information, see CRS Report RL32059, *Trade, Trade Barriers, and Trade Deficits: Implications for U.S. Economic Welfare*, by Craig K. Elwell.

**Figure 2. Trade Deficits and Unemployment, 1948-2005**




**Source:** Bureau of Labor Statistics and Bureau of Economic Analysis

**Note:** Trade Deficits are measured as a share of GDP. Each data point represents a quarter between 1948 and 2005.

**Table 2** presents regression results making the same adjustments to the data described in the previous section, and performing the same regressions using the trade deficit as an independent variable instead of imports.

In the simple least-squares, bivariate regression between the unemployment rate and the trade deficit, the results were not statistically significant and the opposite direction from what some trade opponents claim (a one percentage point increase in the trade deficit-GDP ratio led to a 0.42 percentage point decline in the unemployment rate) over the full sample. The R-squared was zero: the trade deficit could not explain any of the variation in the unemployment rate. When the employment-population ratio is substituted for the unemployment rate, the results are weakly significant and small, a one percentage point increase in the trade deficit-GDP ratio led to a 0.17 percentage point decline in the employment-population ratio. Similar results are found for unemployment and the employment-population ratio when the more recent subsample is used.

**Table 2. Employment and Trade Deficits**

(Independent variables: trade deficit-GDP ratio, recession when noted)

| Dependent Variable | Time Period | Beta Estimate | Significance | R-Squared | Model Type | Dummy Variable for Recession? |
|---|---|---|---|---|---|---|
| unemployment rate | 1948:2-2005:4 | -0.42 | No | 0.00 | least squares | no |
| | 1980:1-2005:4 | -0.28 | No | 0.00 | | |
| employment-population ratio | 1948:2-2005:4 | -0.17 | At 10% level | 0.02 | least squares | no |
| | 1980:1-2005:4 | -0.20 | At 10% level | 0.03 | | |
| unemployment rate | 1948:2-2005:4 | 0.10 | At 10% level | 0.96 | autoregression (w/ 2 lags) | yes |
| | 1980:1-2005:4 | 0.64 | No | 0.87 | | |
| unemployment rate | 1948:2-2005:4 | -0.25 | No | 0.17 | distributed lag model (w/ 2 lags) | yes |
| | 1980:1-2005:4 | -0.39 | No | 0.24 | | |

**Source:** CRS calculations

**Notes:** Employment-population ratio and trade deficit-GDP ratio have been differenced. Beta estimate for distributed lag model is the sum of the two lagged betas.

In an autoregression with a two-period lag that also included a dummy variable for whether the economy was in a recession, the trade deficit was found to increase the unemployment rate, but this result was very small and only weakly significant. The effect becomes statistically insignificant over the more recent subsample. In a distributed lag model, the result was very small and statistically insignificant, and the independent variables explained only 17% of the variation in the unemployment rate over the full sample.[15]

# Evidence on Trade, Trade Deficits, and Workers' Compensation

Some opponents of free trade concede that trade does not lower net employment, but argue that it should be opposed on the grounds that it reduces workers' compensation (wages and benefits). Economic theory suggests that trade's effects on compensation would depend on the unit labor costs of U.S. workers compared to foreigners in each industry. Unit labor costs are a measure that compares a worker's productivity to his compensation. After opening up to trade, imports would be expected to rise in industries where foreign unit labor costs are lower than in the United States, and U.S. compensation in those industries is likely to be adversely affected. In industries with

[15] The relationship was also statistically insignificant when other lag lengths are used.

relatively low U.S. unit labor costs, production and compensation would rise. Although compensation in the United States is high relative to the world average, unit labor-costs are unlikely to be prohibitively high across the economy for two reasons. First, U.S. labor productivity is also relatively high. Second, most U.S. trade is with other wealthy nations. But for the remaining trade with low income nations, it would be expected that low income nations would have low unit labor costs for labor-intensive industries and high unit labor costs for skill-intensive or capital-intensive industries. This suggests that the compensation of high-skilled U.S. workers would rise with trade and the compensation of low-skilled U.S. workers would fall (or rise more slowly), so that unit labor costs across countries moved closer together. On average, the effect would be theoretically ambiguous, and cannot be predicted without empirical evidence.

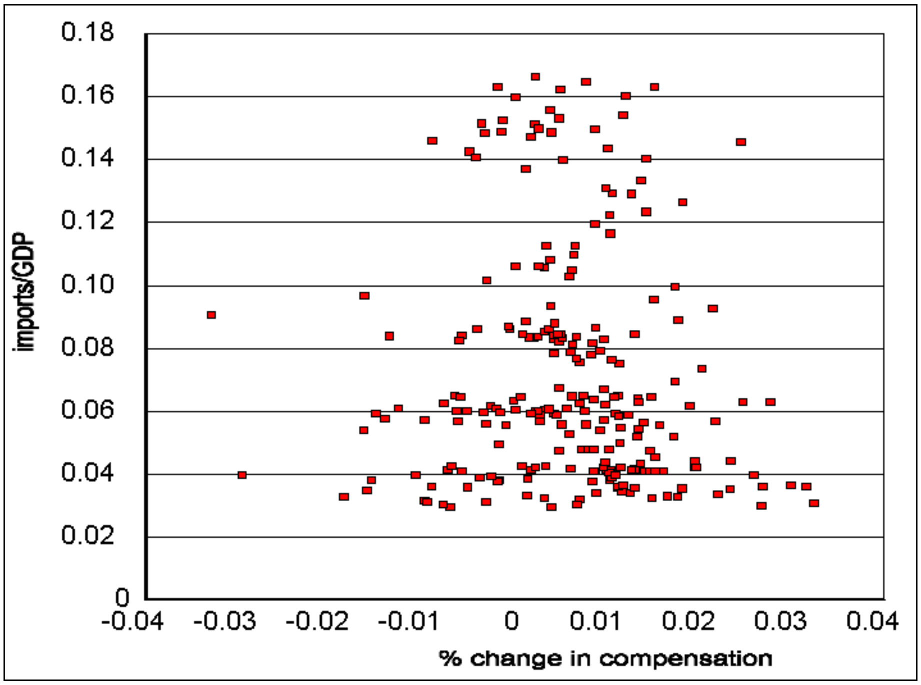
It is important to note that average compensation includes both high-wage workers and low-wage workers. An increase in average compensation may mask divergent experiences for high-wage and low-wage workers (for example, if one group's wages rose while the other's fell, the changes would cancel each other out).[16] But average compensation can address another argument: that capital owners benefit from trade at the expense of workers because trade holds down wages so that profits flow to owners instead of workers. At least one standard trade model (the Hecksher-Olin model) used by economists, with its prediction that trade will make wage and capital income equalize across countries, suggests that this is possible. But some economists argue that this model makes unrealistic simplifications that would prevent this from happening in reality.[17] For example, income may already be equalized because of capital mobility.

As a first step, this report looks at what has happened to average real workers' compensation (wages and benefits, adjusted for inflation) as trade has increased. As can be seen in **Figure 3**, compensation rose in most, but not all quarters. There is no clear pattern, but on balance more of the quarters where compensation fell occurred when imports were relatively low.

[16] This evidence is examined in CRS Report 98-441, *Is Globalization the Force Behind Recent Poor U.S. Wage Performance?: An Analysis,* by Craig K. Elwell. See also William Cline, "Trade and Income Distribution: The Debate and New Evidence," International Institute for Economics, policy brief 99-7, Sep. 1999.

[17] For example, see Jagdish Bhagwati and Marvin Kosters, eds., *Trade and Wages*, American Economics Institute Press (Washington, D.C.: 1994), ch. 2.

**Figure 3. Worker Compensation and Trade, 1948-2005**




**Source:** Bureau of Labor Statistics and Bureau of Economic Analysis

**Note:** Imports are measured as a share of GDP. Each data point represents a quarter between 1948 and 2005.

**Table 3** presents the results of the same regressions performed in the last two sections using percentage change in worker compensation per capita as a dependent variable. The least-squares, bivariate regression produces results that are highly statistically significant, but relatively small and the opposite of the effect predicted by some free trade opponents. A one percentage point increase in imports as a share of GDP *increases* worker compensation by 1.19%.[18] Only 6% of the variation in compensation can be explained by imports. Both the autoregressive method and the distributed lag model reduce the effect by three-fourths and make it statistically insignificant (although the autoregression is weakly significant and the distributed lag is statistically significant at the 5% level over the more recent subsample).[19] Only the autoregression had an R-squared value that was not negligible.

[18] If a dummy variable for recession is added, the effect of imports is reduced by half and becomes only marginally significant.

[19] Six lags are used for the autoregressive model because the first, second, fifth, and sixth lag are highly statistically significant. Two lags are used for the distributed lag model because the recession variable is highly significant in this specification. A number of different lags were tried, and the imports variable was significant in none of them. If the recession dummy variable is removed from the autoregression, the imports variable is significant at the 5% level, but has the opposite effect from what some trade opponents predict.

**Table 3. Trade, Trade Deficits, and Worker Compensation**

(Dependent variable: percent change in worker compensation per capita)

| Independent Variable | Time Period | Beta Estimate | Statistical Significance | R-Squared | Model Type | Dummy Variable for Recession? |
|---|---|---|---|---|---|---|
| imports-GDP ratio | 1948:2-2005:4 | 1.19 | At 1% level | 0.06 | least squares | no |
| | 1980:1-2005:4 | 1.58 | At 1% level | 0.15 | | |
| trade deficit-GDP ratio | 1948:2-2005:4 | -0.79 | At 1% level | 0.03 | least squares | no |
| | 1980:1-2005:4 | -1.17 | At 1% level | 0.09 | | |
| imports-GDP ratio | 1948:2-2005:4 | 0.33 | No | 0.39 | Autoregression (6 lags) | yes |
| | 1980:1-2005:4 | 0.81 | At 10% level | 0.31 | autoregression (2 lags) | |
| trade deficit-GDP ratio | 1948:2-2005:4 | -0.14 | No | 0.39 | autoregression (6 lags) | yes |
| | 1980:1-2005:4 | -0.85 | At 1% level | 0.33 | autoregression (2 lags) | |
| imports-GDP | 1948:2-2005:4 | 0.22 | No | 0.06 | distributed lag model (2 lags) | yes |
| | 1980:1-2005:4 | 0.98 | At 5% level | 0.10 | | |
| trade deficit-GDP | 1948:2-2005:4 | -0.96 | At 1% level | 0.10 | distributed lag model (2 lags) | yes |
| | 1980:1-2005:4 | -0.95 | At 1% level | 0.11 | | |

**Source:** CRS calculations based on data from Bureau of Labor Statistics, Bureau of Economic Analysis, and National Bureau of Economic Research

**Notes:** Data for import-GDP ratio and trade deficit-GDP ratio has been differenced. Beta estimate for distributed lag model is the sum of the two lagged betas.

When using the trade deficit instead of imports, the results agree with the predictions of some free trade opponents, but they are also small. A one percentage point increase in the trade deficit as a share of GDP decreases worker compensation by 0.79%, an effect that was highly significant.[20] Only 3% of the variation in compensation can be explained by imports, however. The distributed lag method had a slightly larger effect and was still highly significant. The autoregressive method reduced the effect of trade deficits to nearly zero and made it statistically insignificant. Over the more recent subsample, however, the autoregressive method yielded a result that was highly significant and similar in size to the simple bivariate regression. Only the autoregression had an R-squared value that was not negligible.

[20] If a dummy variable for recession is added, the effect becomes statistically insignificant.

# Conclusion

Most economists argue that free trade is mutually beneficial because it allows countries to specialize in what they do best, thereby employing their resources in the most efficient way. They argue that trade neither creates nor destroys jobs on net, because jobs destroyed by trade are replaced by new jobs elsewhere in the economy, and the economy is capable of reaching full employment regardless of what happens to imports or the trade deficit. Some opponents of free trade argue that imports destroy jobs, or trade deficits destroy jobs, or trade lowers wages. This report looks at quarterly national data from 1948 to 2005 to try to clarify some of these issues.

The first set of regressions performed in this report can be thought to answer the first of the three questions posed in the Summary: Do increases in imports systematically correspond to periods of high unemployment or negative/low employment growth? The empirical evidence disputes that claim on three counts. First, most of the evidence is statistically insignificant, meaning that it cannot be ruled out that any correlation found between the variables is simply random chance. This means the evidence does not meet generally accepted standards of professional research. Some of the evidence that is statistically significant becomes insignificant with small modifications in methods or data. If a relationship between variables were fundamentally strong, it would be expected to hold under many different statistical specifications. Second, the R-squared measure for these regressions is very low (except when lagged values of the dependent variable are included), which means that very little of the variability in unemployment or employment can be explained by imports. Finally, even when the results are statistically significant, they do not support the position that imports have a negative effect on employment. In one case, a one percentage point increase in imports as a share of GDP was predicted to *increase* the employment-population ratio by 0.30-0.42 percentage points, all else equal. In another case, a one percentage point increase in imports as a share of GDP was predicted to *decrease* the unemployment rate by 0.10 percentage points, all else equal.

The second set of regressions answers the second question: Do increases in the trade deficit systematically correspond to periods of high unemployment or low employment growth? Here too, the empirical evidence is weak. Most of the evidence is statistically insignificant and explains little of the variation in unemployment or employment growth. In this case, the relationship is consistent with the predictions of some free trade opponents, but is too small to have a significant economic impact. In one case, a one percentage point increase in the trade deficit as a share of GDP was predicted to reduce the employment-population ratio by 0.17-0.20 percentage points, all else equal. In another case, a one percentage point increase in imports as a share of GDP was predicted to decrease the unemployment rate by 0.10 percentage points, all else equal. All of these results were only marginally statistically significant, and lost significance over different time periods or using different methods.

The third set of regressions answers the third question: Do increases in imports or the trade deficit systematically correspond to periods of weak growth in worker compensation? For these regressions, the results were more consistently statistically significant, with all the results significant over the period of 1980-2005. The results still had low R-squared measures, however. Imports consistently had the effect that some free trade proponents predicted—a one percentage point increase in the import-GDP ratio led to a 0.81%-1.58% increase in worker compensation, all else equal. Trade deficits consistently had the effect predicted by some free trade opponents, although the effect was small: a one percentage point increase in the trade deficit as a share of GDP reduced worker compensation by 0.79-1.17%, all else equal. These results are based on average worker compensation, and do not address the question of how trade affects income inequality among workers at different income levels.

These results may seems surprising to non-economists, but they are generally consistent with events in recent decades. Imports have been steadily rising as a share of GDP for decades, and yet the economy has mostly maintained full employment over that time. The 1990s serve as an example of a period of low unemployment, rapid employment growth, and steady compensation gains in the midst of high imports and large trade deficits. Recent experience provides another example: imports and the trade deficit reached record highs in 2005, and the unemployment rate fell to 5.1%.

These empirical results should be considered suggestive rather than definitive, as more elaborate methods would be required to tease out the true relationship between trade and labor markets. For instance, trade probably disproportionately affects some regions or occupations or sectors of the economy positively and others negatively. Nevertheless, the results generally confirm the view that, on balance, trade's adverse impact on labor markets overall are small or non-existent because the negative effects on some American workers are roughly canceled out by positive effects on other workers.

# Appendix. A Primer on Econometric Analysis[21]

This section provides a brief introduction to the econometric techniques used in this report. Equations estimated by linear regression take their form from some hypothesized relationship in which the behavior of one or more variables (the independent variables) is held to influence some other variable (the dependent variable). The application of regression analysis involves fitting a straight line to a group of observations, usually a sample selected from the universe of those variables, that are suggested by the hypothesized relationship. The straight line is fitted such that the deviations of the actual observations from those suggested by the straight line are minimized. The value of the slope of that line then gives the effect of the independent variable (or variables) on the dependent variable.

While the calculated value of the slope of the line may be positive or negative (or even zero), it's true value may not be statistically significantly different from zero. Because this is so, it will be necessary to briefly discuss what is meant by a calculated value being "statistically significant."

To understand statistical significance, say that the calculated effect of the independent variable on the dependent variable is 0.10. Thus, changes in the independent variable by one unit change the dependent variable by 0.10. This assumes, of course, that the value 0.10 is really different from zero. Recall, that it was calculated, not from the universe of the independent variable, but from a sample taken from that universe. Thus, it is possible that our assumption that the true value of the effect of this variable on the dependent variable is different from zero is wrong. It is, however, possible to control for making this type of error—that is, for accepting as true a relationship that is, in fact, not true. It is common to set the control factor at 1 to 5 chances in 100 of accepting the hypothesis that the variable is different from zero when it is not. If the calculated value of the independent variable lies within a range that limits the error to 1% to 5%, it is said to be statistically significant (or statistically significantly different from zero).

The R-squared measures a goodness of fit. The R-squared is designed to measure the fraction of the variation of the dependent variable that is explained by the variation of the independent variable(s). The R-squared ranges in value between 0 and 1. The higher the R-squared is, the larger is the proportion of the variation in the dependent variable that is explained by the variation of the independent variable(s).

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