IN RE: OIL SPILL BY THE OIL RIG "DEEPWATER HORIZON"
IN THE GULF OF MEXICO, ON APRIL 20, 2010
MDL 2179

EXPERT RESPONSE REPORT

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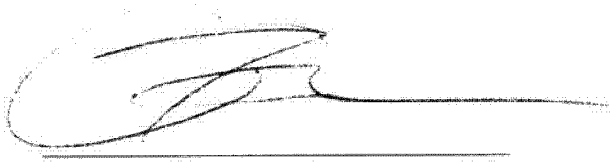
September 12, 2014



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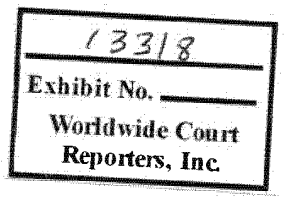

Table of Contents

Figure and Tables

I. Executive Summary

In this report I respond to the reports of both Dr. Loren Scott and Dr. David Sunding submitted on August 15, 2014. I submitted my own expert report in this case on August 15, 2014. In that report, I summarized my professional background and provided a copy of my Curriculum Vita, which contained a list of my publications and previous testimony. There have been no changes or additions to my Curriculum Vita since that report.

In Section II of this report, I respond to various claims made in Dr. Loren Scott's expert report, including: that the Gulf Coast fishery has fully recovered; that tourism in the Gulf Coast area has fully recovered; and that BPXP plays a particularly important role in the Gulf of Mexico Oil and Gas Industry. I conclude that Dr. Scott makes significant errors in his analysis of the purported fishery and tourism recoveries, and overstates the significance of BPXP's role in the Gulf of Mexico economy.

In Section II of this report, I respond to certain claims made in Dr. David Sunding's expert report, including: that penalizing Anadarko based on the Clean Water Act is not supported by economic theory; and that the potential for such a punishment has dissuaded investment in the Gulf of Mexico, leading to higher levels of concentration. I conclude that Dr. Sunding's analysis regarding the penalty rests upon assumptions that are unsupported, for instance, he assumes that Anadarko was a passive investor rather than its actual status as an active participant in a joint venture. Furthermore, I show that concentration of the oil and gas industry in the Gulf of Mexico has in fact decreased, contrary to Dr. Sunding's assertions.

II. Response to Report of Dr. Loren Scott

In this section of my report, I respond to various claims made in Dr. Loren Scott's expert report, including: that the Gulf Coast fishery has fully recovered; that tourism in the Gulf Coast area has fully recovered; and that BPXP plays a particularly important role in the Gulf of Mexico Oil and Gas Industry.

A. BPXP has made large payments under the oil spill claims programs

On page 11, Table 4, Dr. Scott notes that BP has paid over $10 billion to residents in the four states of Alabama, Florida, Louisiana and Mississippi. On page 12, he argues that these payments are large in relation to growth in these states' personal income. Because these claims payments are in compensation for losses suffered by individuals in the four states, the sheer magnitude of the payments, both in absolute terms and in relation to the states' growth in personal income, underscores the magnitude of the damages related to the oil spill. In Louisiana, for example, these losses represent a substantial share of the growth in personal income.

B. BPXP has spent large amounts of money responding to the spill

On page 13, Dr. Scott notes that BPXP has spent over $14 billion responding to the oil spill.[1] Again, this spending underscores the magnitude of the damages associated with the spill. BPXP's decision to undertake these expenditures provides information about its anticipation of

[1] Dr. Scott contends that BPXP has made large payments under the oil spill claims programs, spent large amounts of money responding to the spill, allocated money to the tourism boards of the four states Alabama, Florida, Louisiana and Mississippi, and spent billions on employee compensation and vendors. As explained in the Expert Report of Ian Ratner (August 15, 2014), various other BP entities, such as BP International Limited and the North American Funding Company, have provided most of the funding for the payments and expenditures made by BPXP. The sources of these payments and expenditures made are beyond the scope of this Report.

ongoing damages. Indeed, on page 17 of his report, Dr. Scott agrees that the large amounts of money spent responding to the oil spill by BPXP "could play an important role in preventing harm to the economies in the Gulf Coast region that may otherwise have resulted from the spill." A standard feature of economic analysis of disasters is that the amount of preemptive spending taken in an attempt to limit the damage is a component of the economic damage from the event.[2] Dr. Scott notes that BPXP has spent a total of $25.7 billion after the oil spill in claims payments, tourism promotion, and response.[3] By this measure, damages from the oil spill exceed $25 billion.

C. Gulf of Mexico Fishery

Dr. Scott argues that individuals who received claims payments through the Settlement Program's Seafood Compensation Program were "paid more than the objective measure of their estimated losses."[4] This remark confounds the impact on the annual flow of claimants' profits from participating in the industry with the payment received to compensate for the stream of impacts, in 2010 and the future. Indeed, under the GCCF settlement program, claimants were able to accept compensation for future anticipated losses, via a "Future Recovery Factor," which is a multiple of current losses.[5] By comparing one-time payments to losses as measured via

[2] US_PP_MAS010069, Hanley, Shogren & White, Environmental Economics in Theory and Practice (2d ed.) at 55. Under this interpretation, the party that is responsible for the adverse phenomenon, what economists call "externalities," can choose between paying to clean up the mess, in whole or in part, or paying ultimate damages. The rational action is to select the cheaper alternative. If that turns out to be pre-emptive spending to avert possible damages, then the "opportunity cost" of the externality is the amount spent. If it turns out that partially pre-empting possible damages is the cheapest alternative, as is the case in the Gulf oil spill, then the proper measure of damages is the sum of pre-emptive spending plus any residual damages.

[3] Scott Report at 16.

[4] Scott Report at 19.

[5] Claimants had to show an economic loss in the period following the oil spill as measured by reduced income or reduced profits in the period after the spill as compared to an earlier

reduced revenues in 2010, Dr. Scott neglects any impacts after 2010, which there most certainly were for a host of seafood markets.

Later, on page 20, Dr. Scott says: "The decline in revenue substantially exceeds the industry's decline in profits." No attempt is made to substantiate this claim, which is almost certainly incorrect. First, revenues earned by a fisherman do not reflect his or her profit, as they do not consider costs. These costs include payments to crew members, vessel owners and to any lease holders (if relevant). All these stakeholders' losses are relevant, and all are contemplated by the Seafood Compensation Program. But commercial fishermen must also pay for other inputs, including importantly fuel, bait, equipment, and depreciation, among other things;[6] their time spent fishing also has value.

There is good reason to expect that harvesting costs rose after the oil spill. Indeed, while an analysis of the biological impacts of the spill on fisheries is beyond the scope of this report (and is subject to ongoing study pursuant to the Natural Resource Damages Assessment) one published scientific appraisal of the Gulf of Mexico fishery concluded that reduced fish stocks due to the oil spill were very likely to persist for some time.[7]

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benchmark period. Most claimants were allowed to use either 2009, the average of 2008 and 2009, or the average of 2007, 2008 and 2009 to form their benchmark, although individuals who changed jobs between the base period and 2010, or who started work on or after April 21, 2009 had to include 2011 in their benchmark period. See US_PP_MAS009988, available at http://www.deepwaterhorizoneconomicsettlement.com/docs/QRG_IEL.pdf.

[6] Exhibit 11923, at 38.

[7] US_PP_MAS001580, Sumaila et al. (2012). These authors note by way of analogy that some of the fisheries in Prince William Sound have still not recovered, some 25 years after the Exxon Valdez oil spill. The implication is that the adverse effects on some species in the Gulf of Mexico are likely to continue for some time. In a similar vein, local fishermen apparently felt the Gulf Coast fishery was poised for a strong recovery at the start of 2010, pointing to a strong future trajectory. Indeed, an interviewee quoted in Exhibit 11923 reveals that fishermen thought that "2010 was supposed to be our comeback year." *Id.* at 42. It is also true that oiling has adversely impacted key habitat along the Gulf Coast, which would force species that utilized that habitat to relocate. Boesch Report, at 33. In turn, this would force fishermen to travel greater

Moreover, Dr. Scott's focus on fishermen's revenues neglects an entire cohort of market participants who are almost certainly harmed, namely seafood consumers. The spill adversely impacted seafood consumers' perceptions of the safety and desirability of Gulf of Mexico seafood, inducing a reduction in demand for that seafood.[8] With the reduction in demand, processors struggle to find buyers and restaurateurs are forced to find substitute products to offer to restaurant goers.

Absent any other effect, this reduction in demand would lower the quantity of seafood traded, but it would also reduce prices, potentially causing a reduction in revenues received by fishermen and other individuals who interact directly with fishermen. But as Dr. Scott notes, revenues did not fall between 2010 and 2011 for a number of species. The combination of these observations indicates an increase in the cost of harvesting seafood. This increase in cost implies an inward shift of the supply of seafood.

Altogether then, Gulf seafood markets witnessed both a reduction in demand and a

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distances and spend larger amounts of time searching for their prey; both effects would raise fishermen's costs. Moreover, there is evidence that oiling would reduce the growth rate of shrimp, so that the volume of landings would be adversely impacted even if the number of landings was not. *Id.*, at 35.

[8] There is plentiful anecdotal evidence that demand was adversely impacted. BP-HZN-2179MDL01888306, A Study of the Economic Impact of the Deepwater Horizon Oil Spill Part Three – Public Perception, reports in Figure 17 that 50% of restaurant owners reported their customers had an unfavorable impression about Gulf Seafood in 2010. At 23. Also, interviews with seafood distributors: "they all reported a significant decline in the demand for Gulf Seafood. All of the distributors surveyed either supply products to restaurants, grocery stores, or larger distribution companies. Even though the main seafood products have remained unchanged since 2008, there has been a significant decline in demand for Gulf Seafood In all sectors following the Oil Spill. Many oyster, shrimp, and other general seafood distributors were forced to close their doors as a result of the Oil Spill. Even now, despite reports stating that the seafood from the Gulf is safe to eat, a demand significantly smaller than that of previous years still persists." *Id.* at 23. Exhibit 12353: "Stakeholders expressed belief that negative perceptions related to the oil spill and its impacts are causing short- and potentially long-term adverse effects to the economy and to the image of the Coast", "Negative perceptions of the safety of Gulf seafood were detrimental to the tourism and seafood sectors", and "BP ads, intended to improve corporate image, deterred tourism and seafood consumption." At slide 7.

reduction in supply. A variety of impacts flow from these observations: first, benefits to sellers fall, as their profits are squeezed.[9] Second, benefits to buyers fall, as the amount of the goods they consume declines.[10] Thus, the combined benefits accruing to market participants are positively related to the volume of trade. It is therefore the volume of landings, and not the revenues paid to fishermen, that is the relevant indicator of the benefits to market participants: in particular, a reduction in the volume of trade will lower the combined benefits to buyers and sellers.[11]

Dr. Scott asserts on pp. 39-40 that after the spill the volume of landings for a number of key species, including Shrimp, Oysters and Blue Crab, fell in key regional markets. He goes on to argue that the Gulf of Mexico fisheries have generally recovered, or had nearly done so, as of 2012.[12] As an economist, I do not attempt to evaluate Dr. Scott's claim as to the fisheries themselves. But it is possible to evaluate the NOAA landings data that Dr. Scott used in his report.[13] Included in this data is information on landings of Blue Crabs, Oysters and Shrimp, for each year from 2007 to 2012, for each of the Gulf Coast states. Using this data, I analyzed landings for each of the three species in Louisiana, the state that is far and away the most important in terms of volumes landed. I first calculated the average landings over the three-year period 2007-2009. Subtracting the 2010 landings from this average then gives a measure of the

[9] Economists refer to these benefits as "Producer Surplus." That profits fall when there is a reduction in Demand is well known; see for example US_PP_MAS011868, Perloff (4th Ed.), at 272-275.

[10] Economists refer to these benefits as "Consumer Surplus". Consumer Surplus increases as the volume of trade rises, and so is adversely impacted by a decrease in supply. *Id.* At 265-271.

[11] *Id.*

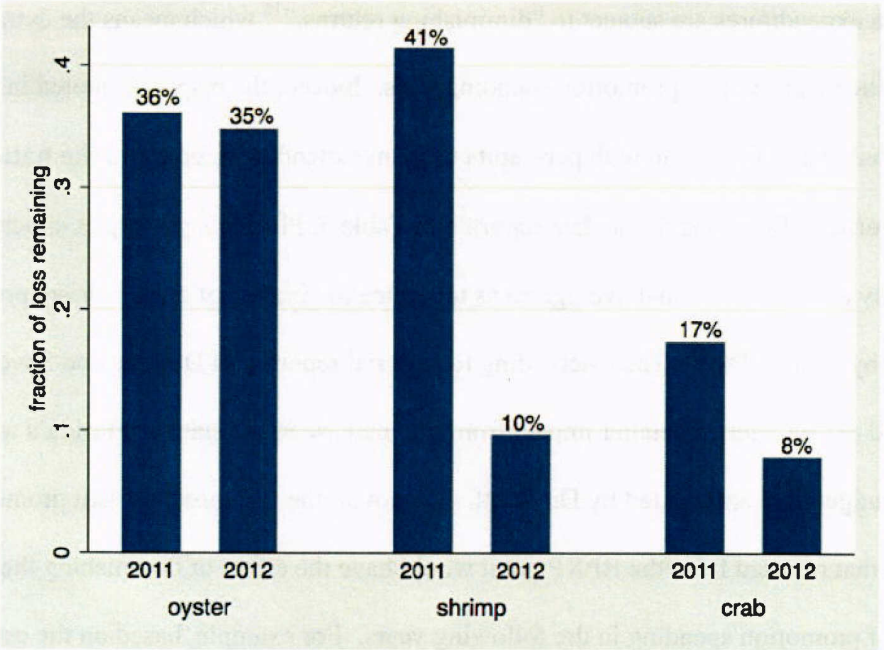
[12] This remark stands in sharp contrast to published scientific conclusion. US_PP_MAS001580, Sumaila et al. (2012).

[13] BP-HZN-2179MDL09216157. The purpose of this analysis is not to comment on the biological or ecological impacts of the spill on fish populations, which is subject to the ongoing Natural Resource Damages Assessment. Instead, this report analyzes the economic effects of the spill, including its effects on the fisheries as sources of economic activity.

volume of losses suffered as a result of the spill; if Dr. Scott's claim were correct, these losses would be largely recouped by 2012. I then calculated the difference between 2011 landings and the 2010 levels, and the difference between the 2012 landings and the 2010 levels. Dividing these numbers by the volume of losses described above yields the fraction of losses recouped for 2011 in the first instance and 2012 in the second. The difference between these numbers and 100% would then indicate the fraction of losses yet to be recouped, as of the year in question.

I plot these remaining unrecouped losses in Figure 1, for each of the three species, for both 2011 and 2012. In addition to providing information about the remaining unrecouped losses, the graph gives a sense of the pattern of recovery. For Oysters and Blue Crabs, landings recovery has been very slow. While Shrimp recovered somewhat faster in percentage terms, the level of unrecouped loss as of 2012 was large. Thus, I conclude that the landings data do not support Dr. Scott's opinion that these fisheries recovered by 2012.

Figure 1: Unrecouped Fishery Losses in the Gulf of Mexico: Blue Crabs, Oysters and Shrimp



D. Gulf Coast tourism

On page 21, Dr. Scott argues that the money allocated by BPXP to the tourism boards of the four states Alabama, Florida, Louisiana and Mississippi "helped to prevent potential harm to tourism that might have occurred in Louisiana, Mississippi, Alabama and the Florida panhandle." He reasons that the monies given to the four states "represented a very substantial increase in their budgets." Here, he buttresses his discussion by referring to "a key scientific article" by Deskins and Seevers.[14] In this article, Deskins and Seevers estimate a relationship between per-capita Tourism Promotion Spending and the growth in Tourism Expenditures. The authors find that a 1% increase in per-capita tourism promotion spending will yield a roughly

[14] Scott Report at 22, citing BP-HZN-2179MDL09238619, John Deskins and Matthew Seevers, "Are State Expenditures to Promote Tourism Effective?", Journal of Travel Research, 50(2) (2010), pp. 154-170.

.9% increase in the growth of tourism expenditures.[15] But they are very clear that tourism promotion expenditures are subject to "diminishing returns,"[16] which means the extra gains tend to fall as the magnitude of promotion spending rises. Indeed, the response quoted in Scott's report is only valid for a state with per-capita tourism expenditures equal to the national per-capita average. Referring to the data reported in Table 5, Florida's per-capita expenditures are sufficiently above the national average so as to reduce the impact of extra tourism promotion spending by about 20%.[17] Thus, according to material reported in Deskins and Severs' article one would expect a much smaller impact from the increase in the state of Florida's tourism board's budget than anticipated by Dr. Scott. Moreover, the increased tourism promotion spending that resulted from the BPXP grant would have the effect of diminishing the positive impacts of promotion spending in the following years. For example, based on the estimates reported in Table 2 of Scott's report,[18] one would expect the grant to the state of Mississippi would sharply reduce the impact of tourism promotion spending after 2010.[19] Thus, all else

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[15] *Id.*, at 160.

[16] *Id.*, at 160.

[17] In their Figure 2, p. 161, Deskins and Seevers show that an increase in tourism promotion spending for a state with per capita tourism expenditures that was one standard deviation above the average would have nearly half the impact as for a state with average per capita tourism expenditures. Based on the data in Table 5, p. 165, the sample average per capita tourism expenditures in 2003 (the latest year considered by Deskins and Seevers) was 2.0, while the standard deviation was 1.52. Thus, a state with per capita tourism expenditures 0.4 standard deviations above average would have a value of 2.6; this is the value Deskins and Seevers report for Florida. The net impact for Florida is therefore 0.4 x 0.5 = 0.2 or 20%.

[18] *Id.* at 161.

[19] Based on Mississippi's per capita tourism expenditures reported in Table 5 of Scott's report, the impact of tourism promotion spending for Mississippi would be about 5% less than that of an average state. As reported in Table 8 on page 22 of the Scott Report, the BPXP tourism grant to Mississippi raised tourism promotion spending by nearly 273%, which would be predicted to more than triple the increase in 2011 tourism expenditures. But this would then raise per-capita expenditures by a similar degree, which would place Mississippi's per-capita expenditures nearly

equal, one would expect any gains from BPXP's tourism grant to Mississippi to be short-lived.

To the contrary, on page 23, Dr. Scott alleges that Gulf Coast tourism has fully recovered from the effects of the oil spill, noting "strong growth of tourism after the spill and no net negative effects from the spill in many areas." To support this claim, he argues that revenue per available room (REVpAR) has recovered to pre-spill levels, as measured by comparing 2009 values to values in the months just after the spill. There are two problems with this line of reasoning. First, there are confounding factors related to a comparison of REVpAR between 2009 and the months after the oil spill: many parts of the Gulf Coast region saw a strong surge in demand as spill response workers flooded into the area.[20] The uptick in the demand for lodging related to response workers is of course transitory, and not representative of typical tourism expenditures, which makes it difficult to draw inferences regarding future trends based on these observations.

Second, tourism in the Gulf Coast area would naturally be expected to recover after the spill, irrespective of any interventions by BPXP, because of the recovery from the great recession. REVpAR is only partially reflective of Gulf Coast tourism, and changes in this measure of expenditure need to be evaluated in light of other confounding factors. On a national

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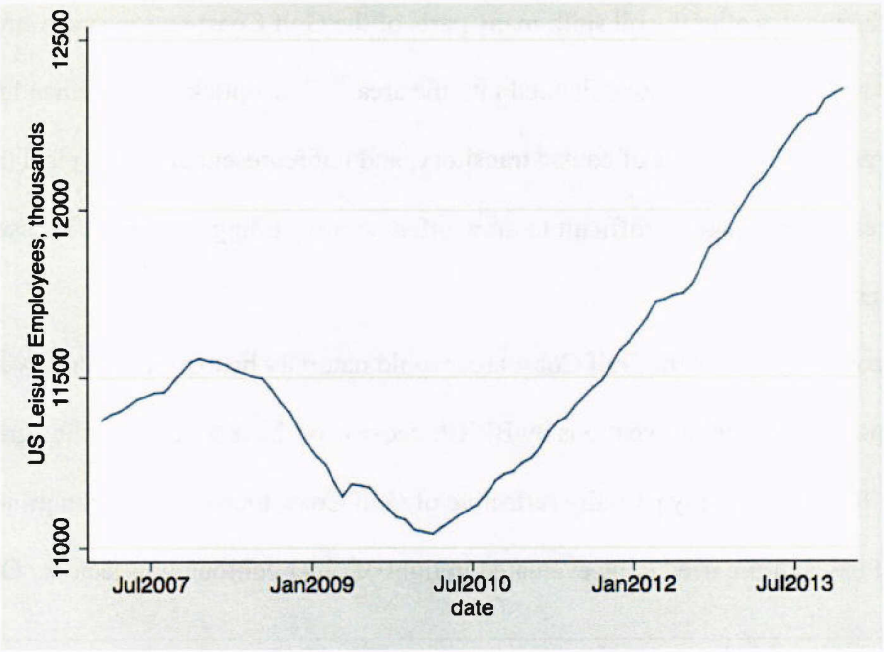
two standard deviations above the average value reported in Table 5. As such, it would reduce the impact of money spent in 2011, nearly to zero.

[20] In an interview published in the *Washington Post*, Harvard Professor and former Special Assistant to the President for Energy and Environment Joseph Aldy describes the "significant impulse of spill response resources coming into the region…" US_PP_MAS011917, available at http://www.washingtonpost.com/news/storyline/wp/2014/08/22/why-the-job-market-actually-improved-after-the-bp-oil-spill/. The FOSC report also notes that the "scarcity of lodging," due to a surge in response workers, "was a theater-wide problem." Exhibit 9105 at 145. The authors of Offshore Oil and Deepwater Horizon: Social Effects on Gulf Coast Communities Volume II note that "Among the retailers who did draw considerable business from the cleanup across much of the Gulf Coast were hotels and motels that filled with thousands of cleanup workers in summer 2010. Many motels were able to temporarily offset their loss of tourist and oilfield clients due to the spill, moratorium, and suspension by providing housing for the cleanup." Exhibit 11923 at 124.

scale, for example, the impact of the great recession was near its height in early 2010; as the effects of the recession eased, the tourism sector recovered across the country. An indication of this phenomenon comes from data on employment levels in the tourism industry, as I illustrate in Figure 2. Here, I show monthly employment levels in the US as a whole in the leisure and hospitality super-sector, from January 2007 through December 2013.[21]

Figure 2: Leisure and Hospitality Employees, 2007-2013



This increase in employment levels in the tourism industry implies an increase in the demand for rooms in hotels, condominiums and the like after early 2010.[22] As such, room

[21] US_PP_MAS011947, available at http://data.bls.gov/timeseries/CES7072000001.
[22] Indeed, in a recent presentation, Dr. Scott makes a similar point, noting that non-farm employment bottomed out in 2010 in several states in the Southeastern U.S., with all these states witnessing a recovery in 2010. BP-HZN-2179MDL09216042, which shows that non-farm employment has been steadily increasing since early 2010 in Florida (slide 108), Georgia (slide

occupancy and REVpAR would naturally be expected to rise *irrespective* of any intervention undertaken by BPXP. Accordingly, the relevant question is not "did REVpAR and room occupancy rates recover to 2009 levels", but "did REVpAR and room occupancy rates recover to levels one would have observed had the oil spill not occurred?"[23]

The usual method economists use to answer such a question is to compare changes in the variable of interest, say REVpAR in one of the Gulf Coast areas, against changes experienced in a similar variable, REVpAR in a region close to the Gulf Coast area under study. For example, one could compare any changes in REVpAR realized in the Mississippi Gulf Coast region to changes in REVpAR in the Mississippi Inland region. As a second example, one could compare any changes in REVpAR realized in the Florida Panhandle region to changes in REVpAR in the Florida Atlantic Coast region. The general idea is that comparable areas should have similar effects across time – if a recession hits one area, it hits a nearby area in a similar way; likewise, a recovery from a recession should have similar impacts in two comparable areas. Accordingly, the recovery should exert a similar effect on REVpAR in the two areas. By comparing the observed change in REVpAR across the two areas one can control for the background effect arising from broad-based economic recovery.

Fortunately, data allowing these comparisons are available in the Smith Travel Research database that Dr. Scott relied on in his report.[24] This database shows, by county and by month,

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95), Louisiana (slide 18), North Carolina (slide 90), South Carolina (slide 82) and Tennessee (slide (103). Non-farm employment has been steadily increasing since late 2010 in Alabama (slide 55) and Mississippi (slide 43).

[23] "As in standard damages assessments, the task in calculating the loss people have experienced as a result of the spill is to determine the income (or property value) trajectory people would have had if the spill had not occurred, the income path they have experienced to date and are expected to have in the future, and the difference between these." DEFEXP001025, Viscusi and Zeckhauser, at 1743.

[24] BP-HZN-2179MDL09216195.

rooms available, rooms rented and revenues collected. This database also indicates the relevant regions (e.g., Mississippi Gulf Coast, Mississippi Inland, Florida Panhandle, Florida Atlantic Coast, and so on). From this data I calculated REVpAR, by county for each month. I also calculated occupancy rates, the fraction of rooms sold to rooms available, again by county and for each month. To retain comparability to Dr. Scott's report, I used data from January 2009 to December 2013,

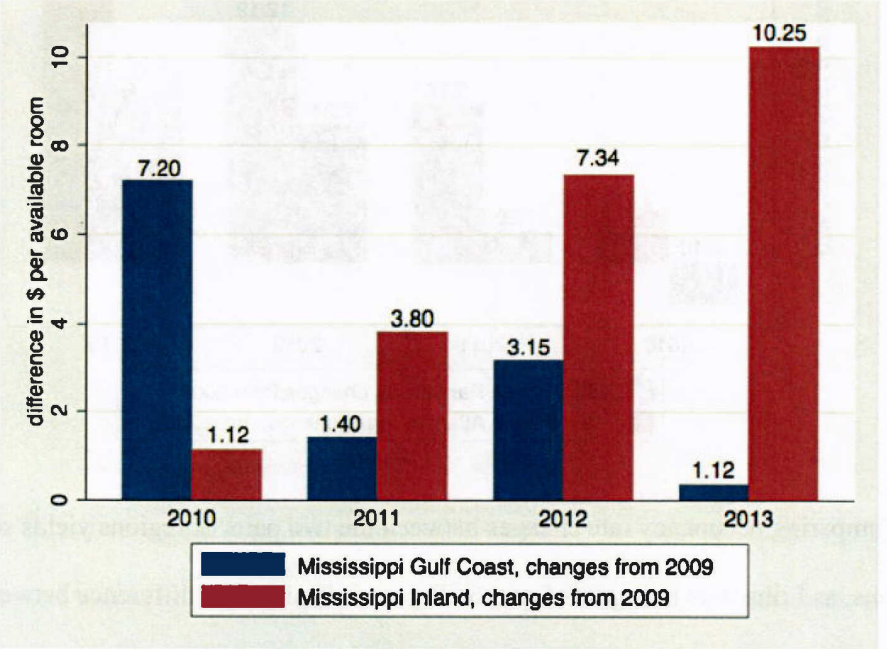
In Figures 3 and 4, I plot the difference between average REVpAR in each of the years 2010, 2011, 2012 and 2013 and the average REVpAR in 2009, for two pairs of geographically close regions.[25] Figure 3 shows these differences for the Mississippi Gulf Coast (shown as the blue bars) and Mississippi Inland (shown as the red bars), while Figure 4 shows these differences for the Florida Panhandle (shown as the blue bars) and the Florida Atlantic Coast (shown as the red bars). In both comparisons, the two areas are in the same state (and so share various elements unique to the particular state). The two Mississippi areas are geographically close, while the two Florida areas have a coastal presence in common.

If the Mississippi Gulf Coast area had fully recovered as Dr. Scott alleges, gains in REVpAR in the Mississippi Gulf Coast area should be similar to those observed in the Mississippi Inland; in that case the difference between the change in REVpAR across the two regions would be very small, and would not change over time. But upon inspection of Figure 2, ones sees that while the Gulf Coast area grew faster than the Mississippi Inland between 2009 and 2010, these gains quickly disappeared. From 2011 onward, the Mississippi Inland region

[25] The averages are taken across all counties in each region, over the twelve months in the calendar year.

was experiencing noticeably greater gains than was the Mississippi Gulf Coast region.[26]

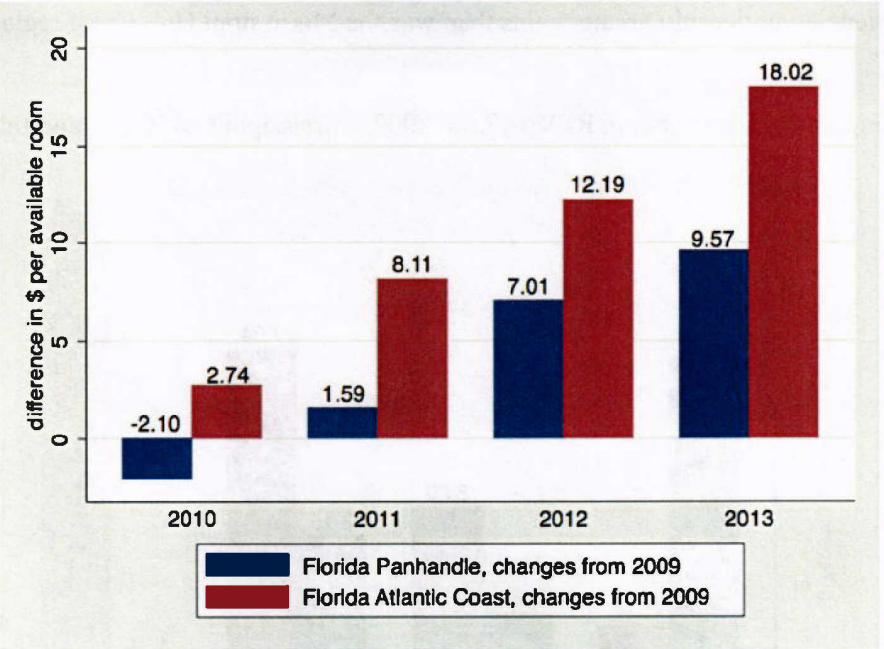
Figure 3: Differences in REVpAR vs. 2009, Mississippi Gulf Coast and Inland



Had the Florida Panhandle area fully recovered as Dr. Scott alleges, gains in REVpAR in the Florida Panhandle and the Florida Atlantic Coast would be similar. Again, the difference between the change in REVpAR across the two regions would be very small, and would not change over time. But upon inspection of Figure 3, it is clear that any increase in REVpAR in the Florida Panhandle did not compare favorably to the Florida Atlantic Coast: not only are changes in REVpAR in the Panhandle region smaller than those in the Atlantic Coast region, the wedge between the two areas is plainly growing over time.

Figure 4: Differences in REVpAR vs. 2009, Florida Panhandle and Atlantic Coast

[26] Interestingly, this pattern of changes over time is consistent with the implications from the Deskins and Seevers study, BP-HZN-2179MDL09238619, I noted above.



Comparing occupancy rate changes between the two pairs of regions yields similar conclusions, as I illustrate in Figures 5 and 6. Figure 5 displays the difference between average occupancy rate in the two Mississippi regions in the years 2010, 2011, 2012 and 2013 and the year 2009. Clearly, room usage grows faster in the Mississippi Inland region grows faster than the Mississippi Gulf Coast after 2010. Figure 6 displays the difference between average occupancy rate in the two Florida regions in the years 2010, 2011, 2012 and 2013 and the year 2009. As above, the Florida Panhandle does not fare as well as the Florida Atlantic Coast: any gains in the Florida Panhandle are smaller than the gains in the Florida Atlantic Coast region.

In summary, there are clear adverse impacts to the Gulf Coast areas: in both Mississippi and Florida, any gains in the Gulf Coast area's REVpAR and occupancy rates pale by comparison with the related area's gains in REVpAR occupancy rates.

Figure 5: Differences in Occupancy Rates vs. 2009, Mississippi Gulf Coast and Inland

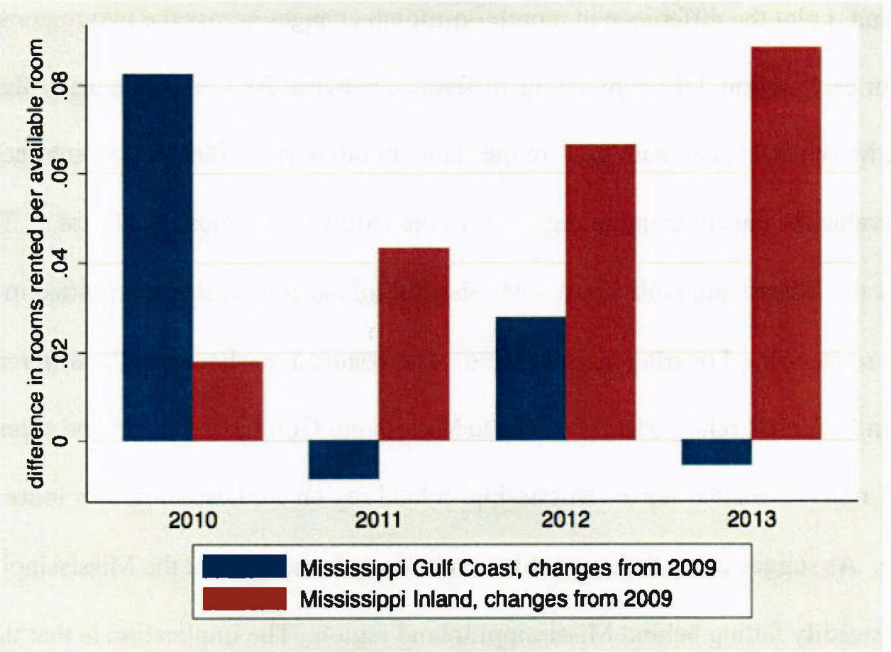
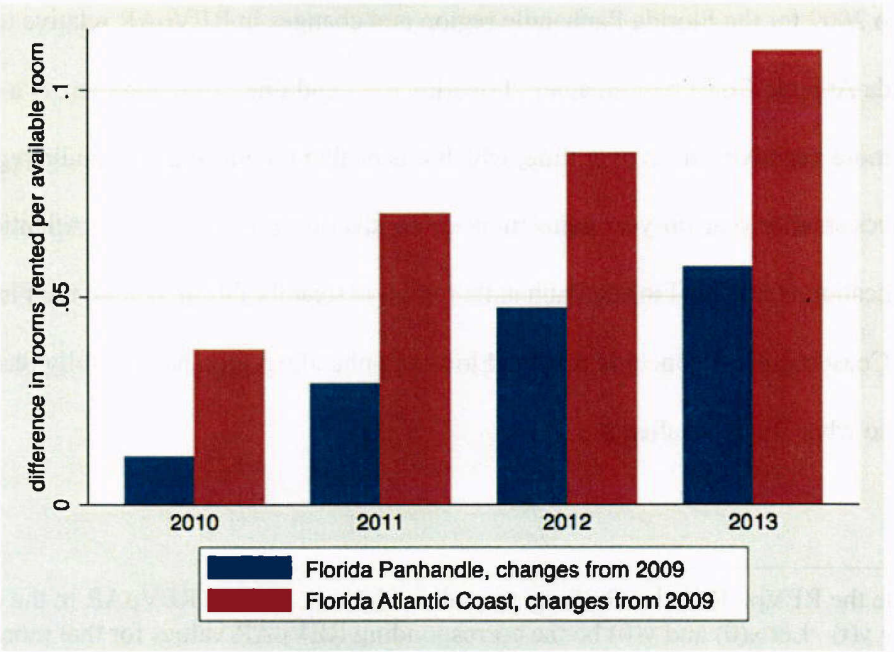


Figure 6: Differences in Occupancy Rates vs. 2009, Florida Panhandle and Atlantic Coast



Relying on annual data has the potential to obscure important trends within a year. With

this in mind, I plot the difference in month-on-month changes across the two regions in Figures 7 and 8. For each region, I determined the difference between REVpAR in a particular month and year, e.g. March 2011, and REVpAR in the same month during 2009. I then subtracted the resultant value for the comparable region from the Gulf Coast region of interest.[27] The resulting values for the Mississippi Gulf Coast – Mississippi Inland comparison are plotted in Figure 7. Onto this scatter plot, I overlay the trend line. The results here show that the difference between changes in REVpAR relative to 2009 for the Mississippi Gulf Coast region and changes in REVpAR relative to 2009 for the Mississippi Inland region are becoming ever more negative over time. As suggested by Figure 3, this trend clearly indicates that the Mississippi Gulf Coast region is steadily falling behind Mississippi Inland region. The implication is that the Mississippi Gulf Coast region has not fully recovered, contrary to what Dr. Scott alleges.

Figure 8 shows the comparison between the difference between changes in REVpAR relative to 2009 for the Florida Panhandle region and changes in REVpAR relative to 2009 for the Florida Atlantic Coast region; again, I overlay the trend line. Here too there is a clear trend towards more negative values over time, which means that the Florida Panhandle region experiences smaller year-on-year gains in most months than does the Florida Atlantic Coast. The implication is that the Florida Panhandle region is steadily falling behind the Florida Atlantic Coast region. I conclude that the Florida Panhandle region has not fully recovered, contrary to what Dr. Scott alleges.

[27] Denote the REVpAR in the Gulf region at date t by x(t), and the REVpAR in the comparator region by y(t). Let x(0) and y(0) be the corresponding REVpAR values for that month in 2009. Then I define the gain in the Gulf region as x(t) – x(0), and the gain in the comparator region as y(t) – y(0). The comparison between the two regions is then given mathematically by x(t) – x(0) – [y(t) – y(0)]. I construct this value for each of the two pairwise comparisons: Mississippi Gulf Coast vs. Mississippi Inland, and Florida Panhandle vs. Florida Atlantic Coast.

Figure 7: Differences in Monthly REVpAR, Mississippi Gulf Coast vs. Mississippi Inland

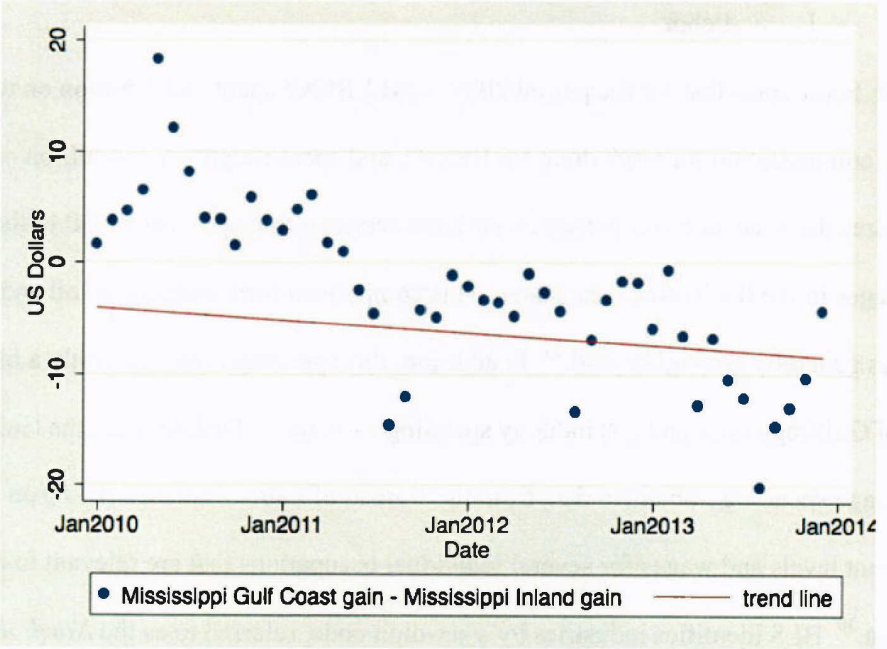
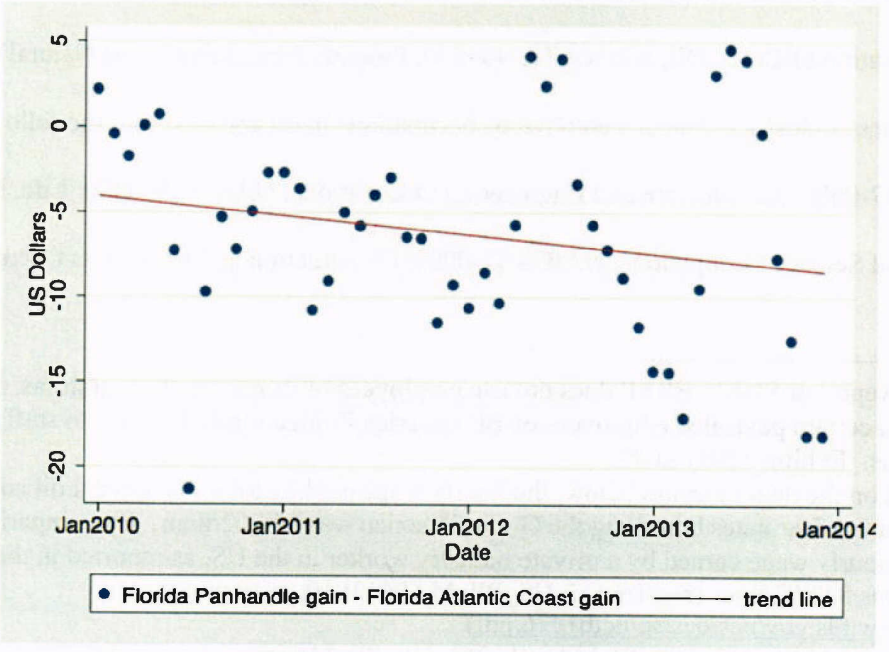


Figure 8: Differences in Monthly REVpAR, Florida Panhandle vs. Florida Atlantic Coast



E. The significance of BPXP in the Gulf of Mexico Oil and Gas Industry

1. Labor

Dr. Scott notes that for the period 2009 – 2013 BPXP spent "$2.1 billion on total employee compensation for work done for BPXP"; and spent roughly $16.4 billion on vendors.[28] He compares the wage and compensation package accruing to employees of BP to the average annual wages in the five Gulf Coast states. This comparison is misleading, as oil and gas employees generally are highly paid.[29] In addition, this spending represents only a limited portion of Gulf region oil and gas industry spending on wages. To determine the Gulf region oil and gas wage spending I obtained data from the Bureau of Labor Statistics (BLS) on employment levels and wages for several individual occupations that are relevant to oil and gas production.[30] BLS identifies industries by a six-digit code, referred to as the *North American Industry Classification System* (NAICS) code. The key industries containing occupations related to oil and gas production are NAICS 21100, Oil and Gas Extraction; NAICS 486100, Pipeline Transportation of Crude Oil; and NAICS 486200, Pipeline Transportation of Natural Gas. Within these industries, I identified obvious occupations in oil and gas from the following list: NAICS 17-0000, Architecture and Engineering Occupations; NAICS 19-0000, Life, Physical, and Social Science Occupations; NAICS 47-0000, Construction and Extraction Occupations;

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[28] Scott Report at 51-52. BPXP does not use employees of its own in its operations; instead it "relies on certain payrolled employees of BP America Production Company" to staff its operations. Exhibit 11981 at 49.

[29] Based on the data I discuss below, the hourly wage paid in 2010 to a typical oil and gas worker in the five states bordering the Gulf of Mexico was $26.02/hour. By comparison, the average hourly wage earned by a private industry worker in the US, as reported in the 2010 census was $22.02/hour (see Table 2 US_PP_MAS011910, available at http://www.bls.gov/ncs/ocs/sp/nctb1476.pdf).

[30] US_PP_MAS011942; US_PP_MAS011943; US_PP_MAS011944; US_PP_MAS011945; US_PP_MAS011946, available at http://www.bls.gov/oes/tables.htm.

NAICS 49-0000, Installation, Maintenance and Repair Occupations; NAICS 51-0000, Production Occupations; and NAICS 53-0000, Transportation and Material Moving Occupations. This produced the following list of specific occupations included, together with their NAICS code:

- Petroleum Engineers, 17-2171
- Geological and Petroleum Technicians, 19-4041
- Derrick Operators, Oil and Gas, 47-5011
- Rotary Drill Operators, Oil and Gas, 47-5012
- Service Unit Operators, Oil, Gas, and Mining, 47-5013
- Roustabouts, Oil and Gas, 47-5071
- Helpers--Extraction Workers, 47-5081
- Extraction Workers, All Other, 47-5099
- Riggers, 49-9096
- Gas Plant Operators, 51-8092
- Petroleum Pump Systems Operators, Refinery, 51-8093
- Gas Compressor and Gas Pumping Station Operators, 53-7071
- Pump Operators, Except Wellhead Pumpers, 53-7072
- Wellhead Pumpers, 53-7073

For this list of occupations, I determined the total number of individuals employed in the five-state region, for each of the five years 2009-2013. I then calculated, for each occupation in each state in any given year, the total amount those individuals earned. Summing over

occupations and states then produced a total amount of labor earnings in oil and gas related occupations, for each of the five years. These values are listed in the fourth column of Table 1.

I compared these amounts against corresponding BPXP spending. To obtain a fair comparison, I first determined the total amount BPXP spent on salaries, wages, overtime and bonuses; these values are listed in the second column[31] I then identified categories related to labor so as to calculate the amount BPXP spent on vendors, excluding goods receipts.[32] I list these values in the third column of Table 1. The ratio of BPXP spending, including vendors, to total Gulf of Mexico area annual wages earned by individuals working in oil and gas related occupations, is given in the fifth column of Table 1. The message here is that BPXP's spending comes to about 20% of total regional oil and gas industry wages. Of this, about 9 in 10 dollars spent by BPXP is on vendors.

[31] BP-HZN-2179MDL07817645, calculated as indicated by Dr. Scott in his footnote 112, page 51. His calculations exclude bonuses, which I include.

[32] From BP-HZN-2179MDL09099967, I retained all entries in the "Details" tab associated with the categories: Labor, Labor & Materials, Travel Expense, "T&E(Only): Meals, Entertainment - 50% Ded", Vessel Meals Lodging And Additional, Seminar & Training Fees, Marine Rigger Contract Personnel Expense, Contractor Engineering, Safety Expense, Lab Services, "Cement, Equipment And Service - Drilling", Consulting & Management Fees, Temporary Help - Short Term, Contractor Incentives, Other Professional Services, Outsourced Service Expenses, Contract Aerial Expense, Marine Rigger Contract Personnel Expense, Casing Work - Idc Costs, Quarters And Catering, Well Testing, Postage & Courier-, Tubing Work - Idc Costs, Well Service - Well Work Charges, Slickline Services, Outside Trans.-Charter & Tows; from this list, I then deleted all entries identified as "goods receipts." To the resultant value I added the entry from "Vendor total" in the Details tab of BP-HZN-2179MDL09099966. Even removing goods receipts, I could not determine the amount of non-wage spending in many categories; as such, the list I developed is likely to overestimate BPXP's labor spending on vendors.

Table 1: BPXP's role in Gulf of Mexico Labor

Year	BPXP Wage Bill	BPXP Total Labor Spending	Gulf of Mexico Labor Earnings	BPXP Share
2009	$259,627,292.72	$1,708,028,184.08	$8,108,291,600	21.31%
2010	$235,611,044.51	$1,520,750,577.63	$7,917,883,700	19.21%
2011	$210,479,852.23	$1,898,993,652.53	$9,108,561,000	20.85%
2012	$262,458,061.14	$2,281,318,617.05	$10,356,304,900	22.03%
2013	$283,323,610.65	$1,973,917,387.99	$10,687,422,700	18.47%
Total	$1,251,499,861.25	$9,383,008,419.28	$46,178,463,900	20.32%

2. Leasing

On page 53, Dr. Scott characterizes BPXP's activity in the market for Gulf of Mexico leases as significant, opining on pages 55-56 that "[i]f not for BPXP submitting more bids than any other bidder, future royalty, rental and bonus revenue to the government would decrease, and the overall development of offshore resources would slow..." It is important to note here that any other company, or a group of companies, that were developing comparable combined resources would make similar expenditures. For Scott's claim to be true, there must be significant limits to participants in the bidding process, also known as barriers to participation. Such barriers, if they were present, would significantly decrease the competitiveness of the market for leases, and increase the degree of concentration in the market for leases. However, as shown below, the data reflect an unconcentrated and competitive market for leases. Therefore, neither the United States' royalty, rental, and bonus revenues, nor the overall pace of offshore development are dependent on BPXP's participation in lease sales.

To determine the competitiveness of the lease sale market, I look to a standard measure of market concentration, the Herfindahl-Hirschman Index (HHI). This index is calculated by summing the squares of firms' shares, measured in percentage points, over all firms in an

industry. Letting s_i represent the percentage share held by a firm *i*, the HHI is the sum over all firms of the squared shares:

$$HHI = \sum s_i^2.$$

This metric can be applied to any variable that describes an industry's structure; here, I evaluate the level of concentration in terms of leases.

The Herfindahl index reaches a maximum value of 10,000 when a monopoly exists, meaning a single firm controls 100 percent of the market. At the other extreme, the Herfindahl index can approach zero in a purely competitive market in which a large number of firms each control a small share of the market. For example, in a market in which 100 firms each control one percent of the market the Herfindahl index would be 100. When market concentration is low, competition will tend to be vigorous. A market with a Herfindahl index of 1,500 or less can be described as unconcentrated. This is consistent with the usage by other experts in the field and government regulators. For example, the current U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines classify markets into three types:

- Unconcentrated Markets: HHI below 1500
- Moderately Concentrated Markets: HHI between 1500 and 2500
- Highly Concentrated Markets: HHI above 2500

For purposes of comparison, industries in the unconcentrated range, along with the value of the Herfindahl Index for that industry include: blast iron and steel mills (445), computers (658), distilleries (1,076), meat products (393), men's and boy's suits and coats (846), and petroleum refining (422). Tires and inner tubes (1,518) are barely above the threshold for an

unconcentrated industry, while household refrigerators (2,025) and breakfast cereal (2,446) are well above the threshold.

Using data taken from the BOEM website,[33] I calculated the number of high bids attributed to each of the 48 firms that submitted a winning bid in lease sale 231, one of the most recent lease sales; dividing these numbers by 444 (the total number of high bids), I constructed the share of winning bids leases for each company. Table 2 shows these values. Based on the shares listed in Table 2, I determine the Herfindahl Index for this sale, as gauged by winning bids; it is 450.15. As this value is well below the cutoff value for unconcentrated markets, I conclude that the market for leases in the Gulf of Mexico is competitive.

Using the BOEM data, a similar exercise can be carried out on the total number of leases newly acquired, on an annual basis. I calculate, for each firm that acquired a lease, the firm's share of newly acquired leases, for each of the five years 2009-2013. Based on these shares, I then determined the HHI for leases newly acquired in that year; these values are combined in Table 3.[34] This list of values gives a feel for the degree of competitiveness in the Gulf of Mexico over time. Importantly, the market is always in the unconcentrated range, with the HHI falling over time. In this competitive lease sale market, there are plenty of bidders for every profitable lease, and barriers to entry do not prevent other firms from leasing and developing the same types of resources that BPXP has bid on in the past.

[33] US_PP_MAS010929, US_PP_MAS011949.

[34] While the BOEM data is based upon lease acquisitions irrespective of the firm's share in the lease holding, it also reports those shares. From that information I constructed ownership-weighted values of market shares. The HHI values I report are based on these ownership-weighted numbers.

Table 3: The HHI for Gulf of Mexico Leases, 2009-2013

Year	HHI
2009	708.93
2010	603.55
2011	790.05
2012	505.96
2013	603.34

3. Production

On pages 57-60, Dr. Scott argues that BPXP is a significant operator of oil and gas leases in the Gulf region. He buttresses this claim with reference to Figure 21, which seemingly shows BPXP's oil production tracking the number of operators in the Gulf. Three points are germane here. First, a comparison of the values embedded in Figure 21 reveals that BPXP's production levels fell by over 50% between 2009 and 2013, from a little over 180 billion barrels to around 70 billion barrels; at the same time, the number of operators fell by 25%, from 107 to 80. Therefore, contrary to the trend that this graph would suggest, BPXP's production fell to a much greater degree than the reduction in the number of operators. As explained in my initial report, this decline in production is due at least in part to BPXP's divestment of a number of assets.[35]

Second, using 2009 as a starting point for this discussion overplays BPXP's historical role. If one looks back a bit earlier, one finds that BPXP's share of oil production, based on leases where it is the operator, has often been less than 20%. I document this point in Table 4, where I list total annual oil production for the Gulf of Mexico as a whole (column two) and production from leases where BPXP was the operator (column three), from 2006 to 2013. The

[35] Mason Report p. 10, footnote 8.

share of total Gulf oil production attributable to BPXP, shown in column four, indicates clearly that recent years are more like the middle part of the last decade; 2009 and 2010 are the outliers.

Table 4: BPXP's role in Gulf of Mexico Oil Production

year	industry total oil production	BPXP total oil production	BPXP share
2006	469,464,392	83,514,215	17.79%
2007	468,011,967	79,066,820	16.89%
2008	423,327,102	116,973,931	27.63%
2009	570,243,015	187,755,109	32.93%
2010	547,820,439	168,831,131	30.82%
2011	466,705,092	100,265,286	21.48%
2012	465,263,243	83,216,931	17.89%
2013	456,348,816	82,916,476	18.17%

Third, and related to the discussion about leases, the critical issue here is the degree of competitiveness in Gulf oil production. I evaluate this issue in a similar manner to my analysis of Gulf leases, by calculating the HHI. To this end, I obtained data on oil production from a database on the BOEM website.[36] This database lists each operator's annual output; for the sake of comparability to Dr. Scott's report I downloaded these data for the five years 2009-2013. Summing these values gives the total annual industry oil production; then dividing an operator's production by the industry production in the corresponding year gives the share of production for that company. Using this information, I then calculated HHI values for each of the five years. These values are listed given in Table 5. In every year since 2009, the HHI is less than the 1500 cutoff, and has in fact fallen steadily over time. These values fall mainly within the unconcentrated range; in recent years, comfortably so.

[36] US_PP_MAS011879; US_PP_MAS011883; US_PP_MAS011887; US_PP_MAS011891; US_PP_MAS011894 available at http://www.data.boem.gov/homepg/pubinfo/repcat/product/Rank%20Oil.asp.

Table 5: HHI in Gulf of Mexico Oil Production, 2009-2013

year	HHI
2009	1,583.86
2010	1,391.82
2011	1,077.11
2012	949.51
2013	857.47

Therefore, since Gulf oil production is competitive, BPXP's role in the Gulf oil industry production could be replicated by other firms seeking to develop the same resources.

F. Capital and Operational Expenditures

Dr. Scott argues that "BPXP's production and investment activities result in large capital and operational expenditures, which have benefitted the Gulf Coast Region economy."[37] However, BPXP did not undertake these capital and operational expenditures with the goal of benefitting the Gulf Coast economy.[38] As with any other company, BPXP's goal is the maximization of its net worth.[39] This motive applies to a variety of actions taken, including the

[37] Scott Report at 45. He also offers various comparisons related to BPXP's operational expenditures in an attempt to illustrate the alleged magnitude of BPXP's role in the Gulf. Instead of comparing these values to industry level activity, he compares them to unrelated industries in a single state.

[38] That BPXP does not take actions with the intent of benefiting the Gulf Coast economy was driven home in stark fashion recently, when the Houston Chronicle reported that the company had lobbied its employees to protest the city's recent filing of a lawsuit against BPXP on the grounds that the company's actions had cost the city $23 million in foregone tax revenue. US_PP_MAS012003, Collier, Kiah and Morris, Mike, "BP employees shower Houston officials with emails over lawsuit", *Houston Chronicle*, 29 July, 2014.

[39] Virtually every textbook on microeconomics, at every level – beginning undergraduate, intermediate undergraduate or graduate, starts from the assumption that firms are motivated by profits. An example of a beginning level text that adopts this convention is US_PP_MAS009878 Krugman and Wells (2014), pp. 192 – 200. An example of an intermediate text that adopts this convention is US_PP_MAS010076 Perloff (4th Ed.), pp. 148-149 and p. 258. A leading graduate text that articulates this convention is US_PP_MAS009889 Mas-Colell, Whinston and Green (1995), pp. 135 and pp. 152-153. Likewise, virtually every text devoted to industrial

amounts of hydrocarbons produced and the volume sent to market, the amount of labor employed in various categories, capital investment decisions, and public relations activities. Capital expenditures and operational expenditures are made after a comparison of the initial costs of investment and the expected revenue to be generated by the investment show that the benefits likely outweigh the costs. This comparison of expected costs to expected revenue can be used to generate an expected profit margin for any given activity.[40]

A variety of statements made by BP to its investors and the public support this conclusion. For example, in a publically available document aimed at investors titled The BP Proposition 2014 to 2018, BP explains that its "strategy is to trade mature assets with declining cash flows to focus on those with higher returns."[41] The focus of the statements made in this forum, and others, is the value to shareholders of actions and decision being taken by BP management. BP opens this document by succinctly stating its proposition to investors:

This theme is reinforced in each of BPs Form 20-F annual reports issued since the 2010 spill. In the 2010 annual report, BP explains that its "fundamental purpose is to create value for

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organization, the field that focuses on market behavior within a particular industry, adopts this framework. A leading example here is US_PP_MAS009843 Carlton and Perloff (2005), pp. 11-13.

[40] "A firm makes an investment if the expected return from the investment is greater than the opportunity cost." US_PP_MAS010076 (Perloff, 4th Ed., pp. 554).

[41] US_PP_MAS012014 BP Proposition2014 – 2018, at page 3.

shareholders"[42] and that the firm aims "to deliver value growth for shareholders by investing in our Exploration and Production business …"[43] A strategic focus on maximizing value is again evident in the 2013 annual report, where the chairman's letter explains that "we choose projects where we can generate the most value through our production."[44] Thus, BP's statements are consistent with the generally applicable principle that firms make investments such as capital expenditures in order to maximize shareholder value.

G. Conclusion

In this part of my report I have responded to variety of claims made by Dr. Scott in his report. His argument that the Gulf of Mexico fisheries have fully recovered is not supported by the data he relied upon. By focusing on revenues he ignores the important role played by costs in determining fishermen's profit. Those costs are tied to available stock, and he offers no evidence to suggest stocks have fully recovered. Moreover, he neglects the impact of a contracting market upon seafood consumers, who most certainly suffered harm. In his analysis of Gulf Coast tourism he has overstated the impact of BPXP's tourism grants. By analyzing the pattern for tourism enterprises on the Gulf Coast in isolation, without controlling for broad-based effects related to the general improvement in the economy, he has exaggerated the degree of recovery for Gulf Coast tourism enterprises. By focusing on the absolute level of its activities in the Gulf of Mexico oil and gas industry, without placing these activities in the proper context, he has exaggerated the significance of BPXP's spending on labor, its lease ownership and its production. Instead of comparing these values to industry level activity, he compares them to

[42] Exhibit 12304A at 11.
[43] *Id.* at 20.
[44] Exhibit 12303A at 6.

unrelated industries in a single state.

Finally, he does not properly consider the degree of competition in the Gulf of Mexico oil and gas industry. There are substantial volumes of hydrocarbons in the Gulf, for which there are a steady ongoing stream of leases. There is strong competition for these leases, and for production based on those acquired leases. The benefits to the Gulf economy from developing these leases do not depend on any single firm, but on the industry as a whole – these benefits will accrue regardless of which company is the purchaser of the lease and the operator of the equipment. Any company developing the resources that BPXP currently develops would be making similar expenditures and generating a similar positive impact on the Gulf economy. BPXP makes expenditures in the course of its business not for the primary purpose of benefitting the Gulf economy but rather in order to maximize its own profit.

III. Response to Report of Dr. David Sunding

In this section of my report, I respond to certain claims made in Dr. David Sunding's expert report: that penalizing Anadarko based on the Clean Water Act is not supported by economic theory; and that the potential for such a punishment has dissuaded investment in the Gulf of Mexico, leading to higher levels of concentration.

A. Optimal Deterrence: Theory vs. Practice

On page 5 of his report, Dr. Sunding observes that the optimal level of economic deterrence arises when there is "full payment of *actual* external damages." (emphasis added). The basic hypothetical situation underlying Dr. Sunding's analysis arises when one party, A, is undertaking privately profitable actions that expose another party, B, to potential damages. One

way to induce A to take these potential damages into account is by levying a tax equal to the expected damage to B. Alternatively, society could make A liable for any damages suffered by B. In this way, A will only undertake actions which generate sufficient increases in profit as to offset any increases in expected damage to B.[45] From this, Dr. Sunding asserts that OPA liability alone is sufficient for economic deterrence purposes.[46] However, his conclusion is based on a number of incorrect assumptions.

To begin with, Dr. Sunding asserts that in this litigation, "OPA damages by themselves should achieve economically optimal deterrence," and that making Anadarko pay more than the $4 billion it paid to BPXP would result in over-deterrence above the optimal level.[47] However, Dr. Sunding offers no support for his assertion that the $4 billion Anadarko paid to BPXP represents a correct proxy for Anadarko's OPA liability in this litigation. It is certainly clear that the $4 billion does not represent "the total amount of harm done," which Dr. Sunding cites as the

[45] It is important to note here that the expected damages could be quite large, particularly if the distribution of damages includes very large possible harms with non-trivial probabilities. This idea, which Dr. Sunding fails to adequately account for, has come to be known by the phrase "fat tails"; it applies when the probability of ever larger damages shrink slowly as the damage rises. In the particular example of oil spills, there is evidence that the magnitude of damages rises very rapidly as one moves from a bad event to the next worst event; at the same time the odds of the event are likely to fall relatively slowly. *See* DEFEXP001025,Viscusi, W. K. and R.J. Zeckhauser. 2011, "Deterring and Compensating Oil-Spill Catastrophes: The Need for Strict and Two-Tier Liability," *Vanderbilt Law Review* 64(6), pp. 1717-1765, which Dr. Sunding cites in his footnote 11. In a scenario with fat tails, *ex post* damages from an observed event will most likely be smaller than the *ex ante* expected damage. This last observation has important implications for the accuracy of Dr. Sunding's analysis. Specifically, the nature of possible damages – the fat tails idea – implies that the expected damage is almost surely much larger than any realized damage. Accordingly, there is no basis for Dr. Sunding's assumption that $4 billion represents total damages.

[46] I do not adopt the proposition that compensation of damages suffices to obviate a civil penalty, either a matter of law or interpretation of the Clean Water Act, nor as economic analysis. My discussion here is to respond to Dr. Sunding within the context of his own theoretical framework in order to highlight some of its logical inconsistencies.

[47] Sunding Report at 5.

optimal amount of a penalty for efficient deterrence;[48] as I note in my initial report, a subset of the economic harm from the oil spill is likely to exceed $10 billion.[49] This subset only includes the claims paid out to individuals and businesses through the various claims programs set up after the Incident; it does not include, for example, natural resource damages that would be covered under OPA.[50] In addition, much of the extant literature to which Dr. Sunding refers assumes that the probabilities associated with the underlying events are known and agreed; in the particular application of deep water drilling they are almost certainly not.[51] Moreover, the probability distribution describing potential losses from oil spills is likely to be characterized by "fat tails."[52] An important consequence of fat tails is that the expected value can easily be larger than almost every observed level of damage.[53,54]

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[48] Sunding Report at 4.

[49] Mason Report, at 42-44.

[50] This subset also does not include "consequential losses," which arise if individuals are forced to substitute away from favored activities. *See* US_PP_MAS011950, Hylton, Keith N., Punitive Damages and the Economic Theory of Penalties, Georgetown Law Journal, Vol. 87, No. 2 (Nov. 1988). At 435. Nor does it include "secondary harms," for example harm that results because individuals change their behavior as a result of the spill. *Id*, at 435-436.

[51] Viscusi and Zeckhauser make a similar point:, noting that "we may be aware of the presence of hazards but have only a poor idea of the size of the probabilities", DEFEXP001025, at 1729-1730. They note also that "[b]ecause the probabilities are very small, there are few opportunities to learn about the magnitude of the risk." At 1729.

[52] As Viscusi and Zeckhauser put it, catastrophes of this sort "tend to have fat-tailed distributions (i.e., distributions where there is a nontrivial chance of extremely large losses." *Id. at* 1733.

[53] Viscusi and Zeckhauser obseve that "a single extreme outcome may readily account for most of the losses from a particular type of catastrophe." *Id. at* 1734. The implication is that the magnitude of the expected value of losses from a catastrophe like a deepwater oil spill will likely be close to the level of the very largest possible damage.

[54] The literature on which Dr. Sunding relies to support his argument that OPA alone achieves optimal economic deterrence, e.g., the references cited in footnote 10 of his Report, also start with the assumption that participants are "risk neutral," which is to say that they would be willing to accept a fair bet. But it is widely accepted that most individuals are "risk averse," which is to say that they would not accept a fair bet. If the damaged individuals are risk averse, then they will require an additional payment above their damages to be made whole. *See, e.g.*, US_PP_MAS011950, Hylton, Keith N., Punitive Damages and the Economic Theory of

Because the payment Anadarko has made to BP is not an accurate reflection of true damages, and because the fat tails argument implies that expected damages exceed realized damages in this application, one cannot argue that Anadarko has paid an amount equal to expected damages. As such, Dr. Sunding's argument that OPA liability achieves optimal deterrence and that Anadarko has paid enough through its payment to BP does not stand.[55]

B. Anadarko was a Participant in a Joint Venture, not in a "Principal-Agent" Relationship

In subsection I.D of his report, Dr. Sunding casts Anadarko in the role of a passive investor. He goes on to elaborate on that part of economic theory that relates to problems between such a party, often called the "Principal," and a party that undertakes certain actions on its behalf, termed the "Agent."[56] An assumption critical to Dr. Sunding's conclusion is that non-operators are "passive investors" who act as "principals" while the operator acts as the "agent." But in the offshore oil and gas industry, non-operators can and do play a much more significant role. Expert Gardner Walkup thoroughly discusses the operator and non-operator relationship under these kinds of contracts, and demonstrates that non-operators actively participate in the

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Penalties, Georgetown Law Journal, Vol. 87, No. 2 (Nov. 1988) at 436 ("Even if compensation awards were inflated by dividing them by the probability of securing compensation, potential victims would still lose out on subjective components of valuation. And those potential victims who are risk averse would need additional compensation in order to cover the cost of risk-bearing"). This additional payment increases with the amount of risk aversion and the size of the loss. In the case of risk aversion then, optimal penalties will be larger than OPA liability.

[55] Additionally, while the literature to which Dr. Sunding refers generally considers a case with one party potentially causing harm, there are multiple parties involved in the case at hand; applying the body of knowledge in extant literature to the case at hand is far from straightforward.

[56] I understand that "principal" and "agent" also have legal meanings; here I address only the principal-agent relationship reflected in the economics literature.

arrangement for a number of strategic, economic and technical reasons.[57] The joint operating agreement (JOA) that Anadarko entered into with BP spelled out specific expectations and privileges accruing to non-operators.[58] As a participating party in the Macondo agreement, Anadarko had a role that clearly involved it in the operations, both at the outset of the agreement and on an ongoing basis. It was accorded access to confidential information associated with the operation, and had a right to offer input, in particular related to health and safety.[59]

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[57] Mr. Walkup noted that non-operators currently participate actively and add value to the joint projects by tapping into the expertise and strengths of each participant, citing literature from major oil and gas companies such as Shell and Chevron. (Walkup also points to a project in which Anadarko as a non-operator played a major technical role.) One aspect of that active participation is that a non-operating participant may provide an independent review of certain critical activities. Walkup Report Section 5.1. Mr. Walkup further outlines the underlying reasons for that active participation, including the non-operator's interest in strategic learning, especially in plays or areas new to the non-operator (Walkup Section 5.3.1); the potential financial exposure in deepwater, given the high costs of each well (Walkup Section 5.3.2); concerns about investor awareness and avoiding negative surprises to the non-operator's investors (Walkup Section 5.3.3); managing technical challenges to well production and the high flow rates needed from deepwater wells (Walkup Section 5.3.4); and managing reputational risks to both the non-operator and to the deepwater industry as a whole (Walkup Section 5.3.5).

[58] Exhibit 1243.

[59] "The Operator shall, as soon as reasonably practicable and to the extent that the information has then been obtained or received by the Operator, furnish each Participating Party the following information about well operations:

(a) a copy of each application for a permit to drill and all amendments to that application;
(b) drilling and Workover reports, which shall include, but not be limited to, the current depth, the corresponding lithological information, data on drilling fluid characteristics, information about drilling difficulties or delays (if any), mud checks, mud logs, and Hydrocarbon information, casing and cementation tallies, and estimated cumulative Costs, to be sent by facsimile or -electronic transmission within eight (8) hours {exclusive of Saturdays, Sundays, and federal holidays) of well operations conducted in the preceding twenty-four (24) hour period..." *Id.*, at 22-23. "[T]he Operator shall, with the support and cooperation of the Non-Operators, while it conducts activities or operations under this Agreement:
(a) design and manage activities or operations to standards intended to achieve sustained reliability and promote the effective management of HSE risks;
(b) apply structured HSE management systems and procedures consistent with those generally applied in the petroleum industry to effectively manage HSE risks and pursue sustained reliability of operations under this Agreement; and
(c) conform with locally applicable HSE related statutory requirements that may apply." *Id.*, at

The nature of the JOA makes clear the relation between Anadarko, as a Participating Party, and BPXPX as Operator. This relation was not that of moral hazard, as Dr. Sunding characterizes. Moral hazard refers to a situation where the agent (which in Dr. Sunding's interpretation is BPXP) can take actions that cannot be observed by the principal (here, Anadarko). Anadarko had ample opportunity to observe a variety of key actions taken by BPXP, so it is inappropriate to apply the moral hazard model taken from economic theory to the relationship between Anadarko and BPXP.[60]

Instead, the relation was best viewed as a Joint Venture, where each party brings particular talents and assets to the relationship, and where each party has a role to play in the operation.[61] This distinction becomes critical as Dr. Sunding remarks "[i]n fact, when an investor cannot observe and control the safety measures undertaken by an operator, but is forced to share in liability and penalties, extending liability from operator to investor can lead to *decreased* investment in safety by the operator because the operator does not bear the entire cost of an accident."[62] By incorrectly interpreting Anadarko's role in its relation with BPXP as a

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[60] Indeed, the JOA makes clear that Anadarko had opportunities to review authorizations for expenditures, results from well-bore tests, and was generally empowered to ask questions.

[61] Again, I refer here to the realities of the relationship between the participating parties, as well as the meaning generally understood by economists, not to the legal entity or definition of a joint venture. Dr. Sunding tacitly acknowledges the relevance of the Joint Venture framework later in his report, at footnote 30. An important motive for non-operators in a joint venture, such as in deepwater activities, is strategic learning. *See* Walkup Report, Section 5.3.1: "The JV [joint venture] is a particularly important learning tool for nonoperators; the knowledge necessary for a non-operator to eventually become an effective operator is highly tacit and integrated with the operator's organizational structure or internal practices...." *Id.*, at 14-15.

[62] Sunding Report, at 7-8. Mr. Walkup, in contrast, explains the constructive role a non-operator may play in *enhancing* safety decisions, both through the extensive initial planning and design phase and during implementation of the design. Walkup Report Section 5.2. Mr. Walkup indicated that non-operators have very constructive roles to play in advance planning, including but not limited to cementing design, evaluation of cement integrity such as cement bond logging, and temporary abandonment procedures. And, during drilling, non-operators may actively

passive investor, as opposed to an active participant in a joint venture, Dr. Sunding brushes aside Anadarko's important role as a self-interested monitor of the operator.[63]

C. Identifying Causal Factors

In Section II.A of his report, Dr. Sunding alleges that concerns related to punishing non-operating investors has driven capital out of the Gulf of Mexico. To support this claim, he presents two pieces of evidence. The first is visual, as summarized in his Figure 1, while the second is based on econometric analysis, summarized in his Table 1.[64] His Figure 1 points to a decrease in entry rates and an increase in exit rates from deepwater Gulf of Mexico oil and gas operations after December 15, 2010, the date that Anadarko was named as a co-defendant (along with MOEX) in this lawsuit. But careful inspection of the underlying data reveals that no firms exited the Gulf of Mexico between 31 May 2010 and 7 September 2011. Accordingly, an alternative event between late 2010 and late 2011 would be equally capable of explaining the change in net entry. Two such alternative explanations for the observed pattern are migration from deepwater production to tight oil plays onshore, or the inhibiting effect on oil production associated with accumulations of stockpiles at Cushing, Oklahoma (the location of the trading hub for West Texas Intermediate crude oil). The following figure, taken from the Energy

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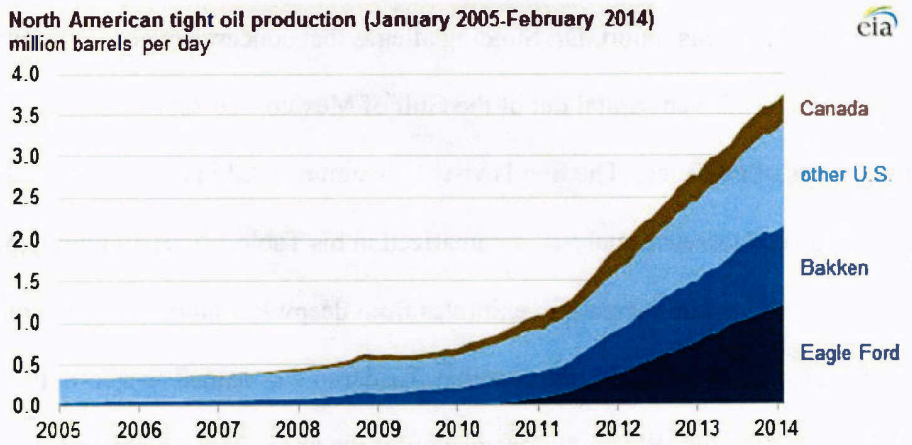
participate at additional junctures, depending on the strengths and weaknesses of the players, including for significant design changes due to major events, and management of change events. *Id.* This participation is in addition to the non-operators' ability to ask questions in connection with their role in authorizing financial expenditures that I cite above.

[63] Indeed, this aspect of the relation between an operator and other participants in a joint operating agreement is consistent with industry best practices: "it is industry best practice for non-operating parties to be active participants in deepwater activities." Walkup Report, at 7. Walkup also refers to a characterization of the appropriate role for a non-operator in deepwater activities, as summarized by a deepwater expert at Shell: "Reach agreement on project objectives, including stakeholder relations and HSE principles." Walkup Report, at 8.

[64] Sunding Report, at 11.

Information Administration (EIA) website, illustrates the first alternative explanation.[65] This graph shows a virtual explosion in oil production, particularly from the Eagle Ford play (which is located not far from the Gulf, in South Central Texas), starting in early 2011.

Figure 9: North American Tight Oil Production



Evidence of the second explanation is based on an emerging wedge between the West Texas Intermediate spot price and the Brent spot price, which also emerged in early 2011. I illustrate this point in Figure 10, which uses weekly observations on the WTI and Brent spot prices at roughly the same time as the court case against Anadarko was filed.[66] There is a clear

[65] US_PP_MAS011940, available at http://www.eia.gov/todayinenergy/detail.cfm?id=15571. It seems likely that this explanation lies behind the apparent departure from the Gulf of Mexico by St. Mary Energy Co., one of the firms Dr. Sunding identifies as having exited after December 2010. At their website, St. Mary says: "[o]ur current development activities in [the South Texas & Gulf Coast] region focus primarily on our Eagle Ford shale program. Our acreage position covers a significant portion of the western Eagle Ford shale play, including acreage in the oil, NGL-rich gas, and dry gas windows of the play." US_PP_MAS011916, available at http://www.sm-energy.com/our-operations/interactive-map, accessed by clicking on the radio button for "S. TEXAS & GULF COAST REGION."

[66] US_PP_MAS011911,available at http://www.eia.gov/dnav/pet/pet_pri_spt_s1_w.htm. For visual clarity, I focus on the period from a few years before to a few years after the bringing of the suit against Anadarko.

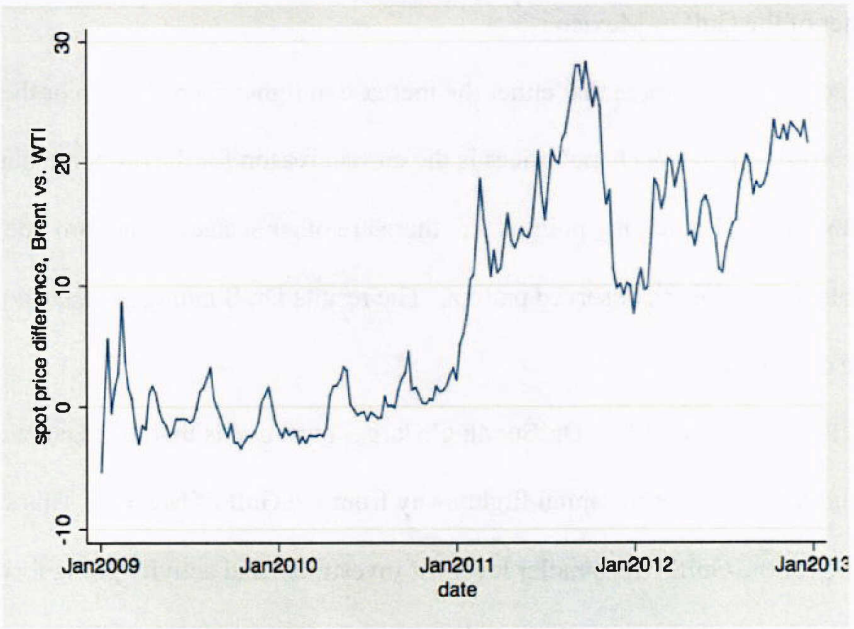
shift in the pattern of these prices in early 2011, which coincides with the shift in net entry into the deepwater of the Gulf of Mexico.

My point is not to argue that either the increase in tight oil production or the emerging wedge between Brent and WTI spot prices is the correct reason for the observed change in the pattern of next entry. Rather, my point is that there are other scenarios that provide alternative possible explanations for the observed pattern. The results Dr. Sunding presents do not demonstrate causation.

One last point is in order. Dr. Sunding's larger narrative is that the legal challenge to Anadarko and MOEX underlie capital flight away from the Gulf of Mexico. This story suggests a bleak future for the Gulf, with smaller levels of investment and activity going forward. But industry observers see things quite differently. One prominent industry analyst, speaking in 2013, expected deepwater rig counts to grow sharply into 2014: "[c]learly, the Gulf of Mexico is expanding very rapidly."[67]

[67] The opinion is from James West, lead oil service and drilling analyst for Barclays Capital. He also indicated it was "[p]erhaps the fastest growing deepwater market in the world today and one that we [Barclay's] think will grow into 2014." See US_PP_MAS012009, available at http://www.rigzone.com/news/oil_gas/a/124243/Gulf_of_Mexico_Poised_to_Remain_Strong_in_Coming_Years.

Figure 10: Differences in Weekly WTI and Brent Spot Prices



The issue of alternative competing explanations also applies to the econometric evidence Dr. Sunding presents in his Table 1. Since the data he uses in this analysis represent annual observations, what he finds is a difference in net entry from 2011 onward, as compared to the period leading up to 2010. Any event that occurred between late 2010 and late 2011 would serve equally well as an explanation for the observed pattern. In addition to the examples I presented above, some firms may have moved their assets from areas where water depths exceeded 1,000 meters into somewhat shallower waters. For example, Dr. Sunding's data shows that Black Elk exited deepwater Gulf of Mexico on 8 December 2013, but as of July 1, 2014 Black Elk had over 30 active leases in the Gulf. A second firm that Dr. Sunding identifies as having exited the deepwater Gulf of Mexico, Arena Energy, also has a strong ongoing presence in the Gulf. Their website points to significant recent activity, including the purchase of 17 leases at lease sale 222,

held in June 2012.[68] Arena's webpage also discusses a variety of activities undertaken during 2013, including two active drilling programs, a new discovery that they are currently developing, and a joint venture with Chevron.[69] If Arena and Black Elk exited waters exceeding 1,000 meters in depth it was not because they were driven away from the Gulf altogether, but because they preferred to operate in somewhat shallower water.

It is also plausible that firms operating in deepwater reassessed the probability of a blowout or other disaster following the Macondo incident, and came to the conclusion that the risks were too large to continue operating in that venue. Such a thought process would naturally have occurred in the second part of 2010, and so coincides with the period that Dr. Sunding has based his analysis on.

Apart from the inability to infer causation from a particular event in his analysis, there are some technical concerns related to Dr. Sunding's econometric analysis. Because he bases the analysis on annual data, he only has 31 observations. The time frame ranges from 1983 to 2013, a period in which the oil industry went through some profound changes. Over such a time frame, it is implausible that key technologies remained relatively unchanged. One reason to use a time trend, as Dr. Sunding does, is to address this concern. But such an approach requires that the underlying variable, here some measure of technology, changes in a gradual manner. As I noted above, oil and gas operators have the option of focusing their energies elsewhere, in particular in onshore tight oil plays. The technology that opened up these plays, "fracking," only became viable since around the turn of the century, and has only had a noticeable impact on oil markets in the last 4 years. Further, the impact was very dramatic, not at all gradual. Accordingly, the

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[68] Dr. Sunding's dataset shows Arena as exiting the Gulf on 14 December, 2012.

[69] These facts are discussed in dialogue boxes that can be accessed from http://www.arenaenergy.com/about-us/our-history/, by clicking on the dropdown menus for the years 2012 and 2013. See US_PP_MAS011929.

use of a linear time trend is ill suited to capture relevant technological aspects in oil and gas markets. More worrisome, Dr. Sunding's analysis pays no attention whatsoever to prices. It is simply implausible that oil and gas operators would not take anticipated future prices into consideration when they made their entry or exit decision. And these future prices went through profound swings during the 31 years in Dr. Sunding's sample: they dropped by over 50% in the middle 1980s, as crude prices fell from the $30 range to the $10 range in 1986; they rose briefly during the first gulf war, only to settle back into the $10 range; they rose sharply between 2004 and 2007, as crude prices rose to nearly $150/barrel; they fell off sharply in the latter part of the first decade of this century; and then they rebounded in the last few years. The roller coaster path taken by crude oil prices during the 31 years in Dr. Sunding's sample is anything but the smooth, monotonic path that would be required for his time trend to capture their effect. All in all then, there are excellent reasons to believe his analysis omits important variables, which will likely undermine the accuracy of his results.[70]

D. The Tendency Toward Lower Concentration Over Time

In Section II.B of his report, Dr. Sunding alleges that deepwater leasing has become more concentrated since Anadarko was named a co-defendant. Related to this point, he infers that "less capital is flowing into the market."[71] The "market" which he evidently has in mind is the market for oil and gas production in deepwater Gulf of Mexico, which Dr. Sunding defines as

[70] In econometric parlance, his analysis suffers from "omitted variable bias." In addition, the technique he uses, "maximum likelihood estimation," is known to be problematic in small samples, such as the one used here. "There is ample evidence that the asymptotic results for these statistics are problematic in small or moderately sized samples." US_PP_MAS011866, Green, William, H. Econometric Analysis, 5th edition, 2002. At 496. See also US_PP_MAS011863, Davidson, Russell and James D. MacKinnon, Estimation and Inference in Econometrics, 1993. At 456-457.

[71] Sunding Report, at 13.

water depth in excess of 1,000 meters. This definition is more restrictive than the cutoff used by BOEM (1,000 feet). As such, it is unclear what relevance any results obtained based on his stricter definition have for the Gulf of Mexico more broadly considered.

To support his claims, Dr. Sunding points to trends in the Herfindahl-Hirschman Index, which is the widely accepted measure of concentration used by industrial economists. This claim of increased concentration is suspect, as the results I presented in my Table 5 above illustrate: concentration in Gulf of Mexico oil production has been falling steadily since 2009. Moreover, as the results I presented in my Table 3 indicate, the Gulf of Mexico lease market was no less competitive in 2013 than in 2010, which directly contradicts Dr. Sunding's argument.

As further evidence rebutting his claim, I collected information on deepwater activities over the past several years. Information related to deepwater drilling structures is available at the BOEM website.[72] These data show the number of permanent drilling platforms in water depths greater than 1,000 feet, by operator, and the number of subsea boreholes in water depths greater than 1,000 feet, by company, as of July 1, 2014.

Table 6 lists permanent drilling platforms, by company. Table 7 shows the list of subsea boreholes, by company. There were 49 permanent platforms and 298 subsea boreholes in water depths greater than 1,000 feet as of July 1, 2014. For any company, dividing the number of permanent platforms they operate by 49 yields that company's share of permanent deepwater platforms. Similarly, dividing the number of subsea boreholes for a particular company by 298 yields that company's share of subsea boreholes. The resultant shares of permanent deepwater platforms are listed in the third column of Table 6, while the shares of deepsea boreholes are listed in the third column of Table 7.

[72] *See* US_PP_MAS011897, available at http://www.data.boem.gov/homepg/data_center/other/tables/dpstruct.asp.

Armed with these market shares, it is straightforward to calculate the Herfindahl-Hirschman Indices for these two metrics of deepwater activity. I calculate the Herfindahl index for permanent platforms as 762.18 and the Herfindahl index for subsea boreholes as 745.24. These values are well below the Department of Justice cutoff value for unconcentrated markets, again indicating that concerns over high concentration in the deepwater Gulf of Mexico are unfounded.

E. Conclusion

In this part of my report I have addressed a variety of claims made by Dr. Sunding in his report. He underestimates *ex ante* damage as equaling the $4 billion paid by Anadarko in its settlement with BPXP, and he has incorrectly characterized Anadarko's relation with BPXP as that of a passive investor. As a result of these errors, he incorrectly argues that there is no economic rationale in assessing a further penalty to Anadarko. He incorrectly argues that the act of bringing suit against Anadarko led to capital flight from the Gulf. In part, this reflects technical errors in his analysis and in part this reflects over-reaching in his interpretation of the results. The technical errors stem from the fact that he did not properly take key time-varying elements into account, and from his use of an estimation technique that is ill suited to problems with small number of observations. His over-reaching in interpretation stems from his erroneous claim that changes between 2010 and 2011 can be associated with the date on which Anadarko was sued. In point of fact, there are several alternative explanations for a change in the pattern of events between 2010 and 2011, none of which have anything to do with the increase in capital costs he alleges are induced by the action against Anadarko.

Table 2: Distribution of High Bids, Lease Sale 231

Company Number	Company Name	Number of High Bids	Share of High Bids
02873	Cobalt International Energy, L.P	44	9.91%
01500	TOTAL E&P USA, INC.	44	9.91%
03238	LLOG Bluewater Holdings, L.L.C.	30	6.76%
02481	BP Exploration & Production Inc.	24	5.41%
03310	GulfSlope Energy	22	4.95%
02266	EPL Oil & Gas, Inc.	21	4.73%
01999	Houston Energy	17	3.83%
03296	Apache Shelf Exploration LLC	17	3.83%
03280	Freeport-McMoRan Oil & Gas LLC	16	3.60%
02647	Murphy Exploration & Production Company	16	3.60%
03247	Talos Energy Offshore LLC	14	3.15%
02668	Red Willow Offshore	12	2.70%
02237	Noble Energy	12	2.70%
02990	Ecopetrol America Inc.	11	2.48%
01308	Ridgewood Energy Corporation	10	2.25%
02748	Statoil Gulf of Mexico LLC	10	2.25%
02375	Energy XXI GOM	10	2.25%
02970	Castex Offshore	9	2.03%
00730	Walter Oil & Gas Corporation	8	1.80%
03295	Fieldwood Energy LLC	8	1.80%
02219	Anadarko US Offshore Corporation	7	1.58%
03228	Venari Offshore LLC	6	1.35%
02790	Focus Exploration	6	1.35%
00078	Chevron U.S.A. Inc.	6	1.35%
03201	GCER Offshore	6	1.35%
00056	ConocoPhillips Company	5	1.13%
03148	W & T Energy VI	5	1.13%
02574	CL&F Resources LP	5	1.13%
02740	Knight Resources, LLC	5	1.13%
03065	Stone Energy Offshore	4	0.90%
00689	Shell Offshore Inc.	4	0.90%
02417	Arena Energy	4	0.90%
02312	McMoRan Oil & Gas LLC	4	0.90%
03026	EnVen Energy Ventures	3	0.68%
02961	Byron Energy Inc.	3	0.68%
02361	Eni Petroleum US LLC	2	0.45%
02277	BHP Billiton Petroleum (Deepwater) In	2	0.45%
00059	Hess Corporation	2	0.45%
00276	Exxon Mobil Corporation	1	0.23%

02985	Deep Gulf Energy II	1	0.23%
03093	Bois d' Arc Exploration LLC	1	0.23%
02967	Peregrine Oil & Gas II	1	0.23%
02814	LLOG Deepwater Development Company	1	0.23%
00724	Marathon Oil Company	1	0.23%
02805	Repsol E&P USA Inc.	1	0.23%
03339	Sunrise Energy LLC	1	0.23%
02579	Tana Exploration Company LLC	1	0.23%
02917	Rooster Oil & Gas	1	0.23%

Table 6: Deepwater Drilling – Permanent Platforms as of July 1, 2014

Operator	Number of Platforms	Share
Anadarko Petroleum Corporation	7	14.29%
Bennu Oil & Gas, LLC	1	2.04%
BHP Billiton Petroleum (GOM) Inc.	2	4.08%
BP Exploration & Production Inc.	4	8.16%
Chevron U.S.A. Inc.	4	8.16%
ConocoPhillips Company	1	2.04%
Energy Resource Technology GOM, Inc.	1	2.04%
Eni US Operating Co. Inc.	3	6.12%
EnVen Energy Ventures, LLC	1	2.04%
Exxon Mobil Corporation	2	4.08%
Freeport-McMoRan Oil & Gas LLC	3	6.12%
Hess Corporation	1	2.04%
LLOG Exploration Offshore, L.L.C.	1	2.04%
MC Offshore Petroleum, LLC	1	2.04%
Murphy Exploration & Production Company - USA	3	6.12%
Noble Energy, Inc.	1	2.04%
Petrobras America Inc.	1	2.04%
SandRidge Energy Offshore, LLC	1	2.04%
Shell Offshore Inc.	7	14.29%
Stone Energy Corporation	2	4.08%
W & T Energy VI, LLC	2	4.08%
Total	49	100%

Table 7: Deepwater Drilling – Subsea Boreholes as of July 1, 2014

Company	Number of wells	Share
Anadarko Petroleum Corporation	39	13.09%
Apache Deepwater LLC	6	2.01%
ATP Oil & Gas Corporation	9	3.02%
BHP Billiton Petroleum (GOM) Inc.	20	6.71%
BP Exploration & Production Inc.	30	10.07%
Chevron U.S.A. Inc.	8	2.68%
Deep Gulf Energy LP	1	0.34%
Energy Resource Technology GOM, Inc.	10	3.36%
Eni US Operating Co. Inc.	18	6.04%
Exxon Mobil Corporation	15	5.03%
Freeport-McMoRan Oil & Gas LLC	7	2.35%
Hess Corporation	9	3.02%
LLOG Exploration Offshore, L.L.C.	10	3.36%
Marathon Oil Company	4	1.34%
Mariner Gulf of Mexico LLC	1	0.34%
Marubeni Oil & Gas (USA) Inc.	8	2.68%
Murphy Exploration & Production Company - USA	8	2.68%
Noble Energy, Inc.	5	1.68%
Petrobras America Inc.	5	1.68%
Shell Offshore Inc.	45	15.10%
Stone Energy Corporation	7	2.35%
Union Oil Company of California	5	1.68%
W & T Offshore, Inc.	9	3.02%
Walter Oil & Gas Corporation	19	6.38%
Total	298	100%

IV. Statement of Compensation

My fee is $350 per hour for expert analysis, $525 per hour for deposition testimony and $700 per hour for courtroom testimony.

V. Consideration Materials

Section V: Consideration Materials

(In addition to the documents cited in my Round 1 report and this expert report, as well as the consideration materials identified in conjunction with my Round 1 expert report)

Bates, Exhibit, TREX, or Other Description
ANA-MDL-000020295-ANA-MDL-000020297
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BP-HZN-2179MDL09240516-BP-HZN-2179MDL09240518
BP-HZN-2179MDL09240535-BP-HZN-2179MDL09240535
BP-HZN-2179MDL09240536-BP-HZN-2179MDL09240561
BP-HZN-2179MDL09240574-BP-HZN-2179MDL09240578
BP-HZN-2179MDL09240579-BP-HZN-2179MDL09240582
BP-HZN-2179MDL09240665-BP-HZN-2179MDL09240668
BP-HZN-2179MDL09240789-BP-HZN-2179MDL09240790
BP-HZN-2179MDL09240791-BP-HZN-2179MDL09240804
BP-HZN-2179MDL09240805-BP-HZN-2179MDL09240805
BP-HZN-2179MDL09241843-BP-HZN-2179MDL09241845

Section V: Consideration Materials

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Bates, Exhibit, TREX, or Other Description
BP-HZN-2179MDL09242014-BP-HZN-2179MDL09242014
BP-HZN-2179MDL09242015-BP-HZN-2179MDL09242018
BP-HZN-2179MDL09242019-BP-HZN-2179MDL09242021
BP-HZN-2179MDL09242025-BP-HZN-2179MDL09242025
BP-HZN-2179MDL09242026-BP-HZN-2179MDL09242027
BP-HZN-2179MDL09242146-BP-HZN-2179MDL09242171
BP-HZN-2179MDL09242172-BP-HZN-2179MDL09242430
BP-HZN-2179MDL09242431-BP-HZN-2179MDL09242431
BP-HZN-2179MDL09242432-BP-HZN-2179MDL09242432
BP-HZN-2179MDL09242433-BP-HZN-2179MDL09242433
BP-HZN-2179MDL09242434-BP-HZN-2179MDL09243022
BP-HZN-2179MDL09243023-BP-HZN-2179MDL09243023
BP-HZN-2179MDL09243024-BP-HZN-2179MDL09243024
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BP-HZN-2179MDL09243029-BP-HZN-2179MDL09243029
BP-HZN-2179MDL09243031-BP-HZN-2179MDL09243031
DEFEXP000870-DEFEXP000896
DEFEXP001025-DEFEXP001077
DEFEXP001118-DEFEXP001212
DEFEXP001303-DEFEXP001320
DEFEXP001340-DEFEXP001353
DEFEXP001430-DEFEXP001460
DEFEXP012596-DEFEXP012628
Deposition Exhibit 12303 A
Deposition Exhibit 12304 A
OSE048-025365-OSE048-025366
PPDEPODOC005129-PPDEPODOC005130
TREX-001243
US_PP_EXP000030-US_PP_EXP000053
US_PP_EXP000084-US_PP_EXP000084
US_PP_EXP000087-US_PP_EXP000087
US_PP_EXP000088-US_PP_EXP000088
US_PP_EXP000089-US_PP_EXP000089
US_PP_EXP000090-US_PP_EXP000090
US_PP_EXP000536-US_PP_EXP000624
US_PP_EXP001363-US_PP_EXP001444
US_PP_EXP001445-US_PP_EXP001513
US_PP_EXP001797-US_PP_EXP001916
US_PP_EXP001917-US_PP_EXP002002

Section V: Consideration Materials

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Bates, Exhibit, TREX, or Other Description
US_PP_EXP002003-US_PP_EXP002150
US_PP_EXP002232-US_PP_EXP002267
US_PP_EXP002268-US_PP_EXP002316
US_PP_MAS011561-US_PP_MAS011630
US_PP_MAS011631-US_PP_MAS011665
US_PP_MAS011666-US_PP_MAS011818
US_PP_MAS011819-US_PP_MAS011844
US_PP_MAS011845-US_PP_MAS011861
US_PP_MAS011862-US_PP_MAS011862
US_PP_MAS011863-US_PP_MAS011864
US_PP_MAS011865-US_PP_MAS011865
US_PP_MAS011866-US_PP_MAS011866
US_PP_MAS011867-US_PP_MAS011867
US_PP_MAS011868-US_PP_MAS011878
US_PP_MAS011879-US_PP_MAS011882
US_PP_MAS011883-US_PP_MAS011886
US_PP_MAS011887-US_PP_MAS011890
US_PP_MAS011891-US_PP_MAS011893
US_PP_MAS011894-US_PP_MAS011896
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US_PP_MAS011902-US_PP_MAS011902
US_PP_MAS011903-US_PP_MAS011904
US_PP_MAS011905-US_PP_MAS011909
US_PP_MAS011910-US_PP_MAS011910
US_PP_MAS011911-US_PP_MAS011911
US_PP_MAS011912-US_PP_MAS011913
US_PP_MAS011916-US_PP_MAS011916
US_PP_MAS011917-US_PP_MAS011928
US_PP_MAS011929-US_PP_MAS011929
US_PP_MAS011930-US_PP_MAS011939
US_PP_MAS011940-US_PP_MAS011941
US_PP_MAS011948-US_PP_MAS011948
US_PP_WAL001596-US_PP_WAL001764
US_PP_WAL002955-US_PP_WAL002975
US_PP_WAL003609-US_PP_WAL003614