The B.E. Journal of Economic Analysis & Policy

Topics

Volume 11, *Issue* 1 2011 *Article* 63

Labor Market Effects of the Exxon Valdez Oil Spill

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Recommended Citation
John Hore and William J. Carrington (2011) "Labor Market Effects of the Exxon Valdez Oil Spill," *The B.E. Journal of Economic Analysis & Policy*: Vol. 11: Iss. 1 (Topics), Article 63.
Available at: http://www.bepress.com/bejeap/vol11/iss1/art63

Labor Market Effects of the Exxon Valdez Oil Spill*

John Hore and William J. Carrington

Abstract

We study the labor market effects of the 1989 Exxon Valdez Oil Spill in Prince William Sound, Alaska, which was the largest U.S. oceanic oil spill prior to the 2010 Gulf Oil Spill. We find that employment and average earnings increased in 1989 when the cleanup effort was largest and there appears to have been little, if any, adverse effect on average labor market opportunities in later years. Increased wages elicited increased labor supply in the form of both in-migration of workers and increased weekly hours. While the labor market effects of the spill were largely beneficial, there is some evidence that the effects upon self-employed fishing boat owners in the region may have been more heterogeneous, with some owners signing lucrative cleanup contracts with Exxon and its agents while others did not. The existence of these positive labor effects does not address the significant environmental, psychological and social costs imposed on the region and on the communities whose livelihood and organization were affected by the spill.

KEYWORDS: Exxon Valdez, labor market, oil spill

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*For their contributions to this research, we thank Sarah Axeen, Mike Di Mattina, Hugette Sun and members of the Alaskan Department of Labor. We also acknowledge the thoughtful comments of the editor and two referees.

I. Introduction

Major oceanic oil spills such as the 2010 Gulf Oil Spill impose significant economic costs on the affected region. Those costs can be usefully classified into categories such as "environmental," "labor market," and an "other" category that includes effects such as the psychological harms to affected residents. There is substantial interest in the ultimate magnitude of these costs, both because of their effect on the market valuation of oil exploration companies and because of their implications for the optimal design of off-shore drilling policy. With regard to drilling policy, estimates of the cost of a spill are an important input into decisions on when and where to allow off-shore drilling and, by extension, on how to intelligently judge the net benefit of costly safety procedures. Estimates of the cost of the Gulf Oil spill will surely change as the environmental crisis and its sequelae evolve, but there is an obvious need for information on the likely size of these costs.

This article looks toward the Alaskan experience and recovery from the 1989 *Exxon* Valdez oil spill for understanding about the labor market costs of large oil spills. The wreck of the *Exxon Valdez* from its strike of Bligh Reef on March 24, 1989 ultimately released roughly 250,000 barrels of oil into the waters of Prince William Sound (PWS) in southern Alaska. While the Gulf Oil Spill released far more oil, the *Exxon Valdez* was at the time the largest oil spill in United States history. Many of the concerns expressed in 2010, about harm to marine life and shorelines and the impact on the livelihood of those affected in the area and beyond, echoed the discussion surrounding the *Exxon Valdez* spill in 1989.

The environmental issues associated with the *Exxon Valdez* spill have been the subject of numerous economic studies.[1] One of the most controversial issues associated with those studies was the appropriateness of using contingent valuation surveys to gauge the economic cost of the harm to remote wilderness areas.[2] In contrast, the labor market effects of the *Exxon Valdez* spill have not, to our knowledge, been studied in the academic literature. This study seeks to fill this gap by examining the evolution of population, employment, wages and earnings in Alaska in the period surrounding the wreck of the *Exxon Valdez*.[3] In

[1] See Cohen (1995), Carson et al. (2003), and Jones et al. (1994).

[2] Contingent valuation surveys attempt to measure the economic cost of remote (and other) events by asking survey respondents how much they would be hypothetically willing to pay to avoid or eliminate an environmental harm. For a discussion of these surveys and their application to the evaluation of the environmental damages associated with the *Exxon Valdez* spill, see Diamond and Hausman (1994) and Hanemann (1994).

[3] From the perspective of analyzing the Gulf Oil Spill, a virtue of this exercise is that both PWS and the Louisiana coast rely upon the oil, tourism, and fishing industries for a significant share of employment, though there are important differences as well.

addition to providing perspective on the Gulf Oil Spill, the Alaskan response to the Valdez spill provides some insight into general labor market responses to labor demand shocks that are both industrially and geographically focused.

Our main finding is that the *Valdez* oil spill had little adverse impact on the aggregate labor market of PWS. Overall employment and earnings in the area were higher in the summer of 1989, i.e., the months following the *Valdez* spill. We also find that increased wages elicited labor supply responses in that workers moved into PWS from elsewhere in Alaska and beyond and, once there, worked more weekly hours than had been the previous norm. Finally, we find that neither the PWS nor the broader Alaskan economy suffered any long-run consequences. While these aggregate statistics indicate little harm, there is some evidence of disparate effects across industries and locales. In particular, Valdez, at the head of PWS and a staging point for much of the clean-up effort paid for by Exxon, experienced an economic boom in the period immediately after the spill and did not appear to suffer any adverse consequences later. In contrast, Cordova, its economy primarily devoted to fishing and fish processing, experienced a relatively difficult time. Some workers were able to shift from fishing to oil clean-up, meaning that the oil clean-up boom conferred market benefits on even those workers - such as fishermen and fish canners - not initially working in the oil or transportation industries. Fishermen unable or unwilling to respond to the new economic environment, however, may have had reduced opportunity and income in the immediate aftermath of the oil spill.

II. Background

Before we study its effects, it is important to understand the economic environment in which the spill occurred. Oil from the North Slope of Alaska is transported via the Trans Alaska Pipeline System (TAPS) to its terminus in Valdez, Alaska at the north end of PWS. The oil is then loaded onto tankers that transport the oil through PWS and down to refineries on the U.S. West Coast. In both 1989 and the present, the area surrounding PWS was very lightly populated with only two significant towns: Valdez (2000 Census population: 4,036), and Cordova (2,454).[4] With a population of just 182, Whittier is the only other town in PWS.[5] In the analysis that follows, data for PWS refer to the Valdez-Cordova Census borough; with such a small economic footprint, the omission of Whittier should not affect our analysis and conclusions.

In addition to being small, the towns on PWS are exceptionally isolated. Cordova, on the east side of the Sound, has no road connections and is accessible

[4] The population data are available at: http://censtats.census.gov/data/AK/1600282200.pdf; http://censtats.census.gov/data/AK/1600217410.pdf.
[5] See, http://censtats.census.gov/data/AK/1600284510.pdf.

only by boat or plane. Valdez, though only 100 air miles from Anchorage, can only be reached by either a 300 mile drive from Anchorage following a northern route that bypasses mountains and glaciers or by ferry from Whittier. Whittier, on the western side of PWS, can be reached relatively directly via a 60-mile route from Anchorage. The towns also have very narrow economic footprints. Cordova's economy was (and is) almost entirely based on the fishing and fish processing industries and related support activities.[6] Valdez is also reliant on the fishing industry though there is also significant employment related to the Trans Alaska Pipeline System, seasonal tourism and government.[7] Whittier is largely a ferry terminus and a recreational boating harbor, with very little commercial fishing. Since 2004, Whittier has had a cruise ship terminal capable of handling the embarkation of large cruise ships, but this capability did not exist in 1989.

The economy of PWS is part of a larger Alaskan economy that also has several unusual features. First, just as PWS is isolated from the rest of Alaska, the entire state itself is isolated from the rest of the United States. This means that migration to and from Alaskan labor markets in response to location-specific fluctuations in labor demand is relatively limited – at least in the short-run.[8] Put differently, a large increase in the demand for labor in a town in central New Jersey would quickly draw commuters from nearby cities and towns and would, if of a sufficiently sustained nature, draw permanent moves from farther afield. This same process, while present, likely operates at a slower rate in rural Alaska. Second, the economy of Alaska is concentrated in mining (i.e., oil), fishing, food manufacturing (mostly canning), government services, and tourism and Alaska has a narrower economic footprint than other states. Third, the severity of the Alaskan winter has led to an economy accustomed to large seasonal fluctuations in employment, work hours, earnings and even population.[9]

In analyzing economic change in small locales such as Alaska and PWS, analysts face a tradeoff with respect to the statistics they analyze. The most useful data would be longitudinal survey data that follow specific individuals as they enter, leave or remain in the PWS area. Unfortunately, none of the large national longitudinal databases are large enough to provide a useful sample for places as small as PWS – or even Alaska as a whole. The next most useful would be cross-sectional survey data that would allow us to track the average circumstances of individuals with fixed observable characteristics – say age, gender and schooling. Unfortunately, even the largest cross-sectional surveys do

[6] *See* Fried and Stinson (1989), p.9.
[7] *Ibid*, p. 5.
[8] *See* Carrington (1996).
[9] In his popular book *Going to Extremes*, author Joe McGinniss notes that a popular slang for snow in Alaska is "termination dust," the term arising from the fact that many seasonal employees are laid off at the start of winter.

not provide enough respondents to accurately measure average attributes in a place as small as PWS. As a result, we rely on tabulations from the unemployment insurance filings of PWS employers reported by the Alaska Department of Labor (DOL) and by the federal Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW). These statistics are based on nearly full counts of employees and thus are not subject to sampling variability. The drawback of these data is that we cannot observe the earnings or employment of individual workers. Thus, if measured earnings go up in a particular month, we cannot be absolutely certain that earnings rose for a fixed group of workers or whether, possibly, an influx of higher-earners drove up the average. Still, these data provide a useful picture of employment and average earnings and work hours and have been used in previous studies.[10]

Because they are based on the same underlying UI reports, we had anticipated that analogous series from the QCEW and the Alaskan DOL would line up closely. In comparing the two series, however, we found that the measured employment growth in PWS in 1989 was much higher in the QCEW than in the Alaskan DOL data on which we had previously relied. Conversations with Alaskan DOL personnel indicated that the QCEW data were updated to reflect adjustments not recorded in the Alaskan DOL publications, which were put out on a more contemporaneous basis. For these reasons, we were advised to rely on the QCEW data, and we have done so where possible. In some cases, we use both series to gain coverage for time periods not available in the public-use QCEW data alone.

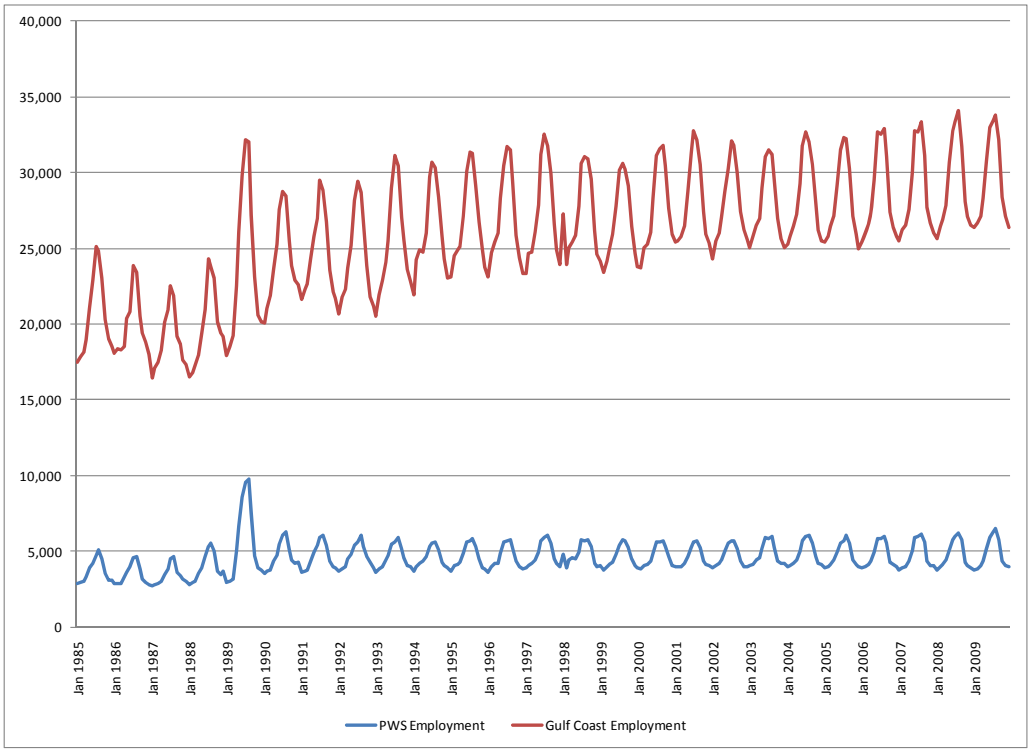
III. Analysis

The first question we consider is how the labor market in PWS and the surrounding areas evolved in the period following the *Valdez* spill in March 1989.[11] Figure 1 below charts the total employment in PWS and the Alaskan Gulf Coast region (which includes PWS) for each month from January 1985 through December 2009. Drawing visual conclusions from these data is challenging given their extreme seasonality, a feature shared by almost all employment data in Alaska.

[10] *See* Carrington (1996).

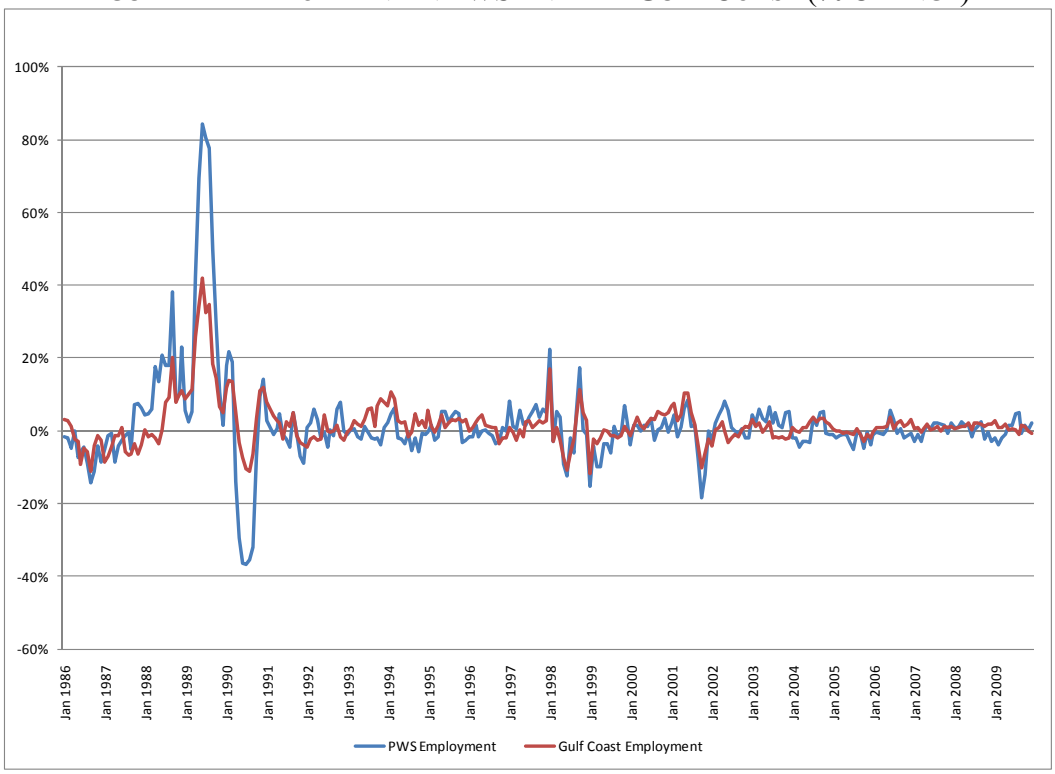
[11] The QCEW data are collected by Census borough. In the figures that follow, "PWS" refers to the Valdez-Cordova Census borough, while "Gulf Coast" refers to the sum of the Valdez-Cordova, Kodiak Island, and Kenai Peninsula boroughs. Thus, "PWS" excludes Whittier, which had a very small economic footprint.

FIGURE 1 – EMPLOYMENT IN PWS AND THE GULF COAST



To abstract from seasonality, Figure 2 charts for each month the percentage change in employment relative to the same month for the previous year. Figures 1 and 2 indicate that there was a significant upward spike in PWS employment in the summer of 1989. For example, peak summer employment in PWS had averaged approximately 4,650 in the four years prior to the oil spill, but it averaged over 9,300 in the summer of 1989, a gain of 100%.

FIGURE 2 – EMPLOYMENT IN PWS AND THE GULF COAST (% CHANGE)



There are at least two issues that need to be considered before one concludes that the *Valdez* oil spill actually increased employment in PWS. First, because they are based on employers' unemployment insurance filings, these data do not record *self*-employment. This is potentially an issue because a significant – though difficult to measure – proportion of workers in the fishing industry in Cordova operate their own boat and are self-employed. Thus, one contributing factor to the increase in measured employment was a move of workers from self-employed fishing in Cordova to employed clean-up in Valdez. This suggests that the observed spike in "employment" may be partially an artifact of the exclusion of self-employed workers from the data collection process. While difficult to document statistically, however, the available evidence suggests that the increase in employment was largely not a reclassification of workers from self-employed to employed. In particular, there is evidence that many of the self-employed fishermen in Cordova either a) continued to fish or b) took lucrative contracts from Exxon for their boats to be used in the clean-up operation, in which case, as contractors, they would continue to be classified as self-employed. Further, accounts from Cordova employers at the time indicate that many of their prior employees abandoned their jobs in Cordova to take higher-paying positions in the

cleanup effort.[12] This would obviously not have happened had there not been an overall increase in the demand for labor that was more than a shift from self-employment.

Second, the 1989 increase in PWS employment could have been merely part of a broader increase in employment in Alaska due to other causes.[13] To address this issue, Figure 3 charts the PWS and Gulf Coast shares of overall Alaskan employment. The chart again indicates the significant seasonality present in virtually all Alaskan economic data. Here, the seasonality of the PWS share occurs because it fluctuates more seasonally than does the rest of Alaskan employment, which is dominated by relatively stable employment in Anchorage and Fairbanks. Figure 3 does indicate that the summer peaks of the PWS and Gulf Coast shares of Alaskan employment trended downwards from 2000 onwards, though we think it unlikely that this trend was an artifact of the 1989 spill. More importantly, the chart reflects that the 1989 PWS employment increase was not part of an overall increase in Alaskan employment that year. One way to see this is to note that the July-to-July increase in employment from 1988 to 1989 was 80.3% for PWS and 6.8% for Alaska as a whole. This lends credence to the conclusion that the employment growth in PWS was due to an increase in economic activity following the *Valdez* spill.

We now move on to a more detailed analysis of employment patterns in the specific industries affected by the spill. The finest level of detail for which we have data by industry is for the Alaskan Gulf Coast region that includes PWS but also towns on the Kenai Peninsula such as Seward and Homer. The Kenai towns account for approximately 80% of the population in the Gulf Coast region and so the PWS towns of Valdez, Cordova and Whittier are not directly observable. The Gulf Coast region also includes a smaller population on Kodiak Island, where the main industries are also fishing and fish processing. Towns in the Gulf Coast region outside of PWS were affected by the oil spill, directly by the movement of the oil into their areas (particularly on Kodiak Island) and indirectly through the movement of workers from there to PWS to work on the cleanup effort.

[12] See, for example, the narrative of Margy Johnson, a Cordova restaurateur at the time, in *The Spill: Personal Stories from the Exxon Valdez Disaster* (2009).
[13] *See* Boucher et al. (1989).

FIGURE 3 – PWS AND GULF COAST EMPLOYMENT AS A % OF ALASKA EMPLOYMENT

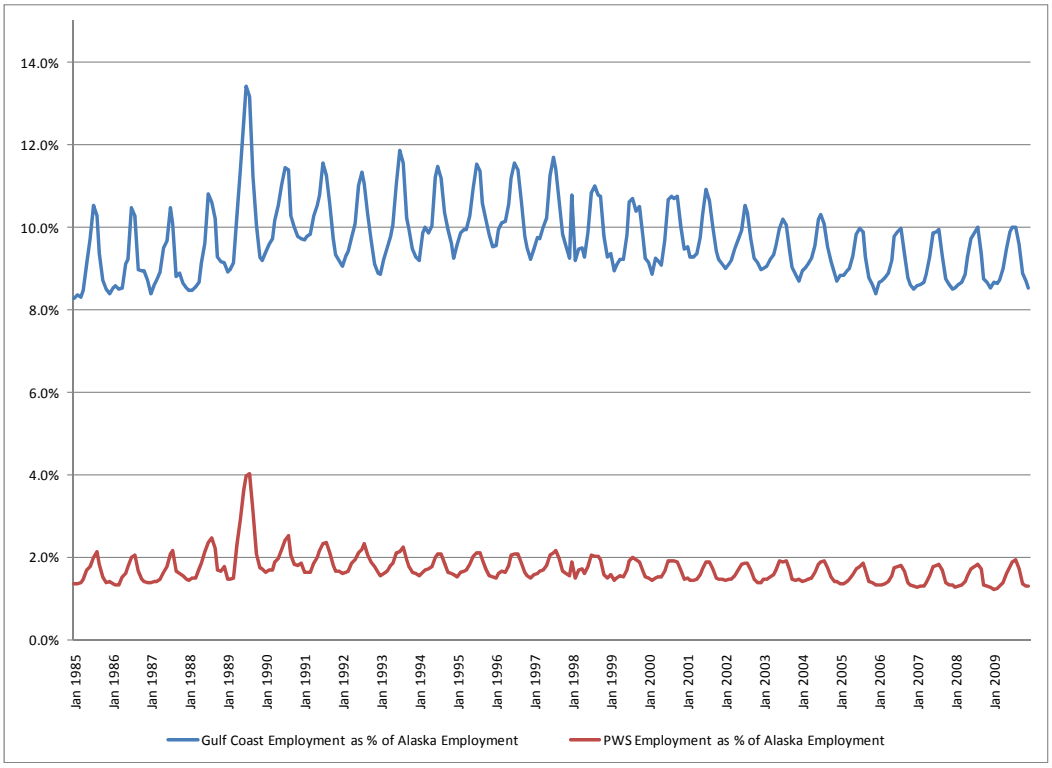
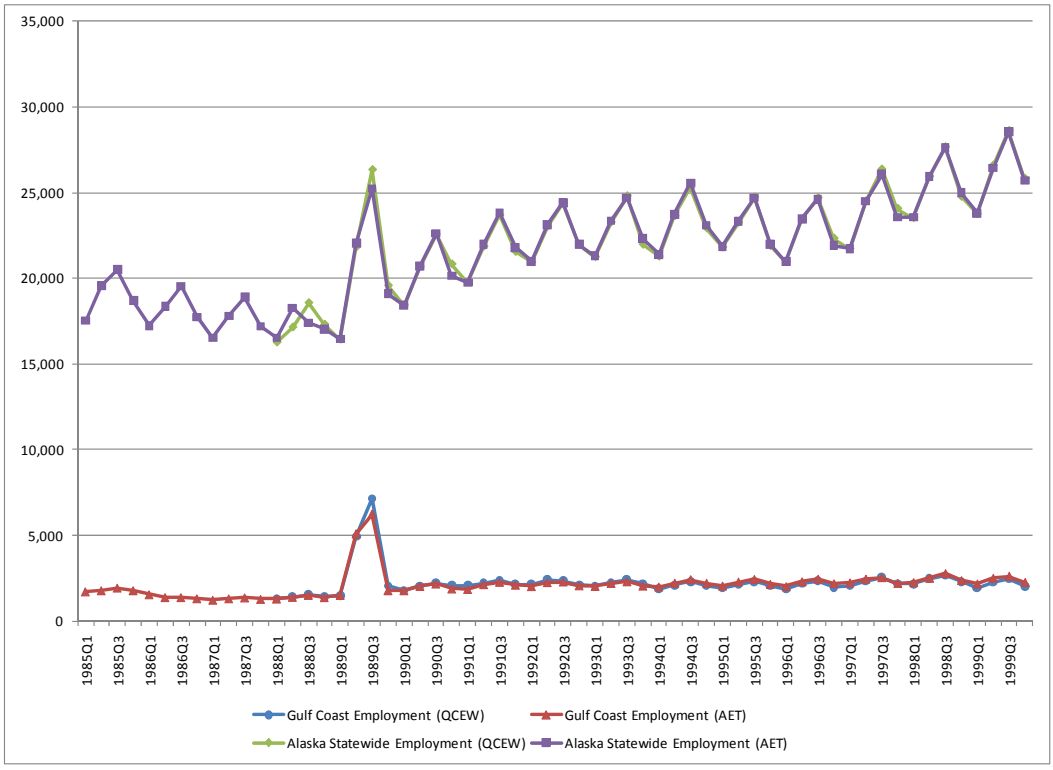


Figure 4 below charts the monthly employment figure for the "Transportation, Communication and Utilities" industry for the Gulf Coast and for Alaska as a whole. While there is a separate oil industry, conversations with Alaska DOL personnel indicate that TAPS employees and those involved in the clean-up effort were typically classified in this industry.[14] For both Alaska as a whole and separately for the Gulf Coast, we present separate series from the QCEW and from the Alaskan DOL's Alaskan Economic Trends (AET) publication. While we view the QCEW data as more reliable, we include the AET data, too, as they extend back to 1985 (as opposed to 1988 for the QCEW) and therefore provide a better notion of the pre-Valdez trends in the industry.

[14] See also Boucher (1989), p. 5.

FIGURE 4 – EMPLOYMENT IN THE "TRANSPORTATION, COMMUNICATION, AND UTILITIES" SECTOR

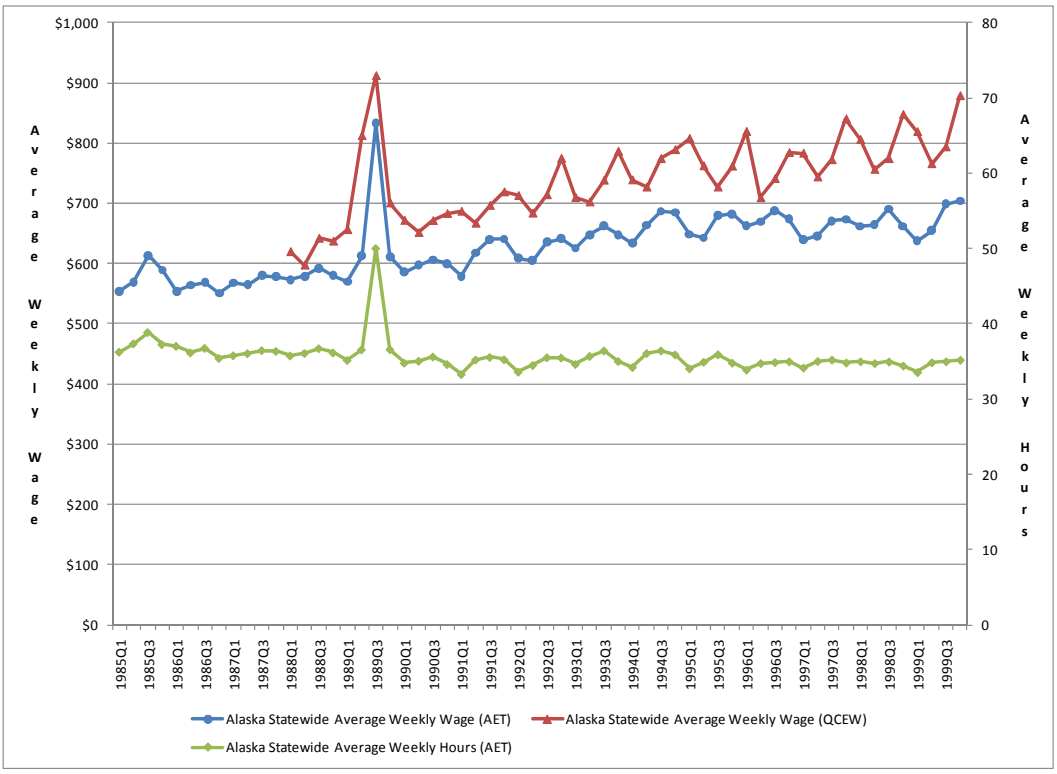


The lines at the bottom of the chart clearly reflect the huge increase in Gulf Coast employment due to the cleanup process. Whereas employment in the Gulf Coast region in this industry had been very steady at approximately 2,500 workers for more than five years, employment increased to more than 7,000 during the summer of 1989. The cleanup was largely completed that year, however, so the 1989 bump in employment was not reproduced in 1990. Since these data are for the entire Gulf Coast region, we cannot say for certain that all these employees were part of the Valdez cleanup, but the timing and size of the increase are certainly consistent with that interpretation.

What was the effect of this increase in demand on the hours, wages and earnings of transportation workers in PWS? These data are unfortunately not reported by either the QCEW or the Alaskan DOL, but there are data on the evolution of those labor market outcomes for the Transportation industry for all of Alaska. Those data are charted in Figure 5 below. As in Figure 4, we chart figures for both data sources to cover a longer time series, though we view the

QCEW data as more accurate.[15] The chart shows that there was a pronounced upward spike in the weekly hours and weekly earnings in the Transportation industry for all of Alaska. For example, whereas Alaska-wide weekly earnings, as measured in the AET, had hovered around the $575 mark for the previous five years, those weekly earnings increased to over $800 during the summer of 1989, an increase of roughly 40%. Similar earnings increases appear in the QCEW data. We presume that weekly earnings likely increased even further in PWS itself.

FIGURE 5 – WAGES AND HOURS IN THE "TRANSPORTATION, COMMUNICATION, AND UTILITIES" SECTOR



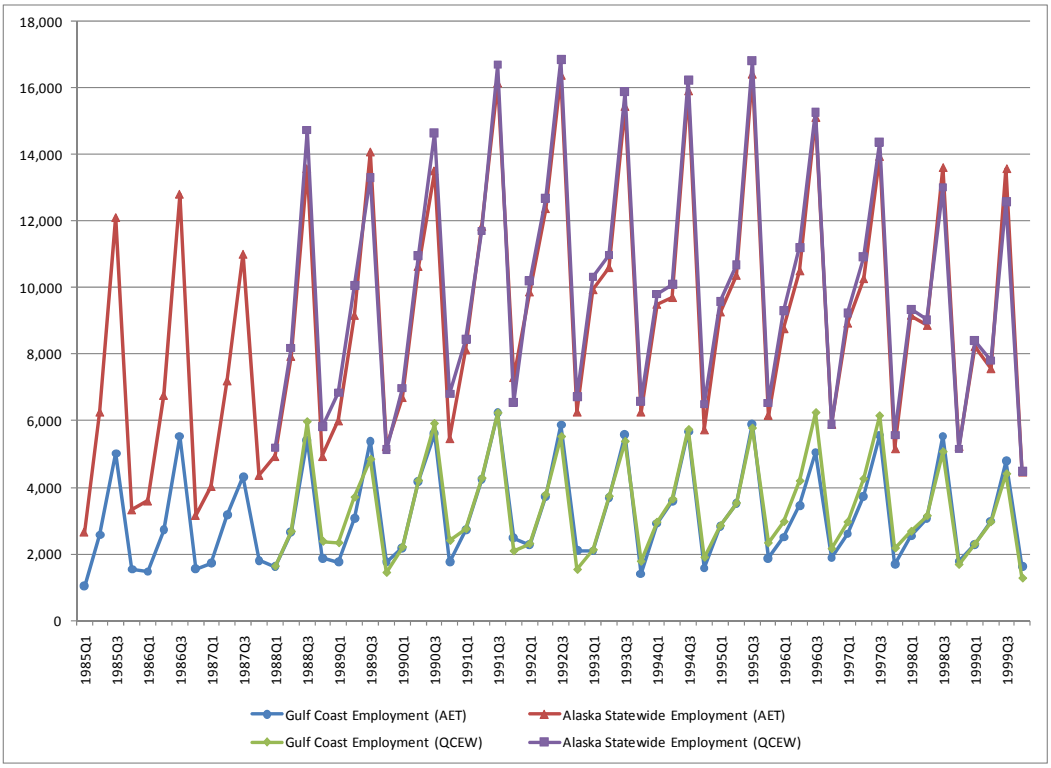
[15] We are not certain why the QCEW earnings are consistently higher than those from the AET. We suspect that the differences lie in the way in which employers were classified industrially, but this is speculative.

Weekly earnings can increase, of course, either because weekly hours increase or because the average hourly wage increased. Figure 5 demonstrates that there were also significant increases in weekly hours, as average hours went from approximately 35 hours per week to 50 hours per week during the summer of 1989, an increase of about 35%. Because the percentage increase was slightly greater for weekly earnings than for weekly hours, the implication is that average hourly wage must have increased as well. The fact that these data are for the entire Alaskan transportation industry means that these increases are a mixture of the increases in PWS and those of the rest of the state. Given that there is no evidence of a statewide employment shock, the most reasonable interpretation is that hours and earnings must have increased even more in PWS than this chart suggests.

What is the implied elasticity of weekly hours in the transportation industry? Average weekly hours increased from 35.7 in August 1988 to 51.2 in August 1989, at the peak of the clean-up effort – an increase of 43.4%. If we divide average weekly earnings by average weekly hours to get an estimate of the average weekly wage, then the implied average hourly wages were $15.97 in August 1988 and $17.54 in August 1989 – an increase of 9.8%. The implied elasticity of weekly hours – the intensive margin – is then 4.4. The overall elasticity of labor supplied to the PWS region, including local residents that entered the labor market and people moving from out of the region, would be higher. It is worth emphasizing again that this average wage measure – based on UI records of earnings and hours worked - does not hold fixed either the composition of the workforce or the relative weights assigned to different workers, so the elasticity must be interpreted with some caution and may not have wide applicability.[16] Nevertheless, the implied labor supply response to a temporary increase in wages was obviously a strong one, similar to the findings of Imai and Keane (2004), but higher than those found in most of the labor supply literature.

[16] Another issue that complicates the interpretation of this elasticity is the choice of price deflator for the conversion of nominal wages to real. It is clear from contemporary accounts that prices for food and housing increased significantly during the summer of 1989 in PWS, but there is no standard price index for the region. It is also not entirely clear what the proper index would be, since much of the money earned in PWS would eventually be spent elsewhere in places where prices were not affected by the Valdez Spill. In our view, the prices we use probably overstate the real wage increase that occurred between 1988 and 1989, with the result that the calculated elasticities are lower than would be calculated with a better real wage index.

FIGURE 6 – EMPLOYMENT IN THE "SEAFOOD PROCESSING" SECTOR



As noted above, the presence of self-employed fishermen means that the average earnings and employment recorded for the fishing industry in Alaska DOL data do not provide an effective guide to the economic opportunities present in that industry. Fortunately, however, the seafood processing industry is highly correlated with the fishing catch.[17] Further, this industry does not have many self-employed workers and, as a result, the state unemployment insurance records are a reasonable guide to economic activity. Figure 6 presents data on the employment in this industry for both Alaska as a whole and for the Gulf Coast region. The chart indicates that there was a drop-off in employment in the seafood processing industry in 1989, with peak summer employment below 5,000 vis-à-vis a summer peak of almost 6,000 in the preceding year. This decline in 1989 reflects workers being drawn from Seafood Processing into the cleanup effort. Importantly, however, the summer employment peaks in the years after 1989 were not diminished relative to their 1988 level. Thus, this was a temporary shift in labor supply from one sector of the economy to another.

[17] This industry was labeled "Food and Kindred Products" until 1988, when it was renamed "Seafood Processing." This is presumably because the food and kindred products industry in Alaska was almost exclusively related to seafood processing.

Finally, while self-employment earnings and hours data are unavailable for fishermen, fishing permit prices provide a measure of the expected future benefits of commercial fishing in Alaska. Fishing permit prices actually rose to record levels after the oil spill for many combinations of species, gear, and fishery, and this price increase was greater in areas touched by the oil spill than in other areas of Alaska.[18] Because the supply of permits was essentially unchanged over this period, this provides further evidence that fishermen in PWS did not suffer long-term losses from the spill.

IV. Summary

Based on these data, what can we say happened to the Alaskan labor market following the wreck of the *Exxon Valdez* in March 1989? While there was great concern about the effect of the spill on the local economy, the fact is that the labor market was not much harmed by the oil spill. This is true whether we look at the Alaskan economy as a whole or at the relatively narrow area of the towns on PWS. Employment was higher in PWS in 1989 than it was in earlier years and that employment growth predated the growth seen in the wider Alaskan economy that did not come until 1990. Thus, our conclusion is that the general effect of the Valdez oil spill on the labor market of PWS and Alaska as a whole was, if anything, positive. There were likely some owners of fishing boats in Cordova that were unable to fully adapt to the unique environment of 1989, but to the extent that they lost out economically, those losses appear to have been halted by 1990 when the PWS fishing industry was back in full swing.

How did this happen? There is really no great mystery. The cleanup effort organized by Exxon and executed by its contractors and subcontractors was enormous in relation to the size of the pre-existing PWS labor market. In prior summers, the typical peak employment in PWS was about 5,000. In an article published in Alaska Economic Trends in April 1990, a team of Alaska DOL economists noted that there were approximately "2,500 jobs on an annual average basis" attributable to "the cleanup's prime contractor and their subcontractors," and that, further, "this component reached a peak of more than 7,000 jobs at the height of the activity."[19] These economists then ask how many additional extra jobs as "hotel workers, hardware store employees, air freight handlers and government employees" would have been generated by those direct clean-up jobs and, using a multiplier of one, estimate that during the peak months there were 14,000 jobs in Alaska generated by the oil spill. While not every one of these jobs was in PWS itself, this was obviously a huge positive shock to labor demand.

[18] See Owen et al. (1995), Chapter 11.
[19] Boucher et al. (1990), p. 3.

The effects of this demand shock were obvious to labor market observers at the time. In July of 1989, also in the official Alaskan DOL publication Alaska Economic Trends, economists Neal Fried and Holly Stinson forecast that the "1989 payroll of the oil spill workers could exceed $100 million, a payroll which is greater than that earned by the Sound's entire pre-spill work force."[20] At the same time, these economists noted that "the spill caused Valdez employment to double in one month" and that the town's population had doubled as well. [21] Many of these new employees and residents came from the unemployed in Valdez and Cordova itself and from other parts of Alaska, often referred by the state's Job Service that works with unemployed workers.

None of this analysis is meant to suggest that the *Valdez* oil spill was a good thing. The spoiling of one of the most beautiful places on earth was a disaster on many dimensions, and nothing in this analysis is pertinent to an evaluation of the direct cost of the environmental or psychological damage. At the same time, however, it is important to take a realistic look at the overall effects of the disaster on the labor market. For the most part, those effects were benign. There were some in the fishing industry who were financially disadvantaged for a time in 1989 by their inability to fish in PWS or by their unwillingness or inability to work in the cleanup effort, but, at an aggregate level, those losses were more than made up for by the increased opportunities presented by the cleanup operation that was massive relative to the pre-existing PWS workforce. The increase in demand led to increased employment, increased wages and earnings and historically low levels of unemployment in the affected region. In many respects, these effects echo the findings of studies of the effects of hurricanes – obviously a natural as opposed to a man-made disaster – on labor markets.[22]

[20] Fried and Stinson (1989), p. 3.
[21] *Ibid.*, p. 6.
[22] See, for example, Belasen and Polacheck (2009), a recent study on the effect of hurricanes on the Florida labor market.

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