# Do Catch Shares Increase Prices? Evidence From U.S. Fisheries

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**ABSTRACT:**

Rights-based management of fishery resources theoretically allows firms to minimize the cost of extraction without the threat that other harvesters will take their allocations, but added flexibility also allows firms to exploit revenue margins such that firms balance potential revenue gains with potential cost savings. Using two approaches, difference-in-differences with an index of seafood prices and synthetic control, we test for revenue gains in 39 U.S. fisheries that adopted market-based regulations and find mixed evidence of price increases. Species with price increases tend to have viable fresh markets or other features that discourage gluts, whereas species with price decreases plausibly have more to gain on the cost side or are part of a multispecies complex with a higher-value species experiencing a price increase.

**JEL Codes:** Q22, Q28, Q52

**Key words:** catch shares, fisheries, rights-based management

**Short title:** Do catch shares increase prices in U.S. fisheries?

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Catch shares are a form of rights-based management that theoretically can produce cost savings and revenue gains. In contrast to rights-based systems, industry-wide caps and input controls can trigger economically costly overcapitalization and races to fish (Birkenbach et al., 2017; Homans and Wilen, 1997; Wilen, 2006). Catch shares, which typically allocate quotas to individuals or small groups, provide participants with a secure right to a share of the total allowable catch each season. Removing input controls allows harvesters to meet the same target catch at lower cost, and, when trading is allowed, low-cost firms can accumulate more quota over time and eliminate redundant fishing capacity (Grafton et al., 2000; National Research Council, 1999; Weninger, 1998).

Although the literature has emphasized cost savings and reductions in overcapitalization, the flexibility of catch shares also allows fishers to exploit revenue margins (Grafton et al., 2000; Homans and Wilen, 2005; Wilen, 2006; Birkenbach et al., 2016). Revenue gains in fisheries could result from improved market timing, changes in the mix between lower-value frozen and higher-value fresh products, or changes in product quality facilitated by longer fishing seasons or other behavioral changes. Homans and Wilen (2005) showed that, in the absence of catch shares, competition among fishing vessels concentrates landings in a short pulse. These short fishing seasons constrain development of a higher-value fresh fish market and encourage expansion of a lower-value frozen market supplied with fish inventoried during the constrained season. Homans and Wilen (2005) theorized that, by removing racing incentives, catch shares alleviate gluts and thus increase the quantity of product directed towards higher-value fresh markets.[1] In addition, revenue-side gains may result from fishers' greater ability under catch shares to time their catch to market demand. They can land catch when prices are high, for example when competing fisheries are closed or during periods of relatively high demand (e.g., tourist season or holidays). Reduced racing may also lead to better quality fish—and thus higher prices—through more careful handling.

The extent to which revenue gains materialize is an empirical question because firms regulated with catch shares balance potential revenue gains with potential cost reductions. If behavioral changes that lead to cost reductions and revenue gains are reinforcing, both could occur. If they are offsetting, revenues might not change or could even decrease. These possible outcomes stem from the fact that firms managed by output controls may be constrained along both revenue and cost margins. Harvesters ideally want to fish in low-cost periods and exploit high-value markets, but command-and-control regulations do not allow them to time their fishing optimally. With the added flexibility of catch shares, firms can reduce costs, increase revenues, or possibly both by shifting production over time.

Three stylized scenarios provide our conceptual framework and reinforce the need for empirical testing of revenue gains. First, as in Homans and Wilen (2005), the race to fish steers potentially high-value fresh product into the low-value frozen market. Eliminating the race to fish increases the share of high-value product, raising the price. Similarly, the ability to exploit high late-season demand (that might otherwise have been unsatisfied due to early fishing closures) or to fish more carefully to avoid damage can also fetch a price premium. Two hypotheses are implicitly presented in Homans and Wilen (2005): 1) catch shares decompress the season, and 2) decompression leads to higher per-unit prices and thus revenues. There is strong empirical support for the first hypothesis (Birkenbach et al., 2017), and an examination of the second hypothesis is the subject of this paper.

Second, catch shares tend to lead to no change or a negative change in price for fisheries with pronounced spawning aggregations during the fishing season. The logic here is that racing incentives generated by non-catch share management might prevent the fleet from fishing during a period of enhanced stock availability and associated lower costs. This would be true if, for instance, there were a race to fish that unfolded before the spawning season (Birkenbach et al., 2020). Catch shares would then allow the fleet to fish more intensively in the low-cost period. If most of the fish was destined for the frozen market anyway—such as the case of saithe in Norway—catch shares would have no effect on price, *ceteris paribus.* But if the behavioral change triggered a glut in the fresh market during the spawning season, we would expect lower prices, indicating that firms were willing to sacrifice some revenues for greater savings on the cost side.

Third, multispecies dimensions of the fishery can give rise to mixed revenue outcomes within the multispecies complex. The mechanism is substitution of effort by individual vessels among species within the complex. In many U.S. catch share fisheries (e.g., New England groundfish or West Coast groundfish), fishers can catch multiple species and thus respond to multiple profit margins. Incentives to spread out harvesting of one species may cause a substitution of effort away from another species, compressing its season (Birkenbach et al., 2020). Elongating one season and compressing another could lead to a price increase for the former and a price decrease for the latter based on the same mechanism proposed by Homans and Wilen (2005).

In this paper, we systematically evaluate the evidence for ex vessel price[2] changes—as a proxy for revenue-side benefits—in 39 U.S. fisheries that transitioned to catch share management. Using two approaches, difference-in-differences with an index of seafood prices and synthetic control, we find mixed evidence of price increases. Species with price increases tend to have viable fresh markets or other features that discourage gluts, whereas species with price decreases plausibly have more to gain on the cost side or are part of a multispecies complex with a higher-value species experiencing a price increase.

We begin with a brief literature review of market-based regulation in fisheries and recent work using quasi-experimental methods to examine fisheries policies. Next, we provide a description of our data sources and empirical methods. We then present and synthesize results across methods and discuss the extent to which the combined results support our conceptual framework, offering alternative explanations for notable results that do not. Finally, we discuss broader data and methodological issues that our empirical analyses bring to light.

## LITERATURE REVIEW

Revenue impacts of catch shares have not previously been studied systematically, although there is evidence for their existence. Grafton et al. (2000) reported that the implementation of the British

Columbia halibut individual vessel quota (IVQ) program in 1991 increased ex vessel prices by 22% to 34%. Casey et al. (1995) found that the same program stretched the price premium of British Columbia halibut over Alaskan halibut from 15% to 70%. Wholesalers were able to sell 94% of their catch to the fresh market, compared to 42% before catch shares. Alaskan halibut, which did not come under catch share management until later, continued to be sold frozen. Price increases were similarly seen after the introduction of the Northeast General Category Atlantic Sea Scallop Individual Fishing Quota (IFQ) Program: a 31% increase in the first year of the program relative to the 3 years prior to implementation. Increases also occurred in the Mid-Atlantic Golden Tilefish IFQ Program (8%), Northeast Multispecies Sector Program (7% on average for groundfish), and the Pacific Coast Sablefish Permit Stacking Program (55%) (Brinson and Thunberg, 2013). Another data point comes from the 2009 introduction of catch shares in the Peruvian anchoveta fishery, the largest fishery in the world by volume. Average prices increased by 37%, the season length increased from approximately 50 days to over 100 days, and the average quality of the anchovy meal improved, all within 1 to 2 years of IFQ introduction (Tveterås et al., 2011). In the same fishery, Kroetz et al. (2019) found a 105% increase in per-unit revenue associated with implementing IVQs and the switch toward higher-value products. Similarly, Kroetz et al. (2017) showed that the Chilean jack mackerel fishery produced higher-value products and higher revenues after individual tradable quotas were adopted. Many of these fisheries operated under derby conditions (i.e., compressed seasons) prior to program implementation.

These examples are consistent with the mechanism proposed by Homans and Wilen (2005). Yet, while suggestive, this evidence is based only on the affected fisheries (i.e., before-after comparisons), and factors besides the management change can influence outcomes concurrently. Such factors include changes in the supply of substitutes, seasonal variation in demand and supply, demand shifts, environmental shocks, and technological change. By contrast, we compare each catch share ("treatment") fishery to a counterfactual ("control"). Our analyses include most U.S. fisheries that have adopted catch shares, and our set of 39 treated fisheries matches those for which season length results were reported in Birkenbach et al. (2017).

The literature using quasi-experimental methods to evaluate fisheries policies has grown significantly in recent years. Most studies focus on individual fisheries (Smith et al., 2006; Abbott and Wilen, 2010; Reimer and Haynie, 2018), with a lot of recent work specifically designed to evaluate the consequences of implementing catch shares (Scheld et al., 2012; Kroetz et al., 2015; Cunningham et al., 2016; Pfeiffer and Gratz, 2016; Hsueh, 2017; Ardini and Lee, 2018; Pfeiffer et al., 2022; Pincinato et al., 2022). Only a handful of published quasi-experimental studies are comparative across many fisheries (Costello et al., 2008, 2010; Birkenbach et al., 2017; Sakai, 2017; Erhardt, 2018; Isaksen and Richter, 2019), and none have evaluated the revenue impacts of catch shares.

## METHODS

We estimate the impacts of catch shares on ex vessel prices using two different methods: 1) difference-in-differences (DID) using the Fish Price Index (FPI) and 2) synthetic control models (SCM) using other U.S. fisheries as potential donors. Based on empirical information and institutional knowledge, we drop fisheries from each analysis that do not meet pre-specified criteria. We also use empirical information and institutional knowledge to customize the synthetic control analysis for each fishery. Both analyses use three-year (36-month) windows before and after the implementation of catch share management in the treated fishery.

### DATA

Monthly U.S. landings data are available for the years 1990 to 2016.[3] For both methods, we began with a master list of U.S. catch share fisheries. We calculated average ex vessel price per pound from total landed quantity and total value by month, species, and management region. In cases where multiple species were grouped together, we generated an average per-pound ex vessel price across the included species, weighted by pounds landed. Four Alaskan programs were excluded due to lack of temporal resolution: the American Fisheries Act Pollock Cooperative, the Bering

Sea and Aleutian Islands Crab Rationalization Program, the Non-Pollock Trawl Catcher/Processor Groundfish Cooperatives (Amendment 80), and the Central Gulf of Alaska Rockfish Cooperatives Program only have annual data available in the relevant time windows, leaving insufficient observations to conduct inference. We also excluded the South Atlantic wreckfish quota program due to confidentiality issues resulting from small numbers of vessels/dealers in the relevant years.[4] This left us with a set of 39 treated fisheries that matches those analyzed in Birkenbach et al. (2017). Online appendix table A.1 provides a summary of included programs and species. Descriptions of programs and the management regimes that preceded them are presented in online appendix B.[5]

The treated fisheries in our sample represent a wide range of species and fishery types. Online appendix table A.2 provides summary statistics on their sizes in terms of yearly landings and value, as well as average prices. The largest catch share fisheries in our sample by pre-catch share volume are Pacific whiting, Alaskan halibut, and Alaskan sablefish. The largest by pre-catch share value are Alaskan Pacific halibut, Alaskan sablefish, and Atlantic cod.[6] Although the top volume and value lists do not entirely coincide, Alaskan fisheries dominate both. However, many of the largest Alaskan fisheries, such as Alaskan pollock, do not have monthly data available and are excluded from our analysis. On a per-pound basis, Atlantic scallop, Gulf of Mexico gag, and Gulf of Mexico other shallow water groupers command the highest prices. Heterogeneity in price spans nearly two orders of magnitude with a pre-treatment price per pound of $7.16 for scallop and $0.10 for Pacific whiting (2015 dollars). A challenge in this analysis is development of an empirical strategy that can a) identify treatment effects at varied scales and b) allow for comparison of treatment effects across fisheries.

For our DID model, we use the Fish Price Index (FPI) (Tveterås et al., 2012) as the counterfactual. Figure 1 plots the FPI along with indexed prices for our 39 treated fisheries. For our synthetic control analyses (Abadie et al., 2010), we construct a set of candidate controls for each fishery. At the broadest level, the donor pool includes all of our 39 catch share fisheries, as well as the top 50 non-catch share fisheries in the United States (based on 2010 value).[7] In addition to collecting ex vessel prices, we compile covariates for both treated and control fisheries, including regional monthly economic time series—food CPI, per-capita income, and average employment rate—as well as species-specific variables, including monthly share of annual landings and imports and exports expressed as a proportion of U.S. landings for that species. Summary statistics for the synthetic control analyses can be found in online appendix table A.3.

## EMPIRICAL STRATEGY

### *Difference-in-Differences (DID)*

We estimate DID for each of our treated fisheries using Fish Price Index (FPI) for capture fisheries as the counterfactual. The FPI is an index of global seafood prices developed for the Food and Agriculture Organization (FAO) of the United Nations to track broad trends (Tveterås et al., 2012). It incorporates international trade data for a wide range of whitefish, salmonid, crustacean, pelagic, mollusk, and other species. The counterfactual in the FPI analysis is based on temporal specificity. That is, treated fishery prices are compared to counterfactual FPI in periods prior to and after the individual fishery's policy treatment. Identification thus relies on the notion that the (indexed) treated fishery price would otherwise track global price trends.

A number of features of seafood markets and seafood data support using FPI as a counterfactual to identify the effects of policy changes on seafood prices. First, seafood markets are highly integrated, and many studies find strong support for the Law of One Price (Jensen, 2007; Smith et al., 2017). Empirical studies demonstrate market integration for wild-caught and farmed fish such as salmon (Asche et al., 1999), different size classes of the same species such as Gulf of Mexico brown shrimp (Smith et al., 2017), different species and country of origin within a similar market such as warm-water shrimp (Petesch et al., 2021), and many different species within a broad market category such as whitefish (Asche et al., 2004). Recent evidence also shows that the FPI is cointegrated with tilapia prices in an inland fish market in Namibia with no direct links to coastal seafood markets nor to any of the trading partners on which the FPI is based (Bronnmann et al., 2020). Second, and related, the international trade in seafood is large and a dominant feature of seafood markets. Tveterås et al. (2012) estimate that between 53% and 98% of seafood is exposed to international trade competition. Moreover, many seafood products are traded internationally multiple times through re-exports and can be combined with other species or products from other regions in the process (Asche et al., 2022). High levels of trade, widespread exposure to trade competition, and mixing of species in processing and re-exporting all reinforce the likelihood that the global market drives seafood prices to a large extent. Third, when the FPI is decomposed into sub-indices, including farmed and wild and prices for individual continents, the sub-indices also tend to move together in the long run (see Figures 7 and 8 in Tveterås et al., 2012). All of these points support the presumption that, absent evidence to the contrary, prices of individual seafood products in the long run will tend to move with the global seafood market, and, to our knowledge, the FPI is the most rigorous and comprehensive index of that market.

Using the FPI as a control also minimizes the potential for interference, as none of our 39 fisheries is large enough to move the entire global seafood market. By contrast, interference would be a substantial concern if one were to use individual control fisheries because markets for similar seafood products may be integrated (Ferraro et al., 2019), and a higher price in the treatment fishery could have spillover effects on the control fishery's prices. In studying season lengths, Birkenbach et al. (2017) are able to use matched control fisheries because geographic separation and regulatory constraints, such as limited entry, mitigate interference among fishing vessels that might otherwise participate in both the treatment and control fisheries. But these same barriers do not buffer against potential interference in markets, which is likely tied to the size of the treated market relative to the control and the other markets with which the control interacts.

Our empirical specification is:

$$PriceIndex_{tk} = \alpha + \beta_1 POST_t + \beta_2 TREAT_k + \beta_3 POST_t * TREAT_k + \theta_m + \epsilon_{tk} \tag{1}$$

$PriceIndex$ is average ex vessel price per pound for month-year $t$ and treatment status $k$, indexed to the first month-year in each fishery's analysis window ($t = 0$). On the control side, the left-hand side variable is already an index, so we divide the series by its value in $t = 0$ to re-index it to the same base month-year as the treatment price series. $POST$ and $TREAT$ are binary variables indicating that an observation occurs after catch share implementation and belongs to the treatment fishery, respectively. We also include month fixed effects ($\theta_m$) to control for seasonal factors that are common across treated and control units. The treatment effect is the DID estimator, $\beta_3$.

We estimate our models monthly rather than annually, as this provides more observations and allows us to specify the timing of the policy change more precisely (mid- calendar year, for instance). Standard errors for monthly models are estimated with both Huber-White and Newey-West variance estimators. The former is consistent in the presence of heteroskedasticity, and the latter, which we use with a 12-month lag, is consistent in the presence of both heteroskedasticity and autocorrelation and thus could be interpreted as more conservative.

Before presenting results, we evaluate whether each fishery DID model is well identified by conducting parallel trends tests and falsification tests. Parallel trends testing is intended to assess whether the treatment and control are driven by the same underlying forces, whereas falsification testing examines whether there is some other explanation besides treatment for effects observed on the treated units (St. Clair and Cook, 2015; Le Moglie and Sorrenti, 2022; Cunningham, 2021). In many empirical settings, multiple treatment and control units are observed over time before and after treatment, and the corresponding parallel trends and falsification tests rely on the same sources of within-period variation. Consequently, the tests appear similar despite having different rationales. They typically include visual inspection of event study diagrams and formal testing for departures from a trend (or differences between treatment and control) in individual periods pre-treatment (Steinmayr, 2021; Le Moglie and Sorrenti, 2022). In our empirical setting, however, this approach is not possible because we have no within-period variation. Indeed, a limitation of using publicly available data is that, for a given fishery, we only have one observation in each period (month), and the same is true for the FPI control. Although each observation for a treated fishery or for the FPI comprises hundreds or thousands of underlying data points, we do not directly observe these points; thus, as a practical matter, variation in our data comes only from observing multiple time periods.

Given these data limitations, we formulate a simple parallel trends test that can be used in our setting. Specifically, we test for the treatment and control time series having the same linear trend pre-treatment. To that end, we first remove seasonality by regressing the series (pre-treatment only) on monthly indicators. We then regress the residuals ($\epsilon$) in the pre-treatment period on treatment status $TREAT_k$ and linear time trend $TIME_t$ and test the restriction that $\beta_3 = 0$:

$$\epsilon_{tk} = \beta_0 + \beta_1 TREAT_k + \beta_2 TIME_t + \beta_3 TIME_t * TREAT_k \tag{2}$$

Because we are testing a linear restriction on a linear model, we report the $p$-value from an F test, although the t-statistic on $\beta_3$ gives an equivalent result. While we cannot conduct the more standard testing and visual inspection of event study plots, our linear trends test is based on 36 de-seasonalized periods, which is far more than the typical handful of periods pre-treatment (Roth, 2022). Based on the F-statistics, four fisheries fail the parallel trends test ($p < 0.05$): New England pollock, Pacific cod, Pacific whiting, and Alaska sablefish. These tests suggest that the prices in these fisheries were not driven by the same underlying forces as the FPI in the periods leading up to treatment. We drop these fisheries from subsequent DID analyses using the FPI. Three other fisheries, fixed gear-caught Pacific sablefish, Pacific yelloweye rockfish, and Alaska Pacific halibut, have $p$-values less than 0.10. The results are presented in online appendix table A.4.

We next conduct a falsification (placebo) test for each of the remaining 35 fisheries. Our test is distinct from parallel trends, can be estimated on data without within-period variation, and is intended to rule out the possibility that some other factor prior to treatment caused the effect that we observed. To this end, we place the placebo treatment 12 months prior to the actual treatment and shift our analysis window accordingly such that the last 12 months of post-treatment data are dropped and replaced with the 12 months of data between placebo and actual treatment. Again, we cannot do what is more common in the literature by randomly assigning treatment to a period in the past and looking at the instantaneous effect. The choice of 12 months is also meant to address data limitations: if we place the placebo further back in time, we run low on data pre-treatment, and if we place the placebo closer to the actual time of treatment, we end up with a sample that is almost the same as the one used to estimate the treatment effect.

The interpretation of our non-standard falsification test is debatable. In the spirit of falsification testing, we place the placebo treatment earlier in time to rule out a cause from the past giving rise to the observed effect. However, in our setting, because we know that treatment with catch shares sometimes leads to season expansion (the standard story) and sometimes to season contraction (the counterexample that can be explained by multispecies targeting), the expected treatment effect for prices could be positive or negative. This feature of our study creates ambiguity in interpretation of placebos placed in the pre-treatment period. If the treatment effects were always the same sign, there would be no ambiguity.

To address this ambiguity, we code the results of falsification testing as follows: 1) if the falsification test is not significant, the fishery passes the test; 2) if the falsification test is significant and the same sign as a significant treatment effect, the fishery fails the test; 3) if both the falsification test and the treatment effect are significant but have opposite signs, we code the result as ambiguous; and 4) if the falsification test is significant but the treatment effect is not, we also code the result as ambiguous. This coding allows us to summarize our results to include only those that (unambiguously) pass and those that (unambiguously) do not fail.

The results and codings for our falsification tests appear in online appendix table A.4. Using Huber-White standard errors, 13 fisheries unambiguously pass, 6 unambiguously fail, and the remaining 16 of 35 fisheries are coded as ambiguous. With Newey-West standard errors, 20 fisheries unambiguously pass, 2 unambiguously fail, and the remaining 13 of 35 fisheries are coded as ambiguous. Table 1 reports treatment effects for both types of standard errors after excluding fisheries that fail parallel trends and unambiguously fail our falsification test.

*Synthetic Control Models (SCMs)*

Synthetic control methods use design-based inference, in contrast to sampling-based inference such as our DID model, to construct a counterfactual. The rationale is that some weighted combination of data series chosen in a data-driven manner may represent the counterfactual better than an analyst-chosen individual control data series or control group. SCMs also allow the analyst to include covariates besides the outcome variable that directly affect the construction of the synthetic control and do not simply shift the regression lines. These covariates are typically based on structural knowledge of the application. In our setting, the ability to combine potential donors is important because, for example, Atlantic cod may have a similar price point to summer flounder, but it might resemble Pacific cod more in the product forms in which it is consumed.

There are a number of issues to address in order to design and customize the synthetic control analysis for each of our treated fisheries. We begin our analysis with a set of possible control fisheries in the donor pool that includes all 39 of our treated fisheries and the top 50 non-catch share U.S. fisheries by value that have monthly data available (88 potential donors for each treated fishery). This set of 50 additional fisheries ensures that we have a large number of potential donors. The fact that they are large fisheries helps to guard against price interference from the treated fisheries.

The SCMs employ moving average prices from all 36 pre-treatment months (constructed from five monthly lags and the current price, uniformly weighted), as well as a 12-month lag of the moving average price, as covariates in the matrix of predictors used to determine the weights associated with each fishery in the donor pool.[8] Unlike in the FPI analysis, we have actual prices rather than price indices for the control side; thus, there is no need to index treatment fishery prices. Furthermore, by leaving prices at their absolute levels, we deliberately promote the selection of control donors that are comparable in terms of value, whereas the FPI analysis involves no such matching process. By contrast, indexing prices would make dissimilar fisheries—and dissimilar seafood markets—appear more alike than they are.

As additional predictors, we use monthly covariates that could influence prices structurally for each treated and potential donor fishery. The regional time series—food CPI, per-capita income, and average employment rate—proxy for the influence of prices of substitutes and income on ex vessel price. The species-specific monthly share of landings relates potential donors and their season compression to the season compression (or decompression) in the treated fisheries. The import variable proxies for the extent of competition from imports, while the export variable proxies for the extent of the export market and the potential for demand outside the U.S. to influence price.

We customize the set of fisheries analyzed, the associated donor pools, and selection of covariates according to heuristics described in Abadie (2021), which lists contextual factors that affect the ability to use SCMs to estimate causal effects. First, size of the effect relative to the volatility of the outcome is important, which applies to causal inference in general. In our case, we do not have *ex ante* expectations about the effect size, and indeed we expect that some fisheries would have a null effect or even a negative effect. As such, we can only assess this contextual factor *ex post*, which we do in the Discussion section.

Second, synthetic control requires availability of a comparison group, a generic requirement for causal inference. In our setting, this means that we need to include candidate control fisheries in the donor pool that were not treated with catch shares during the period of analysis. Thus, we customize each treated fishery donor pool to exclude all potential donors that were treated with catch shares within three years before or after the treated fishery's catch share implementation date. This step implies that many of our treated fisheries drop out of the donor pool for other synthetic control analyses—for example, Gulf of Mexico red grouper drops out of the donor pool for New England Atlantic cod because both were treated in the same year—but the 50 non-catch share fisheries always remain.

Third, identification requires that anticipation of the treatment does not significantly affect the outcome variable. The concern is that behavioral changes made in response to the announcement of a move to catch share management could induce landings of more or less fish (e.g., to influence future quota allocation) and drive prices down or up in the pre-treatment period. In our case, all 39 treated fisheries were regulated prior to catch shares (online appendix B), and various input and output controls limited fleets' ability to adapt to the anticipated policy in the pre-treatment period. Although this does not guarantee the absence of anticipation effects, it suggests that they are likely to be small if they exist at all.

Fourth, as in any causal model, non-interference is required. Our selection of large fisheries in the overall donor pool reduces the risk of interference because treated fisheries would have to move sizable markets. This is also the reason that we do not include a larger list of potential donors extending to small fisheries. To further address possible interference, we customize the donor pool for each treated fishery by excluding all potential donors from the same region. For example, analyses for Gulf of Mexico red snapper and grouper/tilefish catch shares exclude the three large Gulf of Mexico shrimp fisheries (brown, white, and pink). The rationale behind this exclusion is that, despite the wide difference in product types, the importance of seafood for tourism and local specialty foods, as well as other local economic conditions, could induce a shared price determination process. We also exclude potential donors of same species in another region, again due to the possibility of shared price determination. For example, Pacific sablefish is excluded from the Alaskan sablefish donor pool.

Fifth, the convex hull condition requires "that a combination of units in the donor pool may approximate the characteristics of the affected unit" Abadie (2021). As in Abadie et al. (2010), our use of lagged prices as covariates in the synthetic models means that we will have difficulty finding appropriate donors for treated fisheries with price extremes. Thus, to ensure that the convex hull condition holds, we first drop fisheries in the price tails. These include arrowtooth flounder and Pacific whiting on the low end and Atlantic sea scallop on the high end, leaving 36 fisheries. Next, we customize the covariate selection to ensure that we do not introduce extremes through the other covariates. Most relevant is that 7 of our 36 fisheries have no exports throughout the sample period. For these fisheries we drop the export share covariate in the SCMs accordingly (all have imports). All other SCMs include both import and export share covariates.[9]

Lastly, the time period of analysis must include a sufficiently long post-treatment window for any price treatment effect related to catch shares to materialize. Our choice of three years reflects a tradeoff between observing for a plausibly long enough time for behavioral changes to show up in markets and restricting the time horizon to avoid subsequent important confounding policy, environmental, or market shocks.

The components of the synthetic control for each of our 36 treated fisheries are summarized in online appendix table A.5. To generate the point estimates found in Table 1, we take the mean of the difference between the treated fishery price and the synthetic control price across each of the 36 months following catch share implementation.

Following Abadie et al. (2010), we perform placebo/falsification tests that replace the true catch share fishery with each of its donor controls in turn. We repeat the synthetic control routine for each control as if it were the treatment fishery, expecting to see post-intervention outcomes that are generally less extreme than that of the true treatment fishery. Online appendix figure A.1 shows the results of these placebo tests. In each graph, the placebos cluster around the outcome of the treated fishery pre-treatment and fan out post-treatment. However, the graphs appear qualitatively different for the results that are statistically significant compared to the null findings. For significant results, we see the thick black line representing the treated fishery is above (positive effect) or below (negative effect) most or all of the placebo controls. For insignificant results, the thick black line tends to be in the middle of the placebo controls.

Inference regarding the significance of the effect of the treatment on the true catch share fishery is based on the magnitude of the effect observed relative to the distribution of effects observed in the placebo tests. To ensure a fair comparison, however, we first make a correction following Abadie et al. (2010) to exclude placebo tests in which a synthetic control is not able to fit the pre-treatment trajectory of the outcome variable sufficiently well. This correction relies on the mean squared prediction error (MSPE) test statistic, defined by the authors as the average of the squared differences between the treated unit's outcome and its synthetic counterpart over the same pre-intervention period. Thus, a small MSPE indicates a good pre-treatment fit between the treated unit and the synthetic control. In order to avoid mischaracterizing a poor pre-treatment fit as a large post-treatment effect, we apply MSPE-based cutoffs to our placebo tests.

Following Abadie et al. (2010), we test different cutoff values, including 1.5, 2, and 5. We report results from the most conservative of these cutoffs (5), which drops placebos for which the pre-intervention MSPE is at least five times higher than that of the true treated unit and its synthetic control. Thresholds lower than five remove more placebos such that some of our fisheries are left without any, and thresholds larger than five do not preserve significantly more placebo tests.

Next, following Abadie (2021), we compute $p$-values for our treatment effects under the null hypothesis of zero effect. This involves calculation of the ratio of the post-treatment root MSPE (RMSPE) to that of the pre-treatment RMSPE for each unit and placebo unit for a given fishery. $P$-values are obtained, in short, by tallying the number of placebo tests for which the placebo's ratio was greater than that of the treated unit's and scaling this count by the total number of placebo tests (following the filtering process described above). All else equal, smaller $p$-values therefore result when a) discrepancies between the treated unit's outcomes and those of its synthetic control were large in the post-treatment period relative to the pre-treatment period; b) there are less extreme discrepancies between pre- and post-treatment fit for the placebo units; and/or c) a larger number of surviving placebo tests improve confidence.

## RESULTS

The DID analysis using the FPI shows mixed evidence of price changes after treatment with catch shares, but more fisheries have positive effects than negative effects (Table 1). Figure 1 depicts indexed prices and the FPI for each treated fishery. Based on Huber-White (i.e., robust) standard errors, of the 29 fisheries that pass parallel trends tests and whose placebo falsification tests are coded "pass" or "ambiguous," 20 have positive treatment effects with 12 being statistically significant at the 5% level. Nine of the 29 fisheries have negative treatment effects, with 5 being statistically significant at the 5% level. Based on Newey-West standard errors, of the 33 fisheries that pass parallel trends tests and whose placebo falsification tests are coded "pass" or "ambiguous," 20 have positive treatment effects with 5 being statistically significant at the 5% level. Thirteen of the 33 fisheries have negative treatment effects, wifth 5 being statistically significant at the 5% level.

Most of the positive treatment effects are associated with economically important species, both in terms of high unit value and high volume (e.g., Pacific halibut and Atlantic sea scallop). Most of the negative treatment effects are associated with New England groundfish that are less economically important species than Atlantic cod and haddock—that is, lower in total value due to low volume, low unit price, or both. Indeed, four of the five negative and significant treatment effects (using Huber-White standard errors) are white hake, winter flounder, witch flounder, and yellowtail flounder. The fifth negative result is Pacific yellowtail rockfish, which is economically unimportant and one of many species in a multispecies groundfish complex on the West Coast.[10] A similar pattern is seen using Newey-West standard errors.

Many of the species with positive price treatment effects also experienced longer seasons due to catch shares, as suggested by Homans and Wilen (1997, 2005). To illustrate this, Table 1 presents season length treatment effects from Birkenbach et al. (2017) side by side with the price treatment effects from the FPI DID analysis. Importantly, the use of Gini coefficients to measure season compression in Birkenbach et al. (2017) means that a negative result indicates a longer season.[11] As predicted by the theory, the season length results in Table 1 mostly have the opposite sign from the DID results in the second column.

To explore this in more depth, we run a Monte Carlo simulation of the correlation between season length treatment effects from Birkenbach et al. (2017) and price treatment effects from the FPI DID. The Monte Carlo accounts for sampling error in the estimation of both treatment effects: for each run (of $N = 1,000$ runs), we draw with replacement a set of 29 season length treatment effects and 29 price treatment effects (using each fishery's means and associated standard errors) and compute the correlation between them. These correlations are calculated separately for the two sets of FPI DID results in Table 1—those using Huber-White standard errors and those using Newey-West standard errors—with results shown in the left and right panels, respectively, of Figure 2. The preponderance of negative correlations in both panels supports the theory that longer seasons enhance opportunities to exploit revenue margins that tend to translate into price increases. Homans and Wilen (2005) motivate this with the ability to supply fresh rather than frozen fish for more of the year. Lengthening the season can also allow vessels to take shorter trips that leave fish in the hold for a shorter time, to pack fish less densely, or to otherwise reduce the damage to fish that occurs under derby conditions. These mechanisms are not mutually exclusive, and all could contribute to the association of lengthening seasons with price increases.

The synthetic control analysis also yields mixed evidence of price changes, with even fewer fisheries that are statistically significant. Of the 36 price treatment effects estimated, 15 are positive, with only 2 (red snapper and yelloweye rockfish) that are statistically significant at the 5% level. Twenty-one fisheries have negative effects, with only three (gag, red grouper, and other shallow water grouper) that are significant at the 5% level. It is important to note that statistical significance—and the conventional but arbitrary 5% cutoff—is not directly comparable across model types because synthetic control inference is design-based (using permutations of potential donors to the control), whereas inference in the FPI DIDs is based on sampling error. But even if we use a 10% cutoff in the SCMs, the set of significant positive and negative results only expands to five and four fisheries, respectively. Importantly, three of the five positive results are economically important species (haddock, red snapper, and sablefish in Alaska), while the negative results are Gulf of Mexico groupers, which we discuss in more detail below. The correlation of the SCM treatment effect point estimate with the season length treatment effect for the 36 fisheries is -0.134, which is consistent with the findings in Figure 2. We do not have standard errors based on sampling error in the SCMs and, as a result, do not conduct a similar Monte Carlo analysis as in Figure 2.

Although the FPI DID and the SCM are very different methods with fundamental differences in their approach to statistical inference, we compare point estimates for overlapping fisheries in both analyses to see if results appear similar. We convert our treatment effects to percentage changes because the dependent variables are scaled differently in the two analyses. Then we plot the results (Figure 3) and include 26 of the 27 overlapping fisheries, noting that the FPI result for Pacific halibut is an outlier. Most (17 of 26) results fall in the lower-left and upper-right quadrants for which results are similar—at least qualitatively—and mostly clustered around the 45-degree line.

The different methods that we use also allow for different types of post-estimation analysis. The treatment effect in the DID is parametric, whereas the treatment effect in the synthetic models averages the difference between the synthetic control and the actual treated unit in the post-treatment period. This allows us to explore visually how the negative treatment effects for groupers in the Gulf of Mexico unfold over time. Figure 4 shows the results for deep water grouper, gag, other shallow water grouper, and red grouper. Catch shares went into effect in January 2010. In all four cases, treatment fishery prices began to rise above the synthetic control prices until April 2010, when the Deepwater Horizon oil spill occurred. Although the timing differs across these four fisheries, the synthetic control rises above the treated fishery in the months following Deepwater Horizon. Had we ended our post-treatment period in April 2010, the point estimates would have all been positive, but averaging across the entire three-year post-treatment period yields four negative point estimates. The path of the treatment and synthetic control at the end of the post-treatment period is also consistent with our interpretation. As time elapsed after the Deepwater Horizon spill, the gap between the treatment and synthetic control eventually began to close, suggesting that the market effect of the spill was temporary.

Our results suggest that in many cases treatment with catch shares has no statistically significant effects on prices. Considering statistical significance at the 5% level, our dominant finding from the SCMs is a null result (31 of 36). Even using Huber-White standard errors (rather than Newey-West), a large portion (12 of 29) fisheries in the FPI DID show null effects. The idea that catch shares generate substantial revenue gains appears to be a possibility but not the rule. To assess the overall economic importance of revenue margins in catch share fisheries, it is important to consider the magnitudes of prices changes and confidence intervals, as well as the scale of each fishery.

In Table 2, we compile yearly revenue changes from adopting catch shares broken out by fishery, empirical method, regional totals, and grand totals. The point estimate for the FPI DID grand total across 29 fisheries (the ones that pass parallel trends and whose falsification tests are coded as "pass" or "ambiguous") is \$38.3 million, roughly 17.9% of annual pre-catch share revenues for the associated fisheries. This amount is economically significant. However, accounting for sampling error, the 95% confidence interval is very wide (\$17.2 million to \$59.4 million using Huber-White standard errors. When using Newey-West standard errors, the confidence intervals for individual fisheries and set of fisheries changes such that the point estimate is \$37.7 million (17.3% of associated revenues), and the confidence interval ranges from -\$2.0 million to \$77.5 million. Notably, with Newey-West standard errors, the confidence interval for the grand total includes a null effect. The possibility of no effect on revenues in total for large-scale adoption of catch shares is an important consideration for policymakers. When we consider only fisheries that pass parallel trends and unambiguously pass our placebo falsification test, the ranges of both confidence intervals are strictly positive, and the percentage revenue gains based on the point estimates are slightly higher (23.8% for Huber-White and 19.0% for Newey-West). The point estimate for the synthetic control analysis is \$56.7 million across 36 fisheries, which is 22.4% of total annual revenues for the associated fisheries. Point estimates for the 27 fisheries that overlap in both analyses (again using "pass" and "ambiguous" fisheries according to our placebo tests) are \$32.7 million for the FPI DID (16.7% of revenues) and \$24 million for the SCMs (12.3% of revenues). Design-based inference does not produce standard errors and allow construction of associated confidence intervals. However, the small number of statistically significant results suggests that an aggregate null result is a possibility as in the FPI DID analysis.

The largest contributors to the point estimate totals are Alaskan fisheries, followed by New England fisheries. This is particularly notable given that many of the largest Alaskan fisheries are excluded entirely due to lack of monthly data (e.g., Alaskan pollock). Also noteworthy is that the point estimates for Alaskan Pacific halibut and Alaskan sablefish combine for more than half of the total revenue effects for synthetic models, and halibut is more than half of the total in the FPI models. These are the two fisheries most discussed in the context of economic benefits of catch shares, particularly benefits on the revenue side (Homans and Wilen, 1997, 2005). Yet, halibut is not statistically significant in the SCM, and sablefish is only significant at the 10% level and fails the parallel trends test in the FPI DID model.

## DISCUSSION

Excludability and the Stable Unit Treatment Value Assumption (SUTVA), or non-interference, are generic challenges in causal inference that are particularly vexing in coupled human-natural systems like fisheries (Smith et al., 2017; Ferraro et al., 2019). Both of our methods are strongly armored against SUTVA violations because there is no plausible means for our treated units to exert influence on the market counterfactuals. However, both methods can be critiqued on the grounds of excludability. The FPI DIDs assume that treated fishery prices would otherwise track the global seafood market; thus, we use parallel trends tests and placebo falsification tests to establish empirical bases for excludability. Ten of our 39 fisheries drop out of the analysis as a result (using Huber-White standard errors), but there are many statistically significant results for the remaining fisheries. By contrast, the SCMs retain more fisheries but produce far fewer significant results.

In both methods, if something happens in the local market (besides the switch to catch shares) that did not occur pre-treatment or otherwise influence the global market post-treatment, the effect is attributed to the policy. The SCMs attempt to deal with these possibilities via covariates that capture structural drivers of changes, but there are limits to the ability to capture effects that are specific to the treated fishery's market. In preliminary work, we used matched control fisheries to limit the analysis to a similar seafood market, as in Birkenbach et al. (2017) (see Birkenbach et al., 2016). However, the strength of this approach for excludability is its weakness with respect to SUTVA. For example, if the Gulf of Mexico and South Atlantic markets for red grouper are subject to the same common disturbances, then treating the former would exert influence on the latter. With these caveats in mind, we discuss our results, which we believe are the best available evidence on the effects of catch shares on prices and suggest directions for future research.

Multispecies features of our treated fisheries help to explain mixed results. Our basic theoretical motivation suggests that mixed results for price effects are possible in a single-species setting because the added flexibility of catch shares may incentivize catching in shorter seasons or otherwise exploiting cost margins that end up lowering price. Indeed, catch shares do, in some cases, compress seasons (Birkenbach et al., 2017). However, many of the species that experience season compression are part of a multispecies complex. Notably, in the New England groundfish complex, haddock, winter flounder, yellowtail flounder, and Acadian redfish all experienced statistically significant season compression, while Atlantic cod and white hake had statistically significant season elongation. Substitution of effort and capital within the complex can explain these outcomes (Andersen et al., 2010; Birkenbach et al., 2020). Fishers often optimize across multiple species, targeting different species at different times within the season, depending on stock and market conditions. Choice of fishing gears and fishing areas increases the harvest of some species at the expense of others. Fishers might reasonably spread out the season for a species that receives the largest price increase, but this behavior might compress the season for other species. Put another way, compressing one season frees up effort to optimize harvest of the more profitable species. Birkenbach et al. (2020) theoretically show how targeting behaviors across species are linked and find empirical evidence of the behavioral mechanisms in the Norwegian groundfish trawl fishery. They also show that the complexity of behaviors across species grows as more species are included.

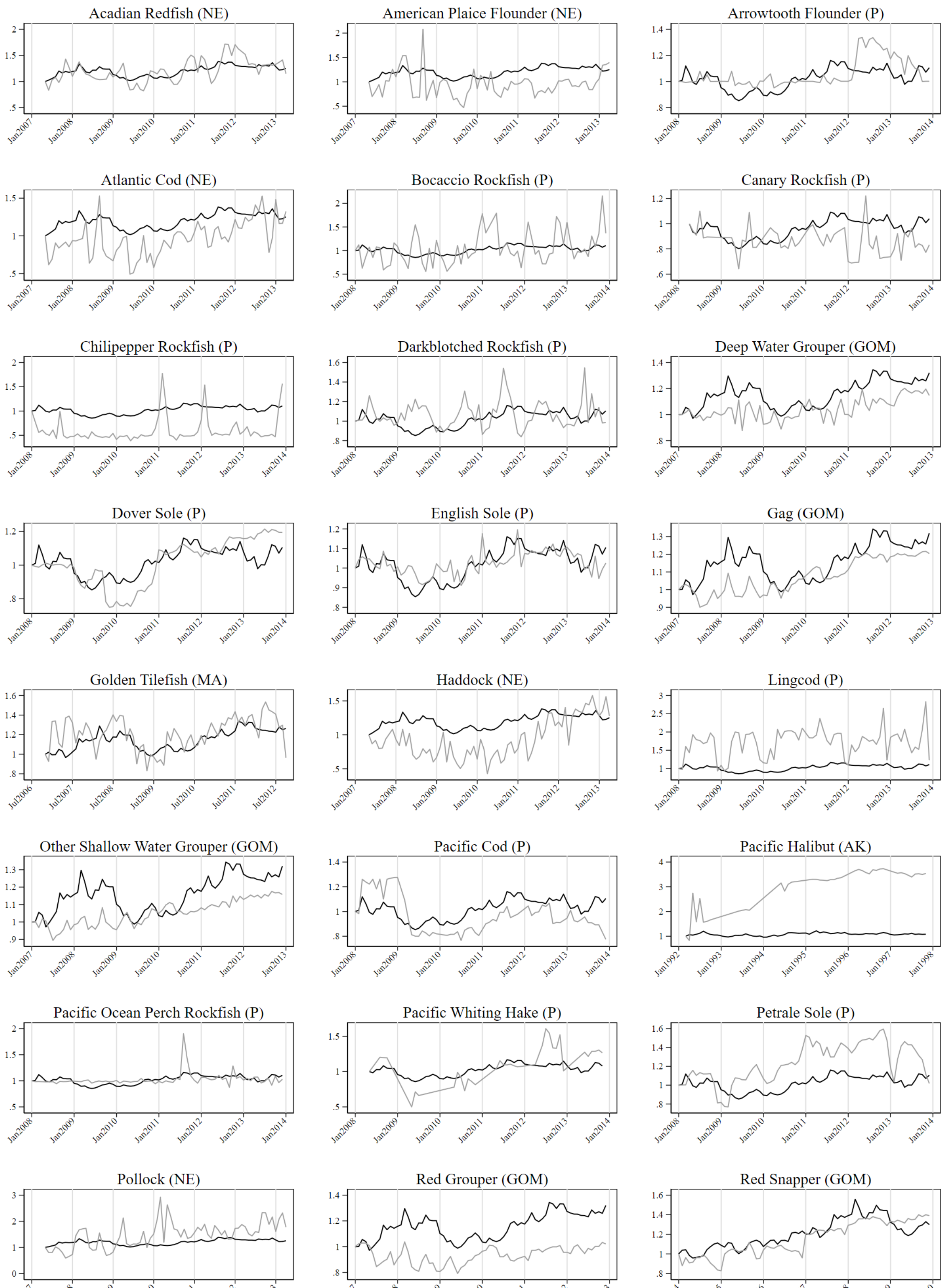
The New England groundfish price results from the FPI DIDs are generally consistent with the predictions in Birkenbach et al. (2020). Catch shares induced season decompression for some species and season compression for others, some species experienced price increases while others had no change or price decreases, and the pattern within the group of species is complex. Specifically, the high-value species Atlantic cod and haddock experience price increases, while the lower-value white hake and three species of flounder show price decreases. Compressing the yellowtail season is also consistent with perverse incentives to over-harvest early in the season so that yellowtail bycatch is less likely to constrain the cod and haddock fishery in the following year when there are stricter conservation measures (Holzer and DePiper, 2019). However, the theory does not fit perfectly in that the flounder species have high unit values despite low overall value (from low volumes), and the haddock season actually compressed. The theoretical model in Birkenbach et al. (2020) assumes that the species are scaled the same in terms of volume, so relaxing this assumption could provide further insights. On the empirical side, analyzing fishing behaviors of individual vessels using microdata could also help shed light on these findings.

Finer data resolution would likely improve our ability to study the effects of catch shares on prices. For example, some fisheries that we had to exclude altogether, such as Alaskan pollock, could be analyzed. Better resolution could also permit the use of other techniques. With publicly available data at the monthly level, there are few degrees of freedom in each analysis. Finer temporal resolution would allow the use of time series methods, whereas individual-level data might allow for a regression discontinuity design or more conventional parallel trends and falsification testing. Either of these could help to disentangle the effects of catch shares on Gulf of Mexico grouper prices from the effects of the Deepwater Horizon oil spill that occurred months later. If we were to attempt to estimate a treatment effect for catch shares without the confounding effect of Deepwater Horizon, we would have only three observations of the post-treatment price for each fishery (January, February, and March of 2010). As such, we interpret the results in Figure 4 as suggestive of positive price treatment effects resulting from catch shares but not conclusive. More broadly, for any quasi-experimental design, the effect size relative to the volatility is important (Abadie, 2021). Conceptually, large effects, small effects, and null effects are possible across our fisheries. It may be that subtle effects are too small relative to price volatility for our methods to resolve, or it may be that they are true null effects. With finer data resolution, our ability to distill treatment effects from intra-seasonal price variability and other noise might be enhanced.

Overall, the weight of the evidence that we present tilts toward positive price effects from catch shares. Despite mixed results, positive effects tend to be more pronounced than negative ones and occur more often in valuable fisheries. This information is important for managers considering future adoption of catch shares and for legislators who might otherwise seek to restrict their use.

Two recent attempts to reauthorize the primary legislation governing federally managed fisheries in the United States, the Magnuson-Stevens Fishery Conservation and Management Act, introduced substantial hurdles for adoption of new catch share programs (H.R. 200, 115th Congress and H.R. 1135, 114th Congress). Lacking support from the Senate, neither bill became law. Yet, they highlight the contentiousness of catch shares.

Price effects are also relevant to concerns about catch shares focused on fishing communities and distributional outcomes (National Academies of Sciences, Engineering, and Medicine, 2021; Abbott et al., 2022). Despite perceptions otherwise, cross-sectional data suggest that community outcomes and economic outcomes are not in conflict (Asche et al., 2018). One reason might be that increased prices offer the potential for more total economic value to flow to fishing communities and more value to share between the harvest and processing sectors. Furthermore, even in cases where there are not revenue gains from catch shares, there may well be substantial gains in overall profitability associated with consolidation and consequent reduction of fixed costs, or reduced variable costs from operating when/where catch rates are higher. If catch shares can increase profit margins, spread out seasons, and in so doing maintain capacity utilization of processors, they may play an important role in sustaining fishing communities in the face of globalization and other pressures.


Acadian Redfish (NE)
American Plaice Flounder (NE)
Arrowtooth Flounder (P)
Atlantic Cod (NE)
Bocaccio Rockfish (P)
Canary Rockfish (P)
Chilipepper Rockfish (P)
Darkblotched Rockfish (P)
Deep Water Grouper (GOM)
Dover Sole (P)
English Sole (P)
Gag (GOM)
Golden Tilefish (MA)
Haddock (NE)
Lingcod (P)
Other Shallow Water Grouper (GOM)
Pacific Cod (P)
Pacific Halibut (AK)
Pacific Ocean Perch Rockfish (P)
Pacific Whiting Hake (P)
Petrale Sole (P)
Pollock (NE)
Red Grouper (GOM)
Red Snapper (GOM)

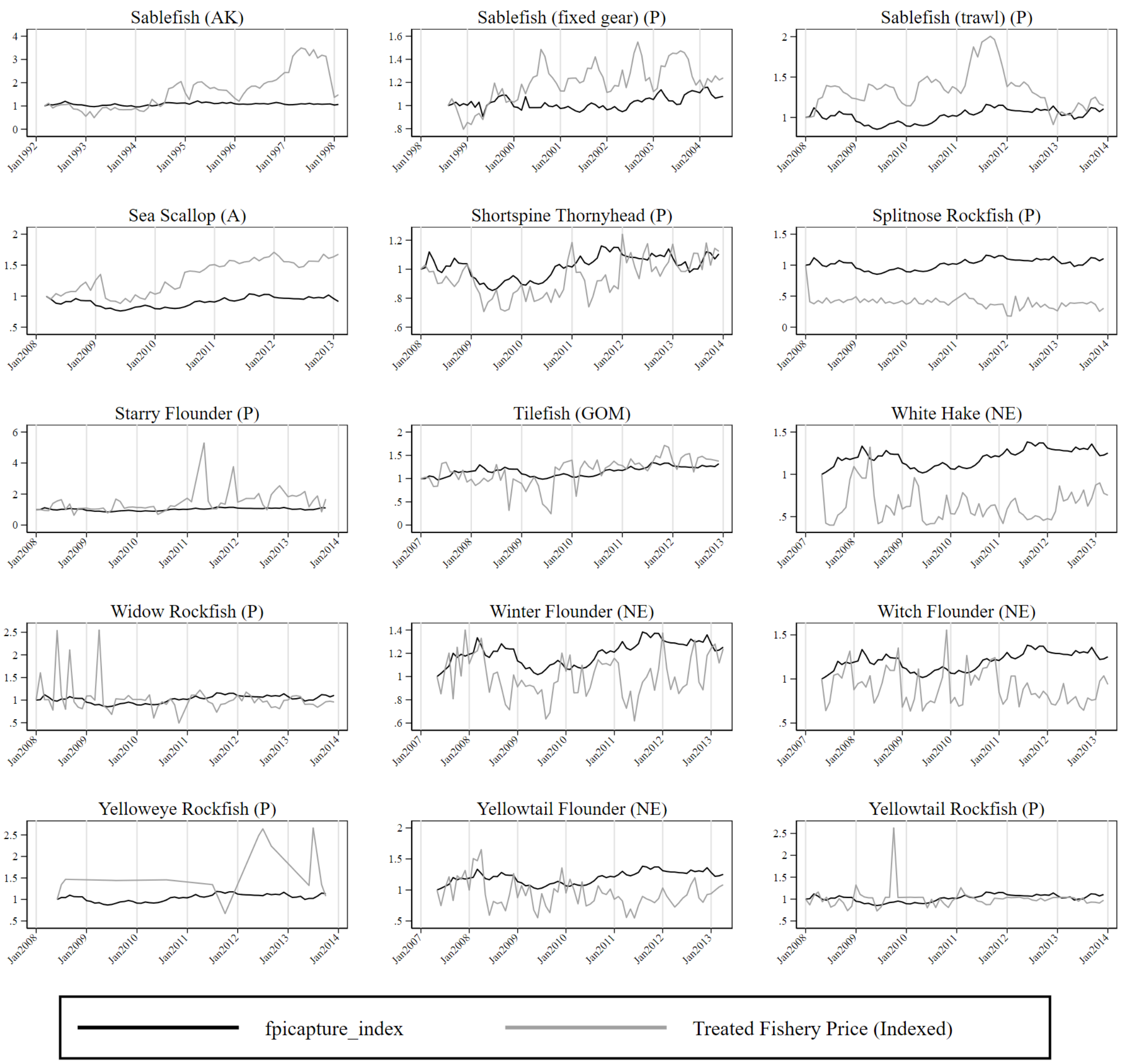



Figure 1. Monthly time series of FPI and indexed treated fishery prices. The FPI and treated fishery's per-pound prices are indexed to the start of the analysis window, which is 36 months prior to the implementation of catch shares, for each individual fishery. Each graph shows 36 months before and 36 months after the start of catch share management.

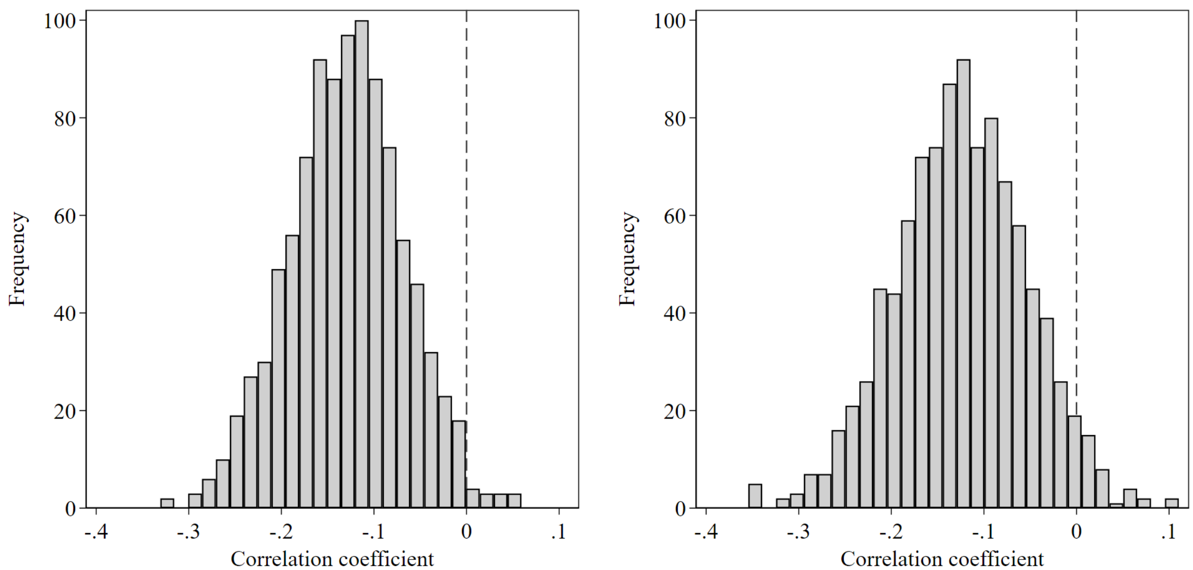



Figure 2. Monte Carlo analysis of correlation between season length treatment effects and price treatment effects from FPI DID using Huber-White (left panel) and Newey-West (right panel) standard errors. $N = 29$, which includes fisheries that pass the parallel trends test and whose falsification tests are coded "pass" or "ambiguous"; 1,000 draws with replacement from distributions defined by the coefficients and standard errors in Table 1. Price treatment effects used are the DID estimators from the FPI analysis. Gini coeffcients are used to measure degree of season compression; therefore, a negative season length treatment effect signifies an increase in season length post-catch share implementation. The Gini coefficient, traditionally used to measure income inequality, provides a quantitative measure of season compression. It captures the dispersion of average monthly harvest during three-year periods before and after catch share implementation. The Gini coefficient is zero when landings are equally divided among months of the year and approaches one as landings concentrate in fewer months. Catch shares that lead to season decompression (lower Gini) are associated with greater price treatment impacts (a negative correlation).

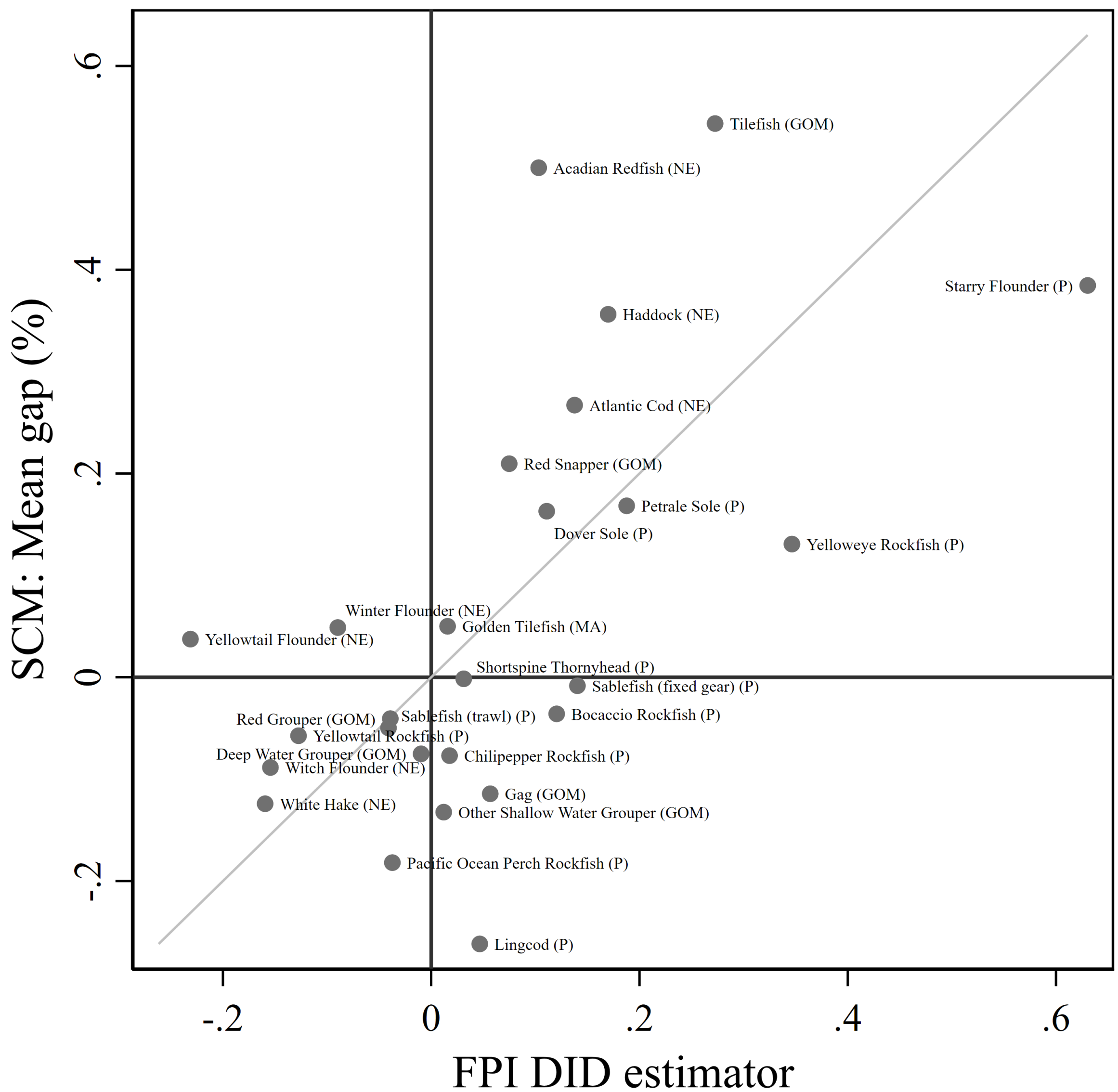



Figure 3. Scatterplot of FPI DID estimator and SCM mean gaps converted to percentage changes. Gray line representing the diagonal ($y = x$) is shown for reference. The SCM mean gap is calculated as the average difference between the treated fishery price and control fishery price across the 36 post-intervention months. It is converted to a percentage using the average pre-intervention price for the treated fishery as the denominator. One outlier (Alaska halibut) is excluded, and fisheries that fail the parallel trends or placebo tests (using either Huber-White or Newey-West standard errors) are excluded.

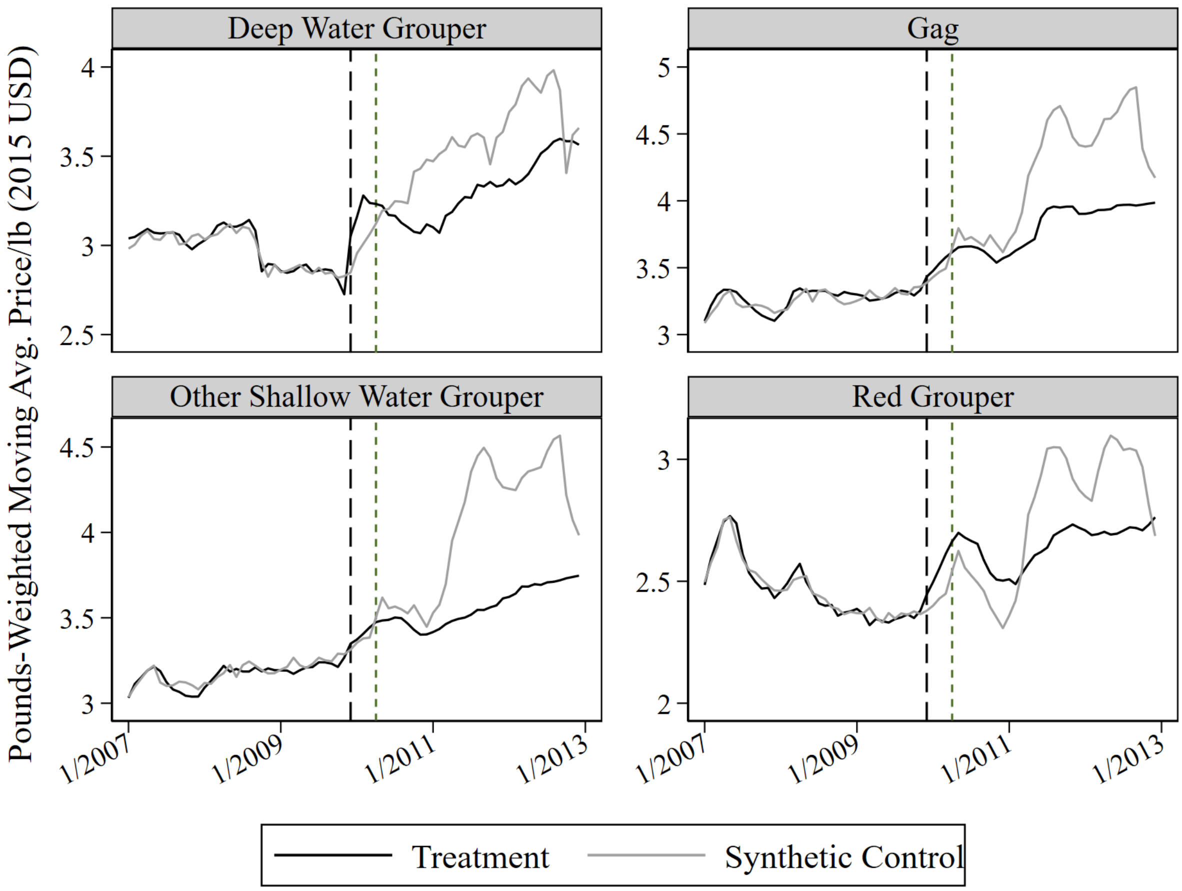



Figure 4. Treated price and synthetic control price paths for Gulf of Mexico fisheries around catch share implementation (January 2010) and the Deepwater Horizon oil spill (April 2010). Dark/long dashed lines indicate catch share implementation; light/short dashed lines indicate Deepwater Horizon oil spill.

## Table 1. Individual Fishery Results

| Species/ Species Group | Season Length | Price—FPI | | | | Price—SCM | | |
|---|---|---|---|---|---|---|---|---|
| | Fractional Logit | DID Est., Huber-White SEs | DID Est., Newey-West SEs | Placebo Test Summary, Huber-White SEs | Placebo Test Summary, Newey-West SEs | Mean Gap ($) | Mean Gap (%) | p-value |
| Sea Scallop (A) | -0.3536*** | 0.3057*** | 0.3057*** | Pass | Pass | | | |
| | (0.0136) | (0.0360) | (0.0400) | | | | | |
| Pacific Halibut (AK) | -0.1421*** | 1.3327*** | 1.3327*** | Pass | Pass | 0.2189 | 0.2127 | 0.3699 |
| | (0.0194) | (0.2015) | (0.3358) | | | | | |
| Gag (GOM) | -0.1909*** | 0.0567* | 0.0567 | Pass | Pass | -0.3760* | -0.1143 | 0.0270 |
| | (0.0514) | (0.0236) | (0.0558) | | | | | |
| Red Snapper (GOM) | -0.0820* | 0.0749** | 0.0749 | Pass | Pass | 0.5656* | 0.2096 | 0.0161 |
| | (0.0349) | (0.0262) | (0.0642) | | | | | |
| Golden Tilefish (MA) | -0.2069*** | 0.0157 | 0.0157 | Pass | Pass | 0.1249 | 0.0500 | 0.5263 |
| | (0.0353) | (0.0436) | (0.0845) | | | | | |
| White Hake (NE) | -0.1205*** | -0.1595*** | -0.1595* | Pass | Pass | -0.1266 | -0.1242 | 0.6250 |
| | (0.0305) | (0.0472) | (0.0795) | | | | | |
| Winter Flounder (NE) | 0.0906*** | -0.0897* | -0.0897 | Pass | Pass | 0.0908 | 0.0488 | 0.5313 |
| | (0.0222) | (0.0427) | (0.0754) | | | | | |
| Witch Flounder (NE) | -0.0186 | -0.1544*** | -0.1544+ | Pass | Pass | -0.1885 | -0.0886 | 0.3125 |
| | (0.0299) | (0.0457) | (0.0834) | | | | | |
| Yellowtail Flounder (NE) | 0.1251*** | -0.2312*** | -0.2312** | Pass | Pass | 0.0555 | 0.0374 | 0.6250 |
| | (0.0307) | (0.0507) | (0.0810) | | | | | |
| Bocaccio Rockfish (P) | -0.0376+ | 0.1205 | 0.1205+ | Pass | Pass | -0.0226 | -0.0359 | 0.5333 |
| | (0.0211) | (0.0763) | (0.0727) | | | | | |
| Lingcod (P) | 0.0091 | 0.0466 | 0.0466 | Pass | Pass | -0.1951 | -0.2617 | 0.3667 |
| | (0.0387) | (0.0814) | (0.0728) | | | | | |
| Petrale Sole (P) | -0.1485*** | 0.1877*** | 0.1877** | Pass | Pass | 0.1682 | 0.1683 | 0.4333 |
| | (0.0206) | (0.0340) | (0.0598) | | | | | |
| Yellowtail Rockfish (P) | -0.0634*** | -0.1274* | -0.1274* | Pass | Pass | -0.0287 | -0.0574 | 0.3000 |
| | (0.0144) | (0.0531) | (0.0594) | | | | | |
| Deep Water Grouper (GOM) | -0.3164*** | -0.0097 | -0.0097 | Ambiguous | Pass | -0.2257+ | -0.0752 | 0.0811 |
| | (0.0221) | (0.0255) | (0.0565) | | | | | |
| Other Shallow Water Grouper (GOM) | -0.2263*** | 0.0120 | 0.0120 | Ambiguous | Pass | -0.4216* | -0.1324 | 0.0270 |
| | (0.0269) | (0.0226) | (0.0531) | | | | | |
| Red Grouper (GOM) | -0.3020*** | -0.0393 | -0.0393 | Ambiguous | Pass | -0.0993* | -0.0406 | 0.0270 |
| | (0.0304) | (0.0244) | (0.0559) | | | | | |
| Sablefish (fixed gear) (P) | -0.3057*** | 0.1404*** | 0.1404+ | Ambiguous | Pass | -0.0125 | -0.0083 | 0.6512 |
| | (0.0514) | (0.0341) | (0.0816) | | | | | |
| Tilefish (GOM) | -0.5248*** | 0.2726*** | 0.2726** | Ambiguous | Ambiguous | 0.7344 | 0.5435 | 0.2703 |
| | (0.0465) | (0.0584) | (0.0884) | | | | | |
| Acadian Redfish (NE) | 0.0704** | 0.1032* | 0.1032 | Ambiguous | Ambiguous | 0.2592+ | 0.5001 | 0.0625 |
| | (0.0257) | (0.0426) | (0.0742) | | | | | |
| Atlantic Cod (NE) | -0.0753*** | 0.1377** | 0.1377+ | Ambiguous | Ambiguous | 0.3833 | 0.2671 | 0.1563 |
| | (0.0178) | (0.0472) | (0.0773) | | | | | |
| Haddock (NE) | 0.1069*** | 0.1699** | 0.1699 | Ambiguous | Ambiguous | 0.3976+ | 0.3563 | 0.0938 |
| | (0.0202) | (0.0590) | (0.1432) | | | | | |
| Arrowtooth Flounder (P) | -0.0946** | 0.0028 | 0.0028 | Ambiguous | Ambiguous | | | |
| | (0.0290) | (0.0259) | (0.0599) | | | | | |

**Table 1 continued from previous page**

| Species/ Species Group | Season Length | Price—FPI | | | | Price—SCM | | |
|---|---|---|---|---|---|---|---|---|
| | Fractional Logit | DID Est., Huber-White SEs | DID Est., Newey-West SEs | Placebo Test Summary, Huber-White SEs | Placebo Test Summary, Newey-West SEs | Mean Gap ($) | Mean Gap (%) | p-value |
| Chilipepper Rockfish (P) | 0.1797** | 0.0176 | 0.0176 | Ambiguous | Ambiguous | -0.0487 | -0.0769 | 0.3667 |
| | (0.0595) | (0.0590) | (0.0651) | | | | | |
| Dover Sole (P) | 0.0296 | 0.1109*** | 0.1109+ | Ambiguous | Ambiguous | 0.0561 | 0.1630 | 0.2000 |
| | (0.0351) | (0.0223) | (0.0582) | | | | | |
| Pacific Ocean Perch Rockfish (P) | 0.2037*** | -0.0373 | -0.0373 | Ambiguous | Ambiguous | -0.0875 | -0.1820 | 0.1333 |
| | (0.0419) | (0.0314) | (0.0416) | | | | | |
| Sablefish (trawl) (P) | 0.0382* | -0.0410 | -0.0410 | Ambiguous | Ambiguous | -0.0929 | -0.0497 | 0.3333 |
| | (0.0179) | (0.0572) | (0.1513) | | | | | |
| Shortspine Thornyhead (P) | 0.0127 | 0.0312 | 0.0312 | Ambiguous | Ambiguous | -0.0010 | -0.0015 | 0.1000 |
| | (0.0291) | (0.0271) | (0.0554) | | | | | |
| Starry Flounder (P) | 0.0648 | 0.6304*** | 0.6304*** | Ambiguous | Ambiguous | 0.2183 | 0.3846 | 0.1000 |
| | (0.0654) | (0.1588) | (0.0969) | | | | | |
| Yelloweye Rockfish (P) | 0.1226+ | 0.3464 | 0.3464 | Ambiguous | Ambiguous | 0.0670* | 0.1307 | 0.0333 |
| | (0.0647) | (0.2509) | (0.2755) | | | | | |
| American Plaice Flounder (NE) | -0.1049* | -0.1234* | -0.1234 | Fail | Pass | -0.2749 | -0.1876 | 0.5313 |
| | (0.0432) | (0.0600) | (0.0871) | | | | | |
| Canary Rockfish (P) | -0.0602 | -0.1402*** | -0.1402*** | Fail | Pass | -0.0913 | -0.1785 | 0.1333 |
| | (0.0412) | (0.0319) | (0.0403) | | | | | |
| Darkblotched Rockfish (P) | -0.0700* | -0.0941** | -0.0941* | Fail | Pass | -0.1066 | -0.2156 | 0.1667 |
| | (0.0350) | (0.0334) | (0.0364) | | | | | |
| English Sole (P) | 0.0231 | -0.0509** | -0.0509 | Fail | Ambiguous | -0.0329 | -0.1011 | 0.6000 |
| | (0.0588) | (0.0173) | (0.0357) | | | | | |
| Splitnose Rockfish (P) | 0.0071 | -0.1878*** | -0.1878*** | Fail | Fail | -0.1076 | -0.2908 | 0.2667 |
| | (0.0605) | (0.0257) | (0.0373) | | | | | |
| Widow Rockfish (P) | -0.1411*** | -0.2160* | -0.2160* | Fail | Fail | -0.0690 | -0.1684 | 0.6000 |
| | (0.0412) | (0.0835) | (0.0929) | | | | | |
| Sablefish (AK) | -0.2100*** | | | | | 0.9156+ | 0.8115 | 0.0704 |
| | (0.0256) | | | | | | | |
| Pollock (NE) | 0.0495 | | | | | 0.1291 | 0.2371 | 0.4063 |
| | (0.0374) | | | | | | | |
| Pacific Cod (P) | -0.0508 | | | | | -0.0450 | -0.0934 | 0.7333 |
| | (0.0466) | | | | | | | |
| Pacific Whiting Hake (P) | -0.0949+ | | | | | | | |
| | (0.0542) | | | | | | | |

Note: FPI results not shown for fisheries that fail the test for parallel trends ($p < .05$).
The SCM mean gap is calculated as the average difference between the treated fishery price and control fishery price across the 36 post-intervention months.
SCM $p$-value column shows results using the conservative cutoff (retains placebos whose mean square prediction error is not greater than five times that of the treated unit's); however, results are similar for stricter cutoffs. SCM treatment effects are converted to percentages based on the pounds-weighted average price for the 36 months prior to catch share implementation.
SCM results not shown for three fisheries whose prices were too high (sea scallop) or too low (arrowtooth flounder and Pacific whiting/hake) to have viable donors.
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Complete results shown in online appendix table A.4.

# Table 2. Estimated Yearly Revenue Changes

| Species/Species Group | Inclusion Coding for Totals: FPI: Huber-White SEs | FPI: Newey-West SEs | FPI: Huber-White SEs, Pass Only | FPI: Newey-West SEs, Pass Only | Overlap: FPI and SCM: Huber-White SEs | Overlap: Newey-West SEs | Overlap: Huber-White SEs, Pass Only | Overlap: Newey-West SEs, Pass Only | FPI With Huber-White SEs: Point Estimate | 95% CI Lower Bound | 95% CI Upper Bound | FPI With Newey-West SEs: Point Estimate | 95% CI Lower Bound | 95% CI Upper Bound | SCM Point Estimate | Avg. Yearly Pre-CS Revenue |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sablefish (AK) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 31,020,348 | 42,784,737 |
| Pacific Halibut (AK) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 25,262,538 | 17,776,092 | 32,748,986 | 25,262,538 | 12,786,367 | 37,738,712 | 8,968,818 | 54,382,105 |
| Red Snapper (GOM) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 920,246 | 289,319 | 1,551,174 | 920,246 | -625,767 | 2,466,260 | 2,530,654 | 12,059,807 |
| Tilefish (GOM) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 197,825 | 114,759 | 280,892 | 197,825 | 72,088 | 323,563 | 367,408 | 684,446 |
| Other Shallow Water Grouper (GOM) | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 17,575 | -47,300 | 82,450 | 17,575 | -134,853 | 170,003 | -191,418 | 1,444,389 |
| Deep Water Grouper (GOM) | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | -36,099 | -222,102 | 149,904 | -36,099 | -448,222 | 376,024 | -275,842 | 3,667,614 |
| Gag (GOM) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 232,849 | 42,890 | 422,808 | 232,849 | -216,291 | 681,989 | -465,967 | 4,072,624 |
| Red Grouper (GOM) | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | -519,105 | -1,150,801 | 112,592 | -519,105 | -1,966,311 | 928,101 | -475,707 | 11,705,596 |
| Atlantic Cod (NE) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 4,716,478 | 1,547,772 | 7,885,184 | 4,716,478 | -472,949 | 9,905,904 | 7,106,978 | 27,602,637 |
| Haddock (NE) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 2,994,327 | 956,281 | 5,032,374 | 2,994,327 | -1,952,252 | 7,940,907 | 4,615,282 | 14,143,097 |
| Pollock (NE) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 2,447,348 | 9,942,122 |
| Acadian Redfish (NE) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 122,547 | 23,398 | 221,696 | 122,547 | -50,149 | 295,243 | 645,170 | 1,323,275 |
| Winter Flounder (NE) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -856,801 | -1,656,214 | -57,387 | -856,801 | -2,268,411 | 554,809 | 438,631 | 9,093,544 |
| Golden Tilefish (MA) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 58,878 | -261,599 | 379,356 | 58,878 | -562,231 | 679,987 | 210,142 | 4,271,030 |
| Yellowtail Flounder (NE) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -1,322,507 | -1,890,934 | -754,081 | -1,322,507 | -2,230,644 | -414,370 | 204,635 | 5,818,435 |
| Witch Flounder (NE) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -839,404 | -1,326,367 | -352,441 | -839,404 | -1,728,085 | 49,277 | -415,276 | 4,936,656 |
| White Hake (NE) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -905,971 | -1,431,446 | -380,496 | -905,971 | -1,791,039 | -20,903 | -415,703 | 3,601,439 |
| American Plaice Flounder (NE) | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | | | | -509,215 | -1,213,681 | 195,251 | -704,900 | 3,864,307 |
| Sea Scallop (A) | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 5,574,864 | 4,288,105 | 6,861,624 | 5,574,864 | 4,145,131 | 7,004,597 | | 17,930,322 |
| Dover Sole (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1,017,397 | 616,420 | 1,418,374 | 1,017,397 | -29,100 | 2,063,894 | 1,349,409 | 8,276,446 |
| Petrale Sole (P) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 666,655 | 429,969 | 903,340 | 666,655 | 250,367 | 1,082,943 | 590,407 | 3,509,736 |
| Starry Flounder (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 32,300 | 16,352 | 48,247 | 32,300 | 22,568 | 42,031 | 20,645 | 44,899 |
| Yelloweye Rockfish (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 19 | -8 | 47 | 19 | -11 | 49 | 10 | 77 |
| Bocaccio Rockfish (P) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 431 | -104 | 967 | 431 | -79 | 941 | -112 | 3,089 |
| Canary Rockfish (P) | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | | | | -1,301 | -2,033 | -568 | -1,384 | 7,784 |
| Shortspine Thornyhead (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 64,565 | -45,353 | 174,484 | 64,565 | -160,139 | 289,269 | -2,619 | 1,770,728 |
| Pacific Ocean Perch Rockfish (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | -2,402 | -6,364 | 1,561 | -2,402 | -7,651 | 2,848 | -11,576 | 63,614 |
| Splitnose Rockfish (P) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | -16,233 | 55,822 |
| Widow Rockfish (P) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | -16,902 | 104,257 |
| English Sole (P) | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | | | | -11,392 | -27,051 | 4,268 | -22,409 | 222,119 |
| Pacific Cod (P) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | -23,692 | 253,650 |
| Chilipepper Rockfish (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 11,140 | -62,055 | 84,336 | 11,140 | -69,623 | 91,903 | -23,851 | 310,108 |
| Darkblotched Rockfish (P) | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | | | | -12,790 | -22,487 | -3,093 | -30,291 | 140,338 |
| Yellowtail Rockfish (P) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | -76,271 | -138,578 | -13,963 | -76,271 | -145,971 | -6,571 | -32,511 | 570,592 |
| Lingcod (P) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5,463 | -13,240 | 24,166 | 5,463 | -11,264 | 22,190 | -54,126 | 206,709 |
| Sablefish (fixed gear) (P) | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1,282,974 | 672,227 | 1,893,721 | 1,282,974 | -178,520 | 2,744,467 | -89,379 | 10,572,267 |
| Sablefish (trawl) (P) | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | -354,310 | -1,323,148 | 614,529 | -354,310 | -2,916,989 | 2,208,370 | -576,136 | 11,585,820 |
| Pacific Whiting Hake (P) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | 10,467,809 |
| Arrowtooth Flounder (P) | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1,960 | -33,570 | 37,489 | 1,960 | -80,211 | 84,130 | | 700,152 |
| Alaska Subtotal (Pass + Ambiguous) | | | | | | | | | 25,262,538 | 17,776,092 | 32,748,986 | 25,262,538 | 12,786,367 | 37,738,712 | 39,989,168 | 97,166,840 |
| Alaska Subtotal (Pass only) | | | | | | | | | 25,262,538 | 17,776,092 | 32,748,986 | 25,262,538 | 12,786,367 | 37,738,712 | 39,989,168 | 97,166,840 |
| Gulf of Mexico Subtotal (Pass + Ambiguous) | | | | | | | | | 813,291 | -973,235 | 2,599,820 | 813,291 | -3,319,356 | 4,945,940 | 1,489,128 | 33,634,476 |
| Gulf of Mexico Subtotal (Pass only) | | | | | | | | | 1,153,095 | 332,209 | 1,973,982 | 615,466 | -3,391,444 | 4,622,377 | 1,489,128 | 33,634,476 |
| New England/Atlantic Subtotal (Pass + Ambiguous) | | | | | | | | | 9,542,411 | 248,996 | 18,835,828 | 9,033,196 | -8,124,310 | 26,190,702 | 14,132,307 | 102,526,864 |
| New England/Atlantic Subtotal (Pass only) | | | | | | | | | 1,709,059 | -2,278,455 | 5,696,575 | 1,199,844 | -5,648,960 | 8,048,648 | 14,132,307 | 102,526,864 |
| Pacific Subtotal (Pass + Ambiguous) | | | | | | | | | 2,649,921 | 112,548 | 5,187,298 | 2,624,438 | -3,378,194 | 8,627,071 | 1,059,250 | 48,866,016 |
| Pacific Subtotal (Pass only) | | | | | | | | | 596,278 | 278,047 | 914,510 | 1,865,161 | -109,987 | 3,840,309 | 1,059,250 | 48,866,016 |
| GRAND TOTAL (Pass + Ambiguous) | | | | | | | | | 38,268,160 | 17,164,402 | 59,371,932 | 37,733,464 | -2,035,493 | 77,502,424 | 56,669,852 | 282,194,197 |
| GRAND TOTAL (Pass only) | | | | | | | | | 28,720,970 | 16,107,893 | 41,334,052 | 28,943,008 | 3,635,976 | 54,250,048 | 56,669,852 | 282,194,197 |
| FPI Total, Huber-White SEs (Pass + Ambiguous) | | | | | | | | | 38,268,160 | 17,164,400 | 59,371,932 | | | | | 214,351,248 |
| FPI Total, Newey-West SEs (Pass + Ambiguous) | | | | | | | | | | | | 37,733,464 | -2,035,493 | 77,502,424 | | 218,585,792 |
| FPI Total, Huber-White SEs (Pass only) | | | | | | | | | 28,720,970 | 16,107,893 | 41,334,052 | | | | | 120,456,088 |
| FPI Total, Newey-West SEs (Pass only) | | | | | | | | | | | | 28,943,008 | 3,635,976 | 54,250,048 | | 151,858,384 |
| SCM Total | | | | | | | | | | | | | | | 56,669,852 | 253,095,904 |
| Overlap Total, Huber-White SEs (Pass + Ambiguous) | | | | | | | | | 32,691,336 | 12,909,866 | 52,472,820 | | | | 24,017,966 | 195,720,784 |
| Overlap Total, Newey-West SEs (Pass + Ambiguous) | | | | | | | | | | | | 32,156,640 | -6,100,413 | 70,413,696 | 23,258,982 | 199,955,328 |
| Overlap Total, Huber-White SEs (Pass only) | | | | | | | | | 23,146,106 | 11,819,788 | 34,472,428 | | | | 11,559,592 | 102,525,768 |
| Overlap Total, Newey-West SEs (Pass only) | | | | | | | | | | | | 23,368,144 | -509,155 | 47,245,448 | 9,790,671 | 133,928,064 |

Note: Fisheries that do not pass parallel trends and/or fail placebo tests (using either Huber-White or Newey-West standard errors) are excluded. Revenue changes are based on average annual catch for each species for the three-year window preceding catch share implementation.

## REFERENCES


Abadie, A. (2021). Using synthetic controls: Feasibility, data requirements, and methodological aspects. *Journal of Economic Literature 59*(2), 391–425.

Abadie, A., A. Diamond, and J. Hainmueller (2010). Synthetic control methods for comparative case studies: Estimating the effect of california's tobacco control program. *Journal of the American statistical Association 105*(490), 493–505.

Abbott, J. K., B. Leonard, and B. Garber-Yonts (2022). The distributional outcomes of rights-based management in fisheries. *Proceedings of the National Academy of Sciences 119*(2).

Abbott, J. K. and J. E. Wilen (2010). Voluntary cooperation in the commons? evaluating the sea state program with reduced form and structural models. *Land Economics 86*(1), 131–154.

Andersen, B. S., Y. Vermard, C. Ulrich, T. Hutton, and J.-J. Poos (2010). Challenges in integrating short-term behaviour in a mixed-fishery management strategies evaluation frame: a case study of the north sea flatfish fishery. *Fisheries Research 102*(1-2), 26–40.

Ardini, G. and M.-Y. Lee (2018). Do ifqs in the u.s. atlantic sea scallop fishery impact price and size? *Marine Resource Economics 33*(3), 263–288.

Asche, F., H. Bremnes, and C. R. Wessells (1999). Product aggregation, market integration, and relationships between prices: an application to world salmon markets. *American Journal of Agricultural Economics 81*(3), 568–581.

Asche, F., T. M. Garlock, J. L. Anderson, S. R. Bush, M. D. Smith, C. M. Anderson, J. Chu, K. A. Garrett, A. Lem, K. Lorenzen, et al. (2018). Three pillars of sustainability in fisheries. *Proceedings of the National Academy of Sciences 115*(44), 11221–11225.

Asche, F., D. V. Gordon, and R. Hannesson (2004). Tests for market integration and the law of one price: the market for whitefish in france. *Marine Resource Economics 19*(2), 195–210.

Asche, F., B. Yang, J. A. Gephart, M. D. Smith, J. L. Anderson, E. V. Camp, T. M. Garlock, D. C. Love, A. Oglend, and H.-M. Straume (2022). China's seafood imports – not for domestic consumption? *Science 375*(6579), 386–388.

Birkenbach, A. M., A. L. Cojocaru, F. Asche, A. G. Guttormsen, and M. D. Smith (2020). Seasonal harvest patterns in multispecies fisheries. *Environmental and Resource Economics 75*(3), 631–655.

Birkenbach, A. M., D. J. Kaczan, and M. D. Smith (2016). Do catch shares end the race to fish and increase ex vessel prices? evidence from u.s. fisheries. In *AEA Annual Conference Proc., San Francisco. https://www. aeaweb. org/conference.*

Birkenbach, A. M., D. J. Kaczan, and M. D. Smith (2017). Catch shares slow the race to fish. *Nature 544*(7649), 223–226.

Brinson, A. A. and E. M. Thunberg (2013). The economic performance of u.s. catch share programs. *NOAA Technical Memorandum NMFS-F/SPO-133, 160p.*

Bronnmann, J., M. D. Smith, J. Abbott, C. J. Hay, and T. F. Næsje (2020). Integration of a local fish market in namibia with the global seafood trade: Implications for fish traders and sustainability. *World Development 135*, 105048.

Casey, K. E., C. M. Dewees, B. R. Turris, and J. E. Wilen (1995). The effects of individual vessel quotas in the british columbia halibut fishery. *Marine Resource Economics*, 211–230.

Costello, C., S. D. Gaines, and J. Lynham (2008). Can catch shares prevent fisheries collapse? *Science 321*(5896), 1678–1681.

Costello, C., J. Lynham, S. E. Lester, and S. D. Gaines (2010). Economic incentives and global fisheries sustainability. *Annual Review of Resource Economics 2*(1), 299–318.

Cunningham, S. (2021). Difference-in-differences. In *Causal Inference: The Mixtape*, pp. 406–510. Yale University Press.

Cunningham, S., L. S. Bennear, and M. D. Smith (2016). Spillovers in regional fisheries management: Do catch shares cause leakage? *Land Economics 92*(2), 344–362.

Erhardt, T. (2018). Does international trade cause overfishing? *Journal of the Association of Environmental and Resource Economists 5*(4), 695 – 711.

Ferraro, P. J., J. N. Sanchirico, and M. D. Smith (2019). Causal inference in coupled human and natural systems. *Proceedings of the National Academy of Sciences 116*(12), 5311–5318.

Grafton, R. Q., D. Squires, and K. J. Fox (2000). Private property and economic efficiency: A study of a common-pool resource. *The Journal of Law and Economics 43*(2), 679–714.

Holland, D. S. and J. E. Jannot (2012). Bycatch risk pools for the u.s. west coast groundfish fishery. *Ecological Economics 78*, 132–147.

Holzer, J. and G. DePiper (2019). Intertemporal quota arbitrage in multispecies fisheries. *Journal of Environmental Economics and Management 93*, 185–207.

Homans, F. R. and J. E. Wilen (1997). A model of regulated open access resource use. *Journal of Environmental Economics and Management 32*(1), 1–21.

Homans, F. R. and J. E. Wilen (2005). Markets and rent dissipation in regulated open access fisheries. *Journal of Environmental Economics and Management 49*(2), 381–404.

Hsueh, L. (2017). Quasi-experimental evidence on the "rights to fish": the effects of catch shares on fishermen's days at sea. *Journal of the Association of Environmental and Resource Economists 4*(2), 407–445.

Isaksen, E. T. and A. Richter (2019). Tragedy, property rights, and the commons: investigating the causal relationship from institutions to ecosystem collapse. *Journal of the Association of Environmental and Resource Economists 6*(4), 741–781.

Jensen, R. (2007). The digital provide: Information (technology), market performance, and welfare in the south indian fisheries sector. *The Quarterly Journal of Economics 122*(3), 879–924.

Kaczan, D. (2017). *Roads, Rights, and Rewards: Three Program Evaluations in Environmental and Resource Economics.* Ph. D. thesis, Duke University.

Kroetz, K., J. N. Sanchirico, E. G. Contreras, D. C. Novoa, N. Collado, and E. W. Swiedler (2019). Examination of the peruvian anchovy individual vessel quota (ivq) system. *Marine Policy 101*, 15 – 24.

Kroetz, K., J. N. Sanchirico, and D. K. Lew (2015). Efficiency costs of social objectives in tradable permit programs. *Journal of the Association of Environmental and Resource Economists 2*(3), 339–366.

Kroetz, K., J. N. Sanchirico, J. Peña-Torres, and D. C. Novoa (2017). Evaluation of the chilean jack mackerel itq system. *Marine Resource Economics 32*(2), 217–241.

Le Moglie, M. and G. Sorrenti (2022). Revealing "mafia inc."? financial crisis, organized crime, and the birth of new enterprises. *Review of Economics and Statistics 104*(1), 142–156.

National Academies of Sciences, Engineering, and Medicine (2021). *The Use of Limited Access Privilege Programs in Mixed-Use Fisheries*. Washington, DC: The National Academies Press.

National Oceanic and Atmospheric Administration Fisheries (2018). The Western Alaska Community Development Quota Program. Technical report, NMFS Alaska Regional Office, Juneau, AK.

National Research Council (1999). *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas*. Washington, DC: The National Academies Press.

Petesch, T., B. Dubik, and M. D. Smith (2021). Implications of disease in shrimp aquaculture for wild-caught shrimp. *Marine Resource Economics 36*(2), 191–209.

Pfeiffer, L. and T. Gratz (2016). The effect of rights-based fisheries management on risk taking and fishing safety. *Proceedings of the National Academy of Sciences 113*(10), 2615–2620.

Pfeiffer, L., T. Petesch, and T. Vasan (2022). A safer catch? the role of fisheries management in fishing safety. *Marine Resource Economics 37*(1), 1–33.

Pincinato, R. B., F. Asche, A. L. Cojocaru, Y. Liu, and K. H. Roll (2022). The impact of transferable fishing quotas on cost, price, and season length. *Marine Resource Economics 37*(1), 000–000.

Reimer, M. N. and A. C. Haynie (2018). Mechanisms matter for evaluating the economic impacts of marine reserves. *Journal of Environmental Economics and Management 88*, 427–446.

Roth, J. (2022). Pretest with caution: Event-study estimates after testing for parallel trends. *American Economic Review: Insights 4*(3), 305–22.

Sakai, Y. (2017). Subsidies, fisheries management, and stock depletion. *Land Economics 93*(1), 165–178.

Scheld, A. M., C. M. Anderson, and H. Uchida (2012). The economic effects of catch share management: the rhode island fluke sector pilot program. *Marine Resource Economics 27*(3), 203–228.

Smith, M. D., A. Oglend, A. J. Kirkpatrick, F. Asche, L. S. Bennear, J. K. Craig, and J. M. Nance (2017). Seafood prices reveal impacts of a major ecological disturbance. *Proceedings of the National Academy of Sciences*, 201617948.

Smith, M. D., J. Zhang, and F. C. Coleman (2006). Effectiveness of marine reserves for large-scale fisheries management. *Canadian Journal of Fisheries and Aquatic Sciences 63*(1), 153–164.

St. Clair, T. and T. D. Cook (2015). Difference-in-differences methods in public finance. *National Tax Journal 68*(2), 319–338.

Steinmayr, A. (2021). Contact versus exposure: Refugee presence and voting for the far right. *Review of Economics and Statistics 103*(2), 310–327.

Tveterås, S., F. Asche, M. F. Bellemare, M. D. Smith, A. G. Guttormsen, A. Lem, K. Lien, and S. Vannuccini (2012). Fish is food-the fao's fish price index. *PLoS One 7*(5), e36731.

Tveterås, S., C. E. Paredes, and J. Peña-Torres (2011). Individual vessel quotas in peru: stopping the race for anchovies. *Marine Resource Economics 26*(3), 225–232.

Weninger, Q. (1998). Assessing efficiency gains from individual transferable quotas: an application to the mid-atlantic surf clam and ocean quahog fishery. *American Journal of Agricultural Economics 80*(4), 750–764.

Wilen, J. E. (2006). Why fisheries management fails: treating symptoms rather than the cause. *Bulletin of Marine Science 78*(3), 529–546.

## Notes

[1]Higher prices may be realized in both the short term and the long term. In principle, the latent demand for fresh products during what was previously the off-season can be tapped immediately. Longer term gains in revenue are also possible as processor infrastructure and supply chains develop to take advantage of the longer season (Wilen, 2006).

[2]The ex vessel price is the unit price received by fishing vessels for harvested but unprocessed fish upon landing the catch.

[3]To our knowledge, these data are the most complete that are publicly accessible.

[4]Monthly data are unavailable in cases where there were fewer than three participating vessels.

[5]Note that our 39 fisheries do not include the Western Alaska Community Development Quota Program and the Individual Bluefin Tuna Quota Program. The Western Alaska Community Development Quota Program is unique among U.S. catch share programs in its structure and goals. The program is primarily designed to support economic development and poverty alleviation efforts in 65 western Alaskan communities. These communities are associated with six non-profit CDQ groups that use the revenue derived from the harvest of their catch allocations (under the MSA) to fund economic initiatives and employment opportunities (National Oceanic and Atmospheric Administration Fisheries, 2018). The Individual Bluefin Quota (IBQ) Program was established in 2015, after we collected our data. Moreover, this program is designed to minimize bluefin bycatch among pelagic longline vessels primarily targeting other species (swordfish and yellowfin tuna), differentiating it from the other programs in our study.

[6]Atlantic sea scallop is among the highest-revenue fisheries in the United States, but only 5% of the fishery is managed with catch shares. Alaskan king crab and snow crab, which do not have monthly price data, are also high-value catch share fisheries.

[7]These fisheries include New England American lobster, Alaska sockeye salmon, Gulf of Mexico

white shrimp, Gulf of Mexico brown shrimp, Alaska pink salmon, Pacific California market squid, Alaska chum salmon, Pacific Pacific geoduck clam, Gulf of Mexico eastern oyster, Gulf of Mexico caribbean spiny lobster, Alaska coho salmon, Pacific oyster, Pacific albacore tuna, South Atlantic white shrimp, Alaska Pacific herring, Pacific shellfish, Pacific chinook salmon, New England Atlantic herring, New England softshell clam, Gulf of Mexico pink shrimp, Alaska chinook salmon, Pacific sockeye salmon, New England goosefish/monkfish, Gulf of Mexico crayfishes/crawfishes, Pacific Ocean shrimp, New England eastern oyster, South Atlantic brown shrimp, Pacific California spiny lobster, Pacific sardine, Alaska flatfish, New England northern quahog clam, New England longfin squid, Alaska arrowtooth flounder, New England summer flounder, New England bluefin tuna, Mid-Atlantic summer flounder, Mid-Atlantic northern quahog clam, New England silver hake, Pacific sea urchins, South Atlantic king and cero mackerel, New England skates, New England pandalid shrimp, South Atlantic summer flounder, South Atlantic eastern oyster, Pacific chum salmon, South Atlantic swordfish, Alaska Pacific geoduck clam, Mid-Atlantic longfin squid, Mid-Atlantic American lobster, and Mid-Atlantic northern shortfin squid.

[8]By default, the synthetic control algorithm averages each predictor across the entire pre-treatment period, which might dampen the influence of seasonality and other sources of temporal variability important to the selection of controls. In other words, two fisheries with the same average price over a given period may have very different seasonality or levels of variability, which in turn could affect the resulting treatment effect. Therefore, we included each month's moving average price as a separate covariate. Moving averages were used to avoid excessive influence of outliers or prices based on low catch volumes in a given month.

[9]Of our 50 non-catch share potential donors, only Alaskan geoduck and Pacific shellfish have no recorded exports, and only the latter has no recorded imports.

[10]The Pacific rockfish species with negative price effects were mostly overfished rockfish species with relatively small quotas. They were taken primarily as incidental catch and were often actively

avoided. Also, there was rampant discarding of these species pre-catch shares but little after catch shares, as discards are fully monitored by on-board observers and count against quota. Thus, it could be that fishers were selectively keeping only higher-value specimens pre-catch shares, undermining any positive price effect in the post period. In any case, there is little incentive for fishers to focus on increasing revenues for these species (Holland and Jannot, 2012).

[11]The Gini coefficient, traditionally used to measure income inequality, provides a quantitative measure of season compression. It captures the dispersion of average monthly harvest during three-year periods before and after catch share implementation. The Gini coefficient is zero when landings are equally divided among months of the year and approaches one as landings concentrate in fewer months.

## Appendix A

Table A1. Summary of treated fisheries and catch share programs

| Region | Program Name | Commencement Date | Species | Grouping |
|---|---|---|---|---|
| Northeast | Mid-Atlantic Golden Tilefish IFQ Program | November, 2009 | Golden tilefish *(Lopholatilus chamaeleonticeps)* | Golden tilefish |
| | Northeast General Category Atlantic Sea Scallop IFQ Program | March, 2010 | Sea scallop (IFQ portion) *(Placopecten magellanicus)* | Sea scallop |
| | Northeast Multispecies Sector Program | May, 2010 | Atlantic cod *(Gadus morhua)* | Atlantic cod |
| | | | Pollock *(Pollachius virens)* | Pollock |
| | | | Haddock *(Melanogrammus aeglefinus)* | Haddock |
| | | | Acadian redfish *(Sebastes fasciatus)* | Acadian redfish |
| | | | White hake *(Urophycis tenuis)* | White hake |
| | | | Witch flounder *(Glyptocephalus cynoglossus)* | Witch flounder |
| | | | Winter flounder *(Pseudopleuronectes americanus)* | Winter flounder |
| | | | Yellowtail flounder *(Limanda ferruginea)* | Yellowtail flounder |
| | | | American plaice flounder *(Hippoglossoides platessoides)* | American plaice flounder |
| Southeast | Gulf of Mexico Red Snapper IFQ Program | January, 2007 | Red snapper *(Lutjanus campechanus)* | Red snapper[a] |
| | Gulf of Mexico Grouper-Tilefish IFQ Program | January, 2010 | Snowy grouper *(Epinephelus niveatus)* | Deep-water grouper |
| | | | Yellowedge grouper *(Epinephelus flavolimbatus)* | |
| | | | Gag *(Mycteroperca microlepis)* | Gag |
| | | | Black grouper *(Mycteroperca bonaci)* | Other shallow-water grouper |
| | | | Scamp *(Mycteroperca phenax)* | |
| | | | Red grouper *(Epinephelus morio)* | Red grouper |
| | | | Blueline (grey) tilefish *(Caulolatilus microps)* | Tilefish |
| | | | Golden Tilefish *(Lopholatilus chamaeleonticeps)* | |
| Northwest | Pacific Coast Sablefish Permit Stacking Program | August, 2001 | Sablefish *(Anoplopoma fimbria)* | Sablefish |
| | Pacific Groundfish Trawl Rationalization Program[b] | January, 2011 | Pacific cod *(Gadus macrocephalus)* | Pacific cod |
| | | | Lingcod *(Ophiodon elongatus)* | Lingcod |
| | | | Pacific hake (whiting) *(Merluccius productus)* | Pacific hake (whiting) |
| | | | Sablefish *(Anoplopoma fimbria)* | Sablefish |
| | | | Pacific Ocean perch *(Sebastes alutus)* | Pacific Ocean perch |
| | | | Widow rockfish *(Sebastes entomelas)* | Widow rockfish |
| | | | Bocaccio rockfish *(Sebastes paucispinis)* | Bocaccio rockfish |
| | | | Canary rockfish *(Sebastes pinniger)* | Canary rockfish |
| | | | Chilipepper rockfish *(Sebastes goodei)* | Chilipepper rockfish |
| | | | Splitnose rockfish *(Sebastes diploproa)* | Splitnose rockfish |
| | | | Yellowtail rockfish *(Sebastes flavidus)* | Yellowtail rockfish |
| | | | Shortspine thornyhead *(Sebastolobus alascanus)* | Shortspine thornyhead |
| | | | Darkblotched rockfish *(Sebastes crameri)* | Darkblotched rockfish |
| | | | Yelloweye rockfish *(Sebastes ruberrimus)* | Yelloweye rockfish |
| | | | Dover sole *(Solea solea)* | Dover sole |
| | | | English sole *(Parophrys vetulus)* | English sole |
| | | | Petrale sole *(Eopsetta jordani)* | Petrale sole |
| | | | Arrowtooth flounder *(Atheresthes stomias)* | Arrowtooth flounder |
| | | | Starry flounder *(Platichthys stellatus)* | Starry flounder |
| Alaska | Alaska Halibut IFQ Program | March, 1995 | Pacific Halibut *(Hippoglossus stenolepis)* | Pacific halibut |
| | Alaska Sablefish IFQ Program | March, 1995 | Sablefish *(Anoplopoma fimbria)* | Sablefish |

Note: Fisheries with insufficient data for difference-in-differences analysis not shown. In cases where a pilot program or partial implementation took place before the full catch share program went into effect, the implementation date used in our analysis (that of full implementation) is shown. ITQ=Individual Tradable Quota.

[a] Moratorium in South Atlantic, 2010-11.

[b] Minor species were excluded from our analysis.

# Table A2. Summary Statistics for Treated Fisheries

| Program | Species/Species Group | Avg. Yearly Landings (1000s pounds) (Mean/SD) | | Avg. Yearly Value of Landings (1000s 2015 USD) (Mean/SD) | | Avg. Price/lb (2015 USD), Pounds-Weighted (Mean/SD) | |
|---|---|---|---|---|---|---|---|
| | | Pre-CS | Post-CS | Pre-CS | Post-CS | Pre-CS | Post-CS |
| Alaska Halibut | Pacific Halibut | 40,972.21 | 37,507.35 | 88,955.38 | 104,312.79 | 2.17 | 2.78 |
| | | 4,900.15 | 9,060.41 | 19,840.61 | 25,717.73 | 0.76 | 0.65 |
| Alaska Sablefish | Sablefish | 33,879.80 | 26,787.82 | 70,069.31 | 81,997.76 | 2.07 | 3.06 |
| | | 2,020.02 | 4,560.61 | 12,227.51 | 20,480.26 | 0.35 | 0.51 |
| Atlantic Seascallop | Sea Scallop | 2,761.03 | 2,483.32 | 19,776.24 | 26,585.50 | 7.16 | 10.71 |
| | | 563.64 | 440.29 | 2,875.20 | 6,242.19 | 0.43 | 1.17 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | 1,222.16 | 839.14 | 4,095.99 | 3,031.43 | 3.35 | 3.61 |
| | | 33.69 | 156.07 | 317.08 | 673.76 | 0.17 | 0.17 |
| Gulf of Mexico Grouper-Tilefish | Gag | 1,239.27 | 564.62 | 4,549.21 | 2,314.75 | 3.67 | 4.10 |
| | | 345.13 | 131.49 | 1,260.96 | 565.14 | 0.02 | 0.12 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | 454.03 | 281.57 | 1,615.55 | 1,078.39 | 3.56 | 3.83 |
| | | 87.37 | 80.90 | 304.07 | 329.37 | 0.04 | 0.08 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | 4,790.60 | 5,166.27 | 13,054.66 | 14,843.54 | 2.73 | 2.87 |
| | | 726.45 | 1,194.29 | 1,732.68 | 3,525.69 | 0.14 | 0.12 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | 500.28 | 396.92 | 763.77 | 865.64 | 1.53 | 2.18 |
| | | 31.70 | 129.16 | 42.16 | 315.16 | 0.12 | 0.16 |
| Gulf of Mexico Red Snapper | Red Snapper | 4,474.28 | 2,885.53 | 14,629.70 | 11,572.55 | 3.27 | 4.01 |
| | | 317.25 | 471.94 | 861.93 | 1,819.15 | 0.12 | 0.11 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | 1,682.48 | 1,876.41 | 4,770.10 | 5,730.78 | 2.84 | 3.05 |
| | | 179.49 | 75.01 | 308.27 | 181.01 | 0.35 | 0.18 |
| Northeast Groundfish | Acadian Redfish | 2,489.08 | 6,187.03 | 1,472.70 | 3,855.93 | 0.59 | 0.62 |
| | | 719.93 | 2,555.34 | 296.16 | 1,740.80 | 0.06 | 0.06 |
| Northeast Groundfish | American Plaice Flounder | 2,564.20 | 3,081.63 | 4,308.92 | 4,839.72 | 1.68 | 1.57 |
| | | 458.75 | 150.00 | 257.67 | 293.39 | 0.27 | 0.07 |
| Northeast Groundfish | Atlantic Cod | 18,541.56 | 12,646.38 | 30,798.59 | 24,510.03 | 1.66 | 1.94 |
| | | 1,475.86 | 6,124.09 | 3,038.55 | 10,426.52 | 0.23 | 0.21 |
| Northeast Groundfish | Haddock | 11,607.85 | 10,663.74 | 15,759.81 | 13,736.69 | 1.36 | 1.29 |
| | | 3,187.24 | 8,306.74 | 2,127.32 | 8,163.47 | 0.31 | 0.32 |
| Northeast Groundfish | Pollock | 18,957.00 | 13,309.40 | 11,077.34 | 12,126.23 | 0.58 | 0.91 |
| | | 2,770.14 | 2,403.86 | 1,353.00 | 1,449.86 | 0.07 | 0.09 |
| Northeast Groundfish | White Hake | 3,283.60 | 5,350.52 | 4,023.36 | 6,092.90 | 1.23 | 1.14 |
| | | 405.62 | 1,122.71 | 341.85 | 1,160.66 | 0.15 | 0.15 |
| Northeast Groundfish | Winter Flounder | 4,830.74 | 4,779.24 | 10,170.47 | 9,043.43 | 2.11 | 1.89 |
| | | 219.85 | 1,049.72 | 1,812.15 | 1,427.28 | 0.28 | 0.22 |
| Northeast Groundfish | Witch Flounder | 2,203.05 | 1,846.29 | 5,518.74 | 4,108.92 | 2.51 | 2.23 |
| | | 122.75 | 338.71 | 1,000.15 | 247.42 | 0.32 | 0.27 |
| Northeast Groundfish | Yellowtail Flounder | 3,687.12 | 3,431.13 | 6,512.74 | 4,851.22 | 1.77 | 1.41 |
| | | 165.61 | 665.98 | 1,551.44 | 572.47 | 0.34 | 0.14 |
| Pacific Groundfish | Arrowtooth Flounder | 7,012.62 | 4,151.49 | 768.58 | 475.93 | 0.11 | 0.11 |
| | | 1,259.44 | 1,031.59 | 137.24 | 149.78 | 0.00 | 0.01 |
| Pacific Groundfish | Bocaccio Rockfish | 4.96 | 19.05 | 3.39 | 14.35 | 0.68 | 0.75 |
| | | 1.87 | 6.28 | 1.48 | 5.60 | 0.04 | 0.05 |
| Pacific Groundfish | Canary Rockfish | 15.16 | 24.07 | 8.54 | 13.24 | 0.56 | 0.55 |
| | | 4.17 | 6.37 | 1.80 | 3.37 | 0.04 | 0.02 |
| Pacific Groundfish | Chilipepper Rockfish | 489.75 | 616.37 | 339.72 | 430.75 | 0.69 | 0.70 |
| | | 263.01 | 79.56 | 149.99 | 45.80 | 0.11 | 0.04 |
| Pacific Groundfish | Darkblotched Rockfish | 284.16 | 202.96 | 153.88 | 100.76 | 0.54 | 0.50 |
| | | 67.81 | 30.41 | 32.79 | 15.33 | 0.02 | 0.02 |
| Pacific Groundfish | Dover Sole | 24,053.64 | 15,739.57 | 9,089.52 | 7,055.80 | 0.38 | 0.45 |
| | | 1,468.27 | 1,540.14 | 1,357.01 | 676.46 | 0.04 | 0.01 |
| Pacific Groundfish | English Sole | 681.12 | 505.86 | 244.11 | 176.57 | 0.36 | 0.35 |
| | | 174.66 | 161.71 | 66.20 | 51.31 | 0.01 | 0.01 |
| Pacific Groundfish | Lingcod | 277.43 | 719.67 | 226.98 | 553.51 | 0.82 | 0.77 |
| | | 57.02 | 143.40 | 35.26 | 104.45 | 0.05 | 0.02 |
| Pacific Groundfish | Pacific Cod | 526.49 | 1,116.59 | 277.78 | 609.33 | 0.53 | 0.55 |
| | | 358.57 | 265.23 | 160.76 | 191.92 | 0.13 | 0.05 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | 132.30 | 66.92 | 69.83 | 33.80 | 0.53 | 0.51 |
| | | 5.81 | 4.95 | 3.46 | 3.27 | 0.00 | 0.03 |
| Pacific Groundfish | Pacific Whiting Hake | 116,141.82 | 196,701.95 | 11,485.35 | 24,549.32 | 0.10 | 0.12 |
| | | 20,301.14 | 37,147.05 | 4,893.67 | 2,985.61 | 0.03 | 0.02 |
| Pacific Groundfish | Petrale Sole | 3,510.15 | 3,641.46 | 3,858.90 | 4,723.65 | 1.10 | 1.30 |
| | | 1,592.99 | 1,664.28 | 1,649.01 | 1,624.95 | 0.11 | 0.18 |
| Pacific Groundfish | Sablefish | 6,201.68 | 3,264.07 | 12,719.19 | 6,716.52 | 2.05 | 2.06 |
| | | 569.33 | 401.42 | 987.72 | 2,281.20 | 0.07 | 0.45 |
| Pacific Groundfish | Shortspine Thornyhead | 2,618.59 | 1,585.70 | 1,944.39 | 1,333.80 | 0.74 | 0.84 |
| | | 256.53 | 145.69 | 238.38 | 163.09 | 0.07 | 0.08 |
| Pacific Groundfish | Splitnose Rockfish | 150.86 | 31.23 | 61.29 | 9.23 | 0.41 | 0.30 |
| | | 32.83 | 10.35 | 17.32 | 2.56 | 0.03 | 0.03 |
| Pacific Groundfish | Starry Flounder | 94.57 | 29.59 | 49.35 | 18.91 | 0.52 | 0.64 |
| | | 65.03 | 12.51 | 30.89 | 6.48 | 0.10 | 0.08 |
| Pacific Groundfish | Widow Rockfish | 244.95 | 786.21 | 114.45 | 363.30 | 0.47 | 0.46 |
| | | 51.40 | 504.35 | 20.69 | 222.34 | 0.03 | 0.02 |
| Pacific Groundfish | Yelloweye Rockfish | 0.15 | 0.27 | 0.08 | 0.16 | 0.56 | 0.57 |
| | | 0.13 | 0.15 | 0.07 | 0.09 | 0.00 | 0.04 |
| Pacific Groundfish | Yellowtail Rockfish | 1,132.79 | 2,804.48 | 625.10 | 1,467.23 | 0.55 | 0.52 |
| | | 518.90 | 359.67 | 282.90 | 214.08 | 0.02 | 0.02 |
| Pacific Sablefish | Sablefish | 7,150.30 | 6,675.71 | 14,895.18 | 14,424.92 | 2.08 | 2.16 |
| | | 1,656.26 | 1,062.23 | 4,780.01 | 2,198.11 | 0.26 | 0.14 |

Table A3. Synthetic Control Descriptive Statistics

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| Alaska | Halibut, Pacific | Average Employment Rate | 103 | 0.432639 | 0.008354 | 0.418263 | 0.450256 |
| | | Exports/Pounds Landed | 103 | 0.019494 | 0.011872 | 0.004657 | 0.067102 |
| | | Food CPI | 103 | 135.8594 | 8.329737 | 124.2667 | 147.8 |
| | | Gini on Landings | 103 | 0.633919 | 0.197769 | 0.400633 | 0.828757 |
| | | Imports/Pounds Landed | 103 | 0.021245 | 0.012634 | 0.001646 | 0.054738 |
| | | Per-Capita Income | 103 | 8677.746 | 650.3738 | 7699.896 | 9967.518 |
| | | Pounds Landed (1000s) | 103 | 5410.282 | 8581.463 | 0 | 37537.7 |
| | | Pounds-Weighted MA Price/lb | 103 | 1.269441 | 0.387699 | 0.113713 | 1.707404 |
| | | Price/lb | 103 | 1.218804 | 0.460571 | 0.094325 | 2.566667 |
| | | Share of Annual Landings | 103 | 0.087379 | 0.133048 | 0 | 0.580076 |
| | | Share of Annual Landings/Gini | 103 | 0.152505 | 0.190382 | 0 | 0.699936 |
| Alaska | Sablefish | Average Employment Rate | 108 | 0.432467 | 0.008602 | 0.417269 | 0.451882 |
| | | Exports/Pounds Landed | 108 | 0.060213 | 0.072092 | 0.002263 | 0.460414 |
| | | Food CPI | 108 | 135.5218 | 8.537929 | 123.4 | 147.9333 |
| | | Gini on Landings | 108 | 0.614119 | 0.118078 | 0.464595 | 0.75907 |
| | | Imports/Pounds Landed | 108 | 0.000378 | 0.000418 | 0 | 0.002287 |
| | | Per-Capita Income | 108 | 8648.61 | 681.2566 | 7524.889 | 9967.518 |
| | | Pounds Landed (1000s) | 108 | 4267.401 | 7029.071 | 0 | 36019.73 |
| | | Pounds-Weighted MA Price/lb | 108 | 1.61406 | 0.8437 | 0.572374 | 3.56 |
| | | Price/lb | 108 | 1.572909 | 0.814507 | 0.520828 | 3.648521 |
| | | Share of Annual Landings | 108 | 0.083333 | 0.122169 | 0 | 0.62669 |
| | | Share of Annual Landings/Gini | 108 | 0.14101 | 0.186622 | 0 | 0.827231 |
| Gulf of Mexico | Deep Water Grouper | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.305492 | 0.15121 | 0.139113 | 0.601389 |
| | | Imports/Pounds Landed | 300 | 0.780591 | 0.354071 | 0 | 1.861785 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 88.70777 | 60.71956 | 0 | 313.052 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.554392 | 0.584747 | 1.713795 | 3.905328 |
| | | Price/lb | 300 | 2.584479 | 0.600906 | 1.55459 | 3.981425 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.052375 | 0 | 0.255873 |
| | | Share of Annual Landings/Gini | 300 | 0.332331 | 0.199884 | 0 | 0.86009 |
| Gulf of Mexico | Gag | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.208694 | 0.054928 | 0.118163 | 0.338375 |
| | | Imports/Pounds Landed | 300 | 0.670118 | 0.535113 | 0 | 2.882176 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 138.4054 | 93.21101 | 0.039 | 565.584 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.7683 | 0.691933 | 1.953005 | 4.248104 |
| | | Price/lb | 300 | 2.786154 | 0.712841 | 1.61883 | 4.330509 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.03323 | 1.44E-05 | 0.255725 |
| | | Share of Annual Landings/Gini | 300 | 0.426657 | 0.18772 | 4.42E-05 | 0.983646 |
| Gulf of Mexico | Grouper, Red | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.156567 | 0.049557 | 0.096184 | 0.310078 |
| | | Imports/Pounds Landed | 300 | 0.140456 | 0.060518 | 0 | 0.318954 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 487.082 | 168.0424 | 1.525 | 974.722 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.118293 | 0.437716 | 1.49576 | 3.258939 |
| | | Price/lb | 300 | 2.150222 | 0.468176 | 1.25541 | 3.364407 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.02489 | 0.000239 | 0.152442 |
| | | Share of Annual Landings/Gini | 300 | 0.576616 | 0.21259 | 0.000769 | 1.117597 |
| Gulf of Mexico | Other Shallow Water Grouper | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.154964 | 0.045754 | 0.085823 | 0.275416 |
| | | Imports/Pounds Landed | 300 | 1.562946 | 1.113011 | 0 | 5.262701 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 57.23275 | 33.29148 | 7.21688 | 210.096 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.66823 | 0.618726 | 1.797595 | 3.947925 |
| | | Price/lb | 300 | 2.688093 | 0.633274 | 1.633335 | 3.991852 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.024132 | 0.008711 | 0.155199 |
| | | Share of Annual Landings/Gini | 300 | 0.582845 | 0.220864 | 0.037101 | 1.284202 |
| Gulf of Mexico | Snapper, Red | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.39715 | 0.241131 | 0.102392 | 0.754836 |
| | | Imports/Pounds Landed | 300 | 0.589311 | 0.2539 | 0 | 1.29051 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 327.5437 | 328.8372 | 0 | 1922.353 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.725586 | 0.802943 | 1.708855 | 4.361833 |
| | | Price/lb | 300 | 2.845838 | 0.761104 | 1.688235 | 4.441441 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.081181 | 0 | 0.525314 |
| | | Share of Annual Landings/Gini | 300 | 0.329311 | 0.277015 | 0 | 1.202792 |
| Gulf of Mexico | Tilefish | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.301984 | 0.152477 | 0.157369 | 0.720372 |
| | | Imports/Pounds Landed | 300 | 1.843249 | 0.848255 | 0 | 5.074099 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 37.62454 | 26.12243 | 0 | 186.603 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.422314 | 0.365526 | 0.679047 | 2.395228 |
| | | Price/lb | 300 | 1.439433 | 0.406661 | 0.354606 | 2.584085 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.054195 | 0 | 0.417413 |
| | | Share of Annual Landings/Gini | 300 | 0.330808 | 0.196248 | 0 | 0.886399 |
| Mid-Atlantic | Tilefish, Golden | Average Employment Rate | 300 | 0.452303 | 0.011398 | 0.432491 | 0.481664 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 164.6809 | 24.40302 | 132.45 | 214.4033 |
| | | Gini on Landings | 300 | 0.187359 | 0.133028 | 0 | 0.728147 |
| | | Imports/Pounds Landed | 300 | 1.376979 | 4.888302 | 0 | 32.34045 |
| | | Per-Capita Income | 300 | 12024.69 | 3126.473 | 7193.126 | 17602.22 |
| | | Pounds Landed (1000s) | 300 | 130.5372 | 74.25519 | 0 | 367.564 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.057805 | 0.655262 | 0.97053 | 3.306917 |
| | | Price/lb | 300 | 2.07457 | 0.718326 | 0.784712 | 3.953377 |
| | | Share of Annual Landings | 300 | 0.076667 | 0.043643 | 0 | 0.354834 |
| | | Share of Annual Landings/Gini | 300 | 0.471514 | 0.300126 | 0 | 1.325847 |
| New England | Cod, Atlantic | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.957325 | 1.179368 | 0.028727 | 6.935654 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.188409 | 0.034858 | 0.123385 | 0.278054 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Imports/Pounds Landed | 300 | 0.649263 | 0.567485 | 0.170892 | 3.245587 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 2441.373 | 2137.632 | 235.138 | 12795.12 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.26179 | 0.420238 | 0.576594 | 2.38885 |
| | | Price/lb | 300 | 1.316217 | 0.477027 | 0.493834 | 2.827918 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.029705 | 0.021642 | 0.181549 |
| | | Share of Annual Landings/Gini | 300 | 0.45781 | 0.176522 | 0.09272 | 0.941691 |
| New England | Flounder, American Plaice | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 3.677974 | 4.573133 | 0.039733 | 34.96698 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.196825 | 0.057319 | 0.083523 | 0.28561 |
| | | Imports/Pounds Landed | 300 | 1.37073 | 0.893785 | 0.308935 | 4.085317 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 530.7845 | 407.84 | 69.863 | 2112.567 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.31609 | 0.273196 | 0.801065 | 2.115232 |
| | | Price/lb | 300 | 1.379758 | 0.416853 | 0.636656 | 3.344043 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.031015 | 0.023545 | 0.176494 |
| | | Share of Annual Landings/Gini | 300 | 0.472267 | 0.235695 | 0.085737 | 1.284379 |
| New England | Flounder, Winter | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 2.20857 | 2.342022 | 0.015824 | 13.74268 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.288747 | 0.071663 | 0.153898 | 0.443715 |
| | | Imports/Pounds Landed | 300 | 0.812109 | 0.360297 | 0.324241 | 1.938735 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 713.0865 | 459.6333 | 16.133 | 2021.61 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.470183 | 0.387347 | 0.716395 | 2.465403 |
| | | Price/lb | 300 | 1.572019 | 0.486788 | 0.486186 | 3.130858 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.044653 | 0.002971 | 0.253473 |
| | | Share of Annual Landings/Gini | 300 | 0.307543 | 0.170273 | 0.007115 | 0.775859 |
| New England | Flounder, Witch | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 5.431685 | 6.878161 | 0.025302 | 38.70648 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.163664 | 0.035284 | 0.096851 | 0.224828 |
| | | Imports/Pounds Landed | 300 | 1.900533 | 1.109425 | 0.574955 | 6.327501 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 336.3324 | 189.6759 | 47.448 | 1020.96 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.764993 | 0.413286 | 1.072913 | 2.753399 |
| | | Price/lb | 300 | 1.834322 | 0.539456 | 0.921491 | 3.838351 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.025627 | 0.028375 | 0.160179 |
| | | Share of Annual Landings/Gini | 300 | 0.535308 | 0.197977 | 0.132872 | 1.115227 |
| New England | Flounder, Yellowtail | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 2.990109 | 3.485682 | 0.01013 | 18.11812 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.255858 | 0.081672 | 0.068822 | 0.460862 |
| | | Imports/Pounds Landed | 300 | 1.024718 | 0.576383 | 0.141367 | 3.038677 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 711.1715 | 654.9329 | 53.575 | 3461.427 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.267404 | 0.282503 | 0.503472 | 2.064696 |
| | | Price/lb | 300 | 1.301651 | 0.371359 | 0.362308 | 2.564218 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.041526 | 0.00368 | 0.248722 |
| | | Share of Annual Landings/Gini | 300 | 0.37735 | 0.250781 | 0.007986 | 1.448403 |
| New England | Haddock | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.019388 | 0.042604 | 0 | 0.504584 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.262428 | 0.098984 | 0.099856 | 0.499137 |
| | | Imports/Pounds Landed | 300 | 1.288205 | 1.681153 | 0.174964 | 8.909219 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 721.7243 | 654.7311 | 36.585 | 4175.746 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.275607 | 0.246098 | 0.895979 | 2.153027 |
| | | Price/lb | 300 | 1.313638 | 0.299176 | 0.646296 | 2.398127 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.046166 | 0.01539 | 0.32936 |
| | | Share of Annual Landings/Gini | 300 | 0.371074 | 0.22466 | 0.030834 | 1.115495 |
| New England | Hake, White | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 1.129339 | 1.937393 | 0 | 13.57008 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.214076 | 0.096466 | 0.088229 | 0.39332 |
| | | Imports/Pounds Landed | 300 | 0.495252 | 0.407191 | 0.066784 | 2.693063 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 605.0888 | 504.0507 | 67.005 | 3869.519 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.794216 | 0.310991 | 0.317953 | 1.770979 |
| | | Price/lb | 300 | 0.849614 | 0.382575 | 0.269162 | 2.289262 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.035425 | 0.015875 | 0.208903 |
| | | Share of Annual Landings/Gini | 300 | 0.4811 | 0.264165 | 0.040361 | 1.22055 |
| New England | Pollock | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 3.288192 | 3.606994 | 0.003061 | 17.91076 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.163884 | 0.048705 | 0.094489 | 0.301532 |
| | | Imports/Pounds Landed | 300 | 1.273957 | 0.646015 | 0.177143 | 3.671391 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 1018.429 | 498.5058 | 206.967 | 4205.062 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.697045 | 0.171747 | 0.38199 | 1.249143 |
| | | Price/lb | 300 | 0.735797 | 0.245691 | 0.295201 | 1.715829 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.025912 | 0.018205 | 0.201696 |
| | | Share of Annual Landings/Gini | 300 | 0.549747 | 0.211114 | 0.112179 | 1.159006 |
| New England | Redfish, Acadian | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.013977 | 0.041727 | 0 | 0.222589 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.198396 | 0.043714 | 0.141333 | 0.300841 |
| | | Imports/Pounds Landed | 300 | 0.05475 | 0.156759 | 0 | 0.67885 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 195.2201 | 248.3671 | 10.613 | 1888.574 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.56567 | 0.094868 | 0.374465 | 0.812636 |
| | | Price/lb | 300 | 0.579324 | 0.135609 | 0.288884 | 1.017031 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.031698 | 0.019303 | 0.206656 |
| | | Share of Annual Landings/Gini | 300 | 0.439286 | 0.179166 | 0.086954 | 1.104316 |
| Pacific | Cod, Pacific | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 19.79731 | 34.36041 | 0.411775 | 333.7556 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.466799 | 0.08481 | 0.343722 | 0.712482 |
| | | Imports/Pounds Landed | 300 | 13.64741 | 15.49789 | 2.962574 | 89.47988 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 138.7322 | 164.215 | 0 | 878.307 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.448317 | 0.091145 | 0.271771 | 0.687596 |
| | | Price/lb | 300 | 0.45146 | 0.093091 | 0.264215 | 0.719745 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.076266 | 0 | 0.517685 |
| | | Share of Annual Landings/Gini | 300 | 0.184026 | 0.160738 | 0 | 0.726595 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| Pacific | Flounder, Starry | Average Employment Rate | 299 | 0.415537 | 0.014899 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 299 | 277.7559 | 522.4432 | 0.614768 | 3762.973 |
| | | Food CPI | 299 | 187.5381 | 35.79553 | 132.025 | 251.3358 |
| | | Gini on Landings | 299 | 0.411839 | 0.103605 | 0.208099 | 0.639113 |
| | | Imports/Pounds Landed | 299 | 87.4091 | 120.6016 | 2.45667 | 650.3025 |
| | | Per-Capita Income | 299 | 11512.5 | 3072.758 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 299 | 28.24425 | 48.37053 | 0 | 344.769 |
| | | Pounds-Weighted MA Price/lb | 299 | 0.470082 | 0.190661 | 0.253759 | 1.075443 |
| | | Price/lb | 299 | 0.538016 | 0.309709 | 0.201941 | 2.875 |
| | | Share of Annual Landings | 299 | 0.083612 | 0.071755 | 0 | 0.469659 |
| | | Share of Annual Landings/Gini | 299 | 0.216986 | 0.173384 | 0 | 0.819557 |
| Pacific | Lingcod | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.004859 | 0.034 | 0 | 0.524659 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.372495 | 0.088081 | 0.237625 | 0.614823 |
| | | Imports/Pounds Landed | 300 | 0.163002 | 0.18353 | 0 | 0.927224 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 116.5361 | 164.7482 | 0 | 1005.468 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.60864 | 0.189739 | 0.293112 | 0.954934 |
| | | Price/lb | 300 | 0.634964 | 0.358936 | 0.293112 | 3.454545 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.057982 | 0 | 0.288734 |
| | | Share of Annual Landings/Gini | 300 | 0.23588 | 0.159811 | 0 | 0.626857 |
| Pacific | Rockfish, Bocaccio | Average Employment Rate | 289 | 0.415264 | 0.015085 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 289 | 6.142698 | 18.27772 | 0 | 120.0632 |
| | | Food CPI | 289 | 189.8145 | 34.978 | 136.9417 | 251.5712 |
| | | Gini on Landings | 289 | 0.33383 | 0.168319 | 0.144782 | 0.916667 |
| | | Imports/Pounds Landed | 289 | 23.69824 | 67.02648 | 0 | 298.0939 |
| | | Per-Capita Income | 289 | 11704.86 | 3014.689 | 7068.692 | 17615.14 |
| | | Pounds Landed (1000s) | 289 | 23.44371 | 39.07572 | 0 | 197.481 |
| | | Pounds-Weighted MA Price/lb | 289 | 0.535447 | 0.176487 | 0.282024 | 1.140586 |
| | | Price/lb | 289 | 0.561607 | 0.235601 | 0.220339 | 1.557769 |
| | | Share of Annual Landings | 289 | 0.086505 | 0.084874 | 0 | 1 |
| | | Share of Annual Landings/Gini | 289 | 0.310417 | 0.209278 | 0 | 1.090909 |
| Pacific | Rockfish, Canary | Average Employment Rate | 299 | 0.415537 | 0.014899 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 299 | 4.549459 | 13.70319 | 0 | 75.11661 |
| | | Food CPI | 299 | 187.5381 | 35.79553 | 132.025 | 251.3358 |
| | | Gini on Landings | 299 | 0.483994 | 0.138566 | 0.200903 | 0.724572 |
| | | Imports/Pounds Landed | 299 | 17.49664 | 50.73214 | 0 | 218.2008 |
| | | Per-Capita Income | 299 | 11512.5 | 3072.758 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 299 | 30.02613 | 68.52319 | 0 | 385.582 |
| | | Pounds-Weighted MA Price/lb | 299 | 0.464775 | 0.072037 | 0.315809 | 0.676077 |
| | | Price/lb | 299 | 0.477339 | 0.100426 | 0.2759 | 0.859347 |
| | | Share of Annual Landings | 299 | 0.083612 | 0.081871 | 0 | 0.50349 |
| | | Share of Annual Landings/Gini | 299 | 0.192197 | 0.173569 | 0 | 0.694879 |
| Pacific | Rockfish, Chilipepper | Average Employment Rate | 298 | 0.415503 | 0.014918 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 298 | 0.205887 | 0.61419 | 0 | 3.643274 |
| | | Food CPI | 298 | 188.1238 | 35.75668 | 132.5083 | 251.5712 |
| | | Gini on Landings | 298 | 0.383478 | 0.176355 | 0.151081 | 0.75316 |
| | | Imports/Pounds Landed | 298 | 0.801032 | 2.309135 | 0 | 10.85936 |
| | | Per-Capita Income | 298 | 11564.05 | 3074.406 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 298 | 66.473 | 65.72153 | 0 | 280.466 |
| | | Pounds-Weighted MA Price/lb | 298 | 0.520027 | 0.150139 | 0.298817 | 0.933404 |
| | | Price/lb | 298 | 0.578794 | 0.285648 | 0.28543 | 2.291925 |
| | | Share of Annual Landings | 298 | 0.083893 | 0.070535 | 0 | 0.47926 |
| | | Share of Annual Landings/Gini | 298 | 0.271531 | 0.202041 | 0 | 0.868814 |
| Pacific | Rockfish, Darkblotched | Average Employment Rate | 201 | 0.418273 | 0.016292 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 201 | 0.945622 | 2.267023 | 0 | 11.76649 |
| | | Food CPI | 201 | 207.6533 | 26.11803 | 164.8875 | 251.5712 |
| | | Gini on Landings | 201 | 0.374944 | 0.180757 | 0 | 0.916667 |
| | | Imports/Pounds Landed | 201 | 3.669835 | 8.459068 | 0 | 33.68742 |
| | | Per-Capita Income | 201 | 13300.47 | 2115.543 | 9652.055 | 17615.14 |
| | | Pounds Landed (1000s) | 201 | 15.77881 | 15.05128 | 0 | 82.794 |
| | | Pounds-Weighted MA Price/lb | 201 | 0.46201 | 0.04852 | 0.3126 | 0.661111 |
| | | Price/lb | 201 | 0.481073 | 0.084074 | 0.3126 | 0.9375 |
| | | Share of Annual Landings | 201 | 0.079602 | 0.091033 | 0 | 1 |
| | | Share of Annual Landings/Gini | 201 | 0.222712 | 0.187518 | 0 | 1.090909 |
| Pacific | Rockfish, Pacific Ocean Perch | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 1.813584 | 5.427278 | 0 | 34.18591 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.276574 | 0.116083 | 0.130684 | 0.592283 |
| | | Imports/Pounds Landed | 300 | 7.029256 | 20.01802 | 0 | 86.65894 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 118.9154 | 162.2475 | 0 | 826.184 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.398346 | 0.086486 | 0.253252 | 0.534955 |
| | | Price/lb | 300 | 0.404298 | 0.094805 | 0.250757 | 0.926627 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.050853 | 0 | 0.420962 |
| | | Share of Annual Landings/Gini | 300 | 0.350775 | 0.206071 | 0 | 0.912787 |
| Pacific | Rockfish, Splitnose | Average Employment Rate | 267 | 0.415733 | 0.015516 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 267 | 3.85681 | 10.91655 | 0 | 61.82 |
| | | Food CPI | 267 | 193.9807 | 33.10069 | 141.7875 | 251.5712 |
| | | Gini on Landings | 267 | 0.418526 | 0.291591 | 0 | 0.916667 |
| | | Imports/Pounds Landed | 267 | 14.9812 | 39.84043 | 0 | 168.8229 |
| | | Per-Capita Income | 267 | 12068.61 | 2844.887 | 7559.439 | 17615.14 |
| | | Pounds Landed (1000s) | 267 | 3.843846 | 7.177598 | 0 | 49.337 |
| | | Pounds-Weighted MA Price/lb | 267 | 0.337464 | 0.179545 | 0.219734 | 1.705882 |
| | | Price/lb | 267 | 0.401135 | 0.294145 | 0.105665 | 1.787879 |
| | | Share of Annual Landings | 267 | 0.067416 | 0.129976 | 0 | 1 |
| | | Share of Annual Landings/Gini | 267 | 0.141842 | 0.202242 | 0 | 1.090909 |
| Pacific | Rockfish, Widow | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.171708 | 0.566506 | 0 | 3.692286 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.445622 | 0.236909 | 0.12306 | 0.804595 |
| | | Imports/Pounds Landed | 300 | 0.688677 | 2.333936 | 0 | 13.64931 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 544.7801 | 665.2791 | 0 | 2882.283 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.396777 | 0.097006 | 0.252772 | 0.975806 |
| | | Price/lb | 300 | 0.440342 | 0.186609 | 0.234011 | 1.509554 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.096437 | 0 | 0.733611 |
| | | Share of Annual Landings/Gini | 300 | 0.266089 | 0.237019 | 0 | 0.981652 |
| Pacific | Rockfish, Yelloweye | Average Employment Rate | 297 | 0.415546 | 0.014949 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 297 | 130.8004 | 404.6606 | 0 | 2075.978 |
| | | Food CPI | 297 | 187.1096 | 35.53068 | 132.025 | 250.5442 |
| | | Gini on Landings | 297 | 0.643339 | 0.19762 | 0.322168 | 0.916667 |
| | | Imports/Pounds Landed | 297 | 530.127 | 1611.86 | 0 | 7674.288 |
| | | Per-Capita Income | 297 | 11471.4 | 3041.76 | 6882.084 | 17362.57 |
| | | Pounds Landed (1000s) | 297 | 0.183657 | 0.421951 | 0 | 3.904 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Pounds-Weighted MA Price/lb | 297 | 0.616754 | 0.174864 | 0.230769 | 1.049497 |
| | | Price/lb | 297 | 0.586826 | 0.202294 | 0.230769 | 1.5 |
| | | Share of Annual Landings | 297 | 0.084175 | 0.151929 | 0 | 1 |
| | | Share of Annual Landings/Gini | 297 | 0.144837 | 0.207507 | 0 | 1.090909 |
| Pacific | Rockfish, Yellowtail | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.043278 | 0.13018 | 0 | 0.74706 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.395234 | 0.13243 | 0.183323 | 0.697778 |
| | | Imports/Pounds Landed | 300 | 0.168544 | 0.479405 | 0 | 2.137323 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 369.8048 | 379.2534 | 0 | 1777.946 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.418352 | 0.080772 | 0.265614 | 0.557846 |
| | | Price/lb | 300 | 0.430529 | 0.106606 | 0.189651 | 1.3875 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.065396 | 0 | 0.404891 |
| | | Share of Annual Landings/Gini | 300 | 0.23881 | 0.177309 | 0 | 0.702598 |
| Pacific | Sablefish (fixed gear) | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.290768 | 0.302764 | 0.008519 | 3.296523 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.343722 | 0.089536 | 0.24082 | 0.51456 |
| | | Imports/Pounds Landed | 300 | 0.005597 | 0.006605 | 0 | 0.054086 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 679.2096 | 538.9435 | 28.164 | 3680.566 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.771094 | 0.670646 | 0.450738 | 3.616236 |
| | | Price/lb | 300 | 1.732996 | 0.692823 | 0.450738 | 3.739452 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.061604 | 0.003001 | 0.399128 |
| | | Share of Annual Landings/Gini | 300 | 0.25855 | 0.176447 | 0.005832 | 0.849102 |
| Pacific | Sablefish (trawl) | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.383829 | 0.321035 | 0.011692 | 2.415514 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.302751 | 0.081507 | 0.193915 | 0.472321 |
| | | Imports/Pounds Landed | 300 | 0.009824 | 0.015636 | 0 | 0.128448 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 549.9016 | 486.9242 | 37.457 | 3334.41 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.211801 | 0.538204 | 0.296828 | 2.672021 |
| | | Price/lb | 300 | 1.196714 | 0.541948 | 0.287215 | 2.794892 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.056369 | 0.005286 | 0.387144 |
| | | Share of Annual Landings/Gini | 300 | 0.294333 | 0.185354 | 0.01212 | 0.954416 |
| Pacific | Sole, Dover | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.750371 | 0.657053 | 0.010801 | 4.288622 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.164456 | 0.056212 | 0.08456 | 0.368717 |
| | | Imports/Pounds Landed | 300 | 0.305413 | 0.104869 | 0.118773 | 0.718676 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 1767.611 | 807.6332 | 1.351 | 5173.098 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.350664 | 0.049644 | 0.25654 | 0.460126 |
| | | Price/lb | 300 | 0.352462 | 0.050727 | 0.25654 | 0.464602 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.027188 | 8.92E-05 | 0.183869 |
| | | Share of Annual Landings/Gini | 300 | 0.559487 | 0.235244 | 0.000242 | 1.27709 |
| Pacific | Sole, English | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 13.88441 | 20.00077 | 0.060707 | 92.53357 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.275615 | 0.071193 | 0.152464 | 0.413063 |
| | | Imports/Pounds Landed | 300 | 4.601319 | 4.592767 | 0.908151 | 28.50261 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 197.5453 | 151.4477 | 0 | 782.363 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.340203 | 0.013748 | 0.307161 | 0.376364 |
| | | Price/lb | 300 | 0.341492 | 0.016707 | 0.291061 | 0.393018 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.042735 | 0 | 0.240043 |
| | | Share of Annual Landings/Gini | 300 | 0.325078 | 0.175228 | 0 | 0.779241 |
| Pacific | Sole, Petrale | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 3.995601 | 3.553815 | 0.037357 | 22.00536 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.309209 | 0.073043 | 0.166381 | 0.477888 |
| | | Imports/Pounds Landed | 300 | 1.627607 | 0.602953 | 0.622551 | 4.413936 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 328.034 | 231.1458 | 0 | 1379.112 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.007117 | 0.176973 | 0.787132 | 1.54196 |
| | | Price/lb | 300 | 1.024606 | 0.189748 | 0.755708 | 1.614321 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.052657 | 0 | 0.286466 |
| | | Share of Annual Landings/Gini | 300 | 0.286445 | 0.180953 | 0 | 0.879338 |
| Pacific | Thornyhead, Shortspine | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.076844 | 0.230532 | 0 | 1.478665 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.209266 | 0.081461 | 0.090696 | 0.4091 |
| | | Imports/Pounds Landed | 300 | 0.297451 | 0.847755 | 0 | 3.67357 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 134.2885 | 83.44817 | 0 | 426.65 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.791021 | 0.206338 | 0.324377 | 1.139018 |
| | | Price/lb | 300 | 0.809657 | 0.23317 | 0.324377 | 1.978264 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.034293 | 0 | 0.199739 |
| | | Share of Annual Landings/Gini | 300 | 0.456917 | 0.226611 | 0 | 1.148255 |
| Alaska | Clam, Pacific Geoduck | Average Employment Rate | 104 | 0.432824 | 0.008525 | 0.418263 | 0.451882 |
| | | Exports/Pounds Landed | 104 | 0 | 0 | 0 | 0 |
| | | Food CPI | 104 | 135.9755 | 8.373327 | 124.2667 | 147.9333 |
| | | Gini on Landings | 104 | 0.776983 | 0.283928 | 0 | 0.916667 |
| | | Imports/Pounds Landed | 104 | 0.807525 | 1.14813 | 0 | 6.400455 |
| | | Per-Capita Income | 104 | 8690.147 | 659.4503 | 7699.896 | 9967.518 |
| | | Pounds Landed (1000s) | 104 | 15.01325 | 45.68454 | 0 | 209.981 |
| | | Pounds-Weighted MA Price/lb | 104 | 1.801526 | 1.195523 | 0.5 | 4.000958 |
| | | Price/lb | 104 | 1.877872 | 1.263614 | 0.5 | 4.000972 |
| | | Share of Annual Landings | 104 | 0.076923 | 0.220492 | 0 | 1 |
| | | Share of Annual Landings/Gini | 104 | 0.088133 | 0.249184 | 0 | 1.090909 |
| Alaska | Flatfish | Average Employment Rate | 107 | 0.432286 | 0.008432 | 0.417269 | 0.450256 |
| | | Exports/Pounds Landed | 107 | 0.560311 | 0.537031 | 0.011402 | 2.347523 |
| | | Food CPI | 107 | 135.4058 | 8.492177 | 123.4 | 147.8 |
| | | Gini on Landings | 107 | 0.415696 | 0.075982 | 0.282767 | 0.518301 |
| | | Imports/Pounds Landed | 107 | 0.258243 | 0.149787 | 0.058013 | 0.720978 |
| | | Per-Capita Income | 107 | 8636.284 | 672.2537 | 7524.889 | 9967.518 |
| | | Pounds Landed (1000s) | 107 | 2544.026 | 2445.079 | 0.117 | 12974.49 |
| | | Pounds-Weighted MA Price/lb | 107 | 0.097569 | 0.019924 | 0.068303 | 0.150786 |
| | | Price/lb | 107 | 0.101735 | 0.033627 | 0.049991 | 0.220019 |
| | | Share of Annual Landings | 107 | 0.084112 | 0.06423 | 4.57E-06 | 0.266224 |
| | | Share of Annual Landings/Gini | 107 | 0.209574 | 0.156644 | 8.82E-06 | 0.588108 |
| Alaska | Flounder, Arrowtooth | Average Employment Rate | 106 | 0.432116 | 0.008287 | 0.417269 | 0.448468 |
| | | Exports/Pounds Landed | 106 | 4.236382 | 3.665079 | 0.266594 | 19.57065 |
| | | Food CPI | 106 | 135.2892 | 8.446006 | 123.4 | 147.8 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Gini on Landings | 106 | 0.509306 | 0.070564 | 0.410644 | 0.644523 |
| | | Imports/Pounds Landed | 106 | 1.987694 | 0.898697 | 0.725056 | 4.620338 |
| | | Per-Capita Income | 106 | 8623.725 | 662.7156 | 7524.889 | 9967.518 |
| | | Pounds Landed (1000s) | 106 | 598.647 | 699.201 | 0 | 3543.903 |
| | | Pounds-Weighted MA Price/lb | 106 | 0.06116 | 0.051096 | 0.027197 | 0.271658 |
| | | Price/lb | 106 | 0.06427 | 0.065803 | 0.016788 | 0.345925 |
| | | Share of Annual Landings | 106 | 0.084906 | 0.084592 | 0 | 0.41461 |
| | | Share of Annual Landings/Gini | 106 | 0.169664 | 0.164083 | 0 | 0.700943 |
| Alaska | Herring, Pacific | Average Employment Rate | 107 | 0.432286 | 0.008432 | 0.417269 | 0.450256 |
| | | Exports/Pounds Landed | 107 | 0.08736 | 0.123587 | 0.000651 | 0.508563 |
| | | Food CPI | 107 | 135.4058 | 8.492177 | 123.4 | 147.8 |
| | | Gini on Landings | 107 | 0.787458 | 0.031061 | 0.728478 | 0.843486 |
| | | Imports/Pounds Landed | 107 | 0.052929 | 0.022474 | 0.016802 | 0.127366 |
| | | Per-Capita Income | 107 | 8636.284 | 672.2537 | 7524.889 | 9967.518 |
| | | Pounds Landed (1000s) | 107 | 8914.486 | 18115.11 | 0 | 78465.52 |
| | | Pounds-Weighted MA Price/lb | 107 | 0.241363 | 0.155999 | 0.090077 | 0.95665 |
| | | Price/lb | 107 | 0.207075 | 0.145714 | 0.090077 | 0.99125 |
| | | Share of Annual Landings | 107 | 0.084112 | 0.169595 | 0 | 0.749281 |
| | | Share of Annual Landings/Gini | 107 | 0.106973 | 0.214044 | 0 | 0.888315 |
| Alaska | Salmon, Chinook | Average Employment Rate | 108 | 0.432467 | 0.008602 | 0.417269 | 0.451882 |
| | | Exports/Pounds Landed | 108 | 5.828053 | 6.751276 | 1.42111 | 33.28741 |
| | | Food CPI | 108 | 135.5218 | 8.537929 | 123.4 | 147.9333 |
| | | Gini on Landings | 108 | 0.749867 | 0.039896 | 0.684345 | 0.806936 |
| | | Imports/Pounds Landed | 108 | 2.424441 | 1.019941 | 1.280971 | 5.050577 |
| | | Per-Capita Income | 108 | 8648.61 | 681.2566 | 7524.889 | 9967.518 |
| | | Pounds Landed (1000s) | 108 | 885.1843 | 1628.132 | 1.602 | 7185.896 |
| | | Pounds-Weighted MA Price/lb | 108 | 1.834402 | 0.386538 | 1.129811 | 2.661589 |
| | | Price/lb | 108 | 1.887798 | 0.47539 | 0.769231 | 2.739418 |
| | | Share of Annual Landings | 108 | 0.083333 | 0.152156 | 0.000133 | 0.596384 |
| | | Share of Annual Landings/Gini | 108 | 0.111446 | 0.202125 | 0.000165 | 0.739073 |
| Alaska | Salmon, Chum | Average Employment Rate | 101 | 0.432497 | 0.008243 | 0.418263 | 0.448468 |
| | | Exports/Pounds Landed | 101 | 0.739835 | 0.921679 | 0.112499 | 4.967639 |
| | | Food CPI | 101 | 135.8563 | 8.246844 | 124.4833 | 147.8 |
| | | Gini on Landings | 101 | 0.791762 | 0.010981 | 0.774469 | 0.807736 |
| | | Imports/Pounds Landed | 101 | 0.26651 | 0.078733 | 0.145824 | 0.567354 |
| | | Per-Capita Income | 101 | 8674.657 | 636.5839 | 7699.896 | 9967.518 |
| | | Pounds Landed (1000s) | 101 | 8548.254 | 16482 | 0 | 79512.63 |
| | | Pounds-Weighted MA Price/lb | 101 | 0.336359 | 0.121447 | 0.1494 | 0.695055 |
| | | Price/lb | 101 | 0.345083 | 0.131786 | 0.146998 | 0.695055 |
| | | Share of Annual Landings | 101 | 0.089109 | 0.160152 | 0 | 0.574765 |
| | | Share of Annual Landings/Gini | 101 | 0.112612 | 0.202173 | 0 | 0.716746 |
| Alaska | Salmon, Coho | Average Employment Rate | 102 | 0.432466 | 0.008208 | 0.418263 | 0.448468 |
| | | Exports/Pounds Landed | 102 | 0.78327 | 0.888314 | 0.129628 | 4.753273 |
| | | Food CPI | 102 | 135.7426 | 8.285767 | 124.2667 | 147.8 |
| | | Gini on Landings | 102 | 0.794442 | 0.016099 | 0.7658 | 0.813392 |
| | | Imports/Pounds Landed | 102 | 0.342542 | 0.234331 | 0.110571 | 1.275146 |
| | | Per-Capita Income | 102 | 8665.101 | 640.7356 | 7699.896 | 9967.518 |
| | | Pounds Landed (1000s) | 102 | 3822.623 | 7514.717 | 0 | 41674.06 |
| | | Pounds-Weighted MA Price/lb | 102 | 0.789735 | 0.173362 | 0.422794 | 1.181193 |
| | | Price/lb | 102 | 0.776265 | 0.175008 | 0.422794 | 1.181193 |
| | | Share of Annual Landings | 102 | 0.088235 | 0.160628 | 0 | 0.568025 |
| | | Share of Annual Landings/Gini | 102 | 0.111068 | 0.201854 | 0 | 0.702752 |
| Alaska | Salmon, Pink | Average Employment Rate | 100 | 0.432337 | 0.008126 | 0.418263 | 0.447005 |
| | | Exports/Pounds Landed | 100 | 0.116924 | 0.136914 | 0.020933 | 0.775723 |
| | | Food CPI | 100 | 135.7388 | 8.203073 | 124.4833 | 147.8 |
| | | Gini on Landings | 100 | 0.866484 | 0.007187 | 0.85312 | 0.876274 |
| | | Imports/Pounds Landed | 100 | 0.045682 | 0.021127 | 0.02218 | 0.13349 |
| | | Per-Capita Income | 100 | 8661.729 | 626.3225 | 7699.896 | 9814.561 |
| | | Pounds Landed (1000s) | 100 | 26177.71 | 64360.21 | 0 | 310858.2 |
| | | Pounds-Weighted MA Price/lb | 100 | 0.18229 | 0.063049 | 0.085608 | 0.335003 |
| | | Price/lb | 100 | 0.185402 | 0.063257 | 0.085608 | 0.335003 |
| | | Share of Annual Landings | 100 | 0.09 | 0.213944 | 0 | 0.779251 |
| | | Share of Annual Landings/Gini | 100 | 0.103808 | 0.246629 | 0 | 0.889278 |
| Alaska | Salmon, Sockeye | Average Employment Rate | 101 | 0.432308 | 0.008091 | 0.418263 | 0.447005 |
| | | Exports/Pounds Landed | 101 | 0.234902 | 0.252081 | 0.05177 | 0.956044 |
| | | Food CPI | 101 | 135.6252 | 8.241394 | 124.2667 | 147.8 |
| | | Gini on Landings | 101 | 0.847133 | 0.016852 | 0.816961 | 0.869902 |
| | | Imports/Pounds Landed | 101 | 0.107586 | 0.086606 | 0.038528 | 0.371398 |
| | | Per-Capita Income | 101 | 8652.206 | 630.4893 | 7699.896 | 9814.561 |
| | | Pounds Landed (1000s) | 101 | 25145.86 | 60718.48 | 0 | 264057.4 |
| | | Pounds-Weighted MA Price/lb | 101 | 1.108685 | 0.285303 | 0.74699 | 2.235721 |
| | | Price/lb | 101 | 1.158354 | 0.303685 | 0.739019 | 2.235721 |
| | | Share of Annual Landings | 101 | 0.089109 | 0.20455 | 0 | 0.824921 |
| | | Share of Annual Landings/Gini | 101 | 0.105226 | 0.240813 | 0 | 0.948292 |
| Gulf of Mexico | Crayfishes Or Crawfishes | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0.011388 | 0.03459 | 0 | 0.326062 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.693924 | 0.067738 | 0.560888 | 0.822333 |
| | | Imports/Pounds Landed | 300 | 0.141187 | 0.463674 | 0 | 5.146012 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 1272.929 | 2126.584 | 0 | 13794.92 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.852821 | 0.382986 | 0.293011 | 2.426437 |
| | | Price/lb | 300 | 0.98388 | 0.522591 | 0.124994 | 3.372998 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.123998 | 0 | 0.55507 |
| | | Share of Annual Landings/Gini | 300 | 0.121293 | 0.17566 | 0 | 0.710609 |
| Gulf of Mexico | Lobster, Caribbean Spiny | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 1.118492 | 1.13805 | 0.108564 | 5.012611 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.591367 | 0.029245 | 0.526009 | 0.65276 |
| | | Imports/Pounds Landed | 300 | 1.792312 | 1.008121 | 0.469753 | 5.677608 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 405.6876 | 485.2796 | 0 | 2277.215 |
| | | Pounds-Weighted MA Price/lb | 300 | 5.069155 | 1.77907 | 2.840118 | 13.84251 |
| | | Price/lb | 300 | 5.215432 | 2.078757 | 1.040411 | 14.2321 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.094282 | 0 | 0.371661 |
| | | Share of Annual Landings/Gini | 300 | 0.141264 | 0.159027 | 0 | 0.604783 |
| Gulf of Mexico | Oyster, Eastern | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0.069439 | 0.045742 | 0.006354 | 0.183709 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.123706 | 0.047368 | 0.068315 | 0.280655 |
| | | Imports/Pounds Landed | 300 | 0.255714 | 0.10359 | 0.045201 | 0.763965 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 1673.915 | 481.4984 | 403.112 | 2909.712 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.692757 | 0.810852 | 1.50598 | 5.508978 |
| | | Price/lb | 300 | 2.712232 | 0.856554 | 1.422926 | 5.715023 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.019755 | 0.019989 | 0.153792 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Share of Annual Landings/Gini | 300 | 0.749124 | 0.264823 | 0.085491 | 1.474311 |
| Gulf of Mexico | Shrimp, Brown | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0.052012 | 0.013168 | 0.0256 | 0.099707 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.497464 | 0.047248 | 0.369443 | 0.575171 |
| | | Imports/Pounds Landed | 300 | 1.37555 | 0.676578 | 0.416681 | 3.746205 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 9953.166 | 9940.817 | 418.86 | 52545.06 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.943605 | 0.633867 | 0.808693 | 3.781655 |
| | | Price/lb | 300 | 2.29467 | 0.809401 | 0.667845 | 4.464427 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.078772 | 0.003974 | 0.317132 |
| | | Share of Annual Landings/Gini | 300 | 0.169164 | 0.157861 | 0.007278 | 0.586755 |
| Gulf of Mexico | Shrimp, Pink | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0.271357 | 0.118311 | 0.073434 | 0.735797 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.259944 | 0.038376 | 0.175027 | 0.328364 |
| | | Imports/Pounds Landed | 300 | 7.834371 | 5.647675 | 1.184803 | 25.66007 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 1109.111 | 772.7233 | 92.605 | 4520.119 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.197502 | 0.397994 | 1.574289 | 3.597793 |
| | | Price/lb | 300 | 2.221813 | 0.442428 | 1.405548 | 3.76754 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.039288 | 0.012343 | 0.200593 |
| | | Share of Annual Landings/Gini | 300 | 0.328533 | 0.15934 | 0.044965 | 0.7167 |
| Gulf of Mexico | Shrimp, White | Average Employment Rate | 300 | 0.42072 | 0.015823 | 0.394568 | 0.455159 |
| | | Exports/Pounds Landed | 300 | 0.074364 | 0.029088 | 0.027119 | 0.160597 |
| | | Food CPI | 300 | 164.6554 | 28.40941 | 126.35 | 219.8072 |
| | | Gini on Landings | 300 | 0.421899 | 0.082085 | 0.22985 | 0.583831 |
| | | Imports/Pounds Landed | 300 | 1.740872 | 0.498403 | 0.720052 | 3.027964 |
| | | Per-Capita Income | 300 | 9931.05 | 2652.569 | 5724.915 | 14873.36 |
| | | Pounds Landed (1000s) | 300 | 7335.291 | 5868.04 | 375.461 | 23223.77 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.105716 | 0.508077 | 1.079114 | 4.186205 |
| | | Price/lb | 300 | 2.197474 | 0.684052 | 0.919363 | 4.522964 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.066829 | 0.00551 | 0.289924 |
| | | Share of Annual Landings/Gini | 300 | 0.206731 | 0.1616 | 0.009437 | 0.59266 |
| Mid-Atlantic | Clam, Northern Quahog | Average Employment Rate | 108 | 0.44861 | 0.010037 | 0.432491 | 0.465083 |
| | | Exports/Pounds Landed | 108 | 23.67429 | 14.88035 | 2.544203 | 76.92337 |
| | | Food CPI | 108 | 193.9956 | 12.38817 | 171.4 | 214.4033 |
| | | Gini on Landings | 108 | 0.25785 | 0.090353 | 0.165405 | 0.48721 |
| | | Imports/Pounds Landed | 108 | 152.3977 | 94.59284 | 10.52395 | 384.3643 |
| | | Per-Capita Income | 108 | 15588.32 | 1020.401 | 13748.79 | 17602.22 |
| | | Pounds Landed (1000s) | 108 | 8.322481 | 10.83477 | 0.911 | 45.559 |
| | | Pounds-Weighted MA Price/lb | 108 | 3.811778 | 0.30747 | 3.192521 | 4.670049 |
| | | Price/lb | 108 | 3.741021 | 0.513174 | 2.680851 | 6.426087 |
| | | Share of Annual Landings | 108 | 0.083333 | 0.050009 | 0.012684 | 0.442057 |
| | | Share of Annual Landings/Gini | 108 | 0.35438 | 0.189587 | 0.026035 | 0.907324 |
| Mid-Atlantic | Flounder, Summer | Average Employment Rate | 300 | 0.452303 | 0.011398 | 0.432491 | 0.481664 |
| | | Exports/Pounds Landed | 300 | 14.04365 | 11.6683 | 0.114108 | 77.63799 |
| | | Food CPI | 300 | 164.6809 | 24.40302 | 132.45 | 214.4033 |
| | | Gini on Landings | 300 | 0.392649 | 0.113764 | 0.204658 | 0.6249 |
| | | Imports/Pounds Landed | 300 | 5.882653 | 2.041286 | 2.619907 | 19.83648 |
| | | Per-Capita Income | 300 | 12024.69 | 3126.473 | 7193.126 | 17602.22 |
| | | Pounds Landed (1000s) | 300 | 264.9135 | 217.3875 | 0.05 | 1305.752 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.999842 | 0.508733 | 1.149264 | 3.600252 |
| | | Price/lb | 300 | 2.226352 | 0.670357 | 0.946639 | 4.87282 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.068548 | 1.51E-05 | 0.398533 |
| | | Share of Annual Landings/Gini | 300 | 0.231595 | 0.17935 | 2.42E-05 | 0.824529 |
| Mid-Atlantic | Lobster, American | Average Employment Rate | 300 | 0.452303 | 0.011398 | 0.432491 | 0.481664 |
| | | Exports/Pounds Landed | 300 | 11.7099 | 13.96599 | 0.225201 | 72.94033 |
| | | Food CPI | 300 | 164.6809 | 24.40302 | 132.45 | 214.4033 |
| | | Gini on Landings | 300 | 0.426777 | 0.053283 | 0.29486 | 0.556156 |
| | | Imports/Pounds Landed | 300 | 18.09406 | 14.03996 | 1.034966 | 82.15699 |
| | | Per-Capita Income | 300 | 12024.69 | 3126.473 | 7193.126 | 17602.22 |
| | | Pounds Landed (1000s) | 300 | 118.4421 | 155.6182 | 0.001 | 1264.434 |
| | | Pounds-Weighted MA Price/lb | 300 | 4.171774 | 0.702008 | 2.885218 | 5.718708 |
| | | Price/lb | 300 | 4.327899 | 0.852027 | 2.449877 | 6.824389 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.066274 | 1.34E-06 | 0.316726 |
| | | Share of Annual Landings/Gini | 300 | 0.198641 | 0.156004 | 2.87E-06 | 0.594831 |
| Mid-Atlantic | Squid, Longfin | Average Employment Rate | 300 | 0.452303 | 0.011398 | 0.432491 | 0.481664 |
| | | Exports/Pounds Landed | 300 | 2.481257 | 3.111667 | 0.15329 | 28.08506 |
| | | Food CPI | 300 | 164.6809 | 24.40302 | 132.45 | 214.4033 |
| | | Gini on Landings | 300 | 0.362122 | 0.085724 | 0.189434 | 0.557907 |
| | | Imports/Pounds Landed | 300 | 1.693514 | 1.214658 | 0.149264 | 5.334074 |
| | | Per-Capita Income | 300 | 12024.69 | 3126.473 | 7193.126 | 17602.22 |
| | | Pounds Landed (1000s) | 300 | 1073.634 | 864.7349 | 10.038 | 4284.436 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.801544 | 0.216307 | 0.369324 | 1.366204 |
| | | Price/lb | 300 | 0.872156 | 0.296511 | 0.369324 | 2.499482 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.057878 | 0.001129 | 0.286337 |
| | | Share of Annual Landings/Gini | 300 | 0.245087 | 0.168722 | 0.002642 | 0.713961 |
| Mid-Atlantic | Squid, Northern Shortfin | Average Employment Rate | 293 | 0.45221 | 0.011505 | 0.432491 | 0.481664 |
| | | Exports/Pounds Landed | 293 | 5572.805 | 23290.95 | 0 | 190177.3 |
| | | Food CPI | 293 | 164.6003 | 23.91788 | 134.35 | 212.6645 |
| | | Gini on Landings | 293 | 0.662155 | 0.259756 | 0 | 0.916667 |
| | | Imports/Pounds Landed | 293 | 5345.207 | 16784.66 | 0 | 91189.33 |
| | | Per-Capita Income | 293 | 12033.16 | 3061.588 | 7303.998 | 17399.79 |
| | | Pounds Landed (1000s) | 293 | 892.7335 | 2030.49 | 0 | 10434.32 |
| | | Pounds-Weighted MA Price/lb | 293 | 0.377853 | 0.261963 | 0.100002 | 1.1 |
| | | Price/lb | 293 | 0.393633 | 0.28226 | 0.049861 | 1.1 |
| | | Share of Annual Landings | 293 | 0.075085 | 0.15738 | 0 | 1 |
| | | Share of Annual Landings/Gini | 293 | 0.100536 | 0.198152 | 0 | 1.090909 |
| New England | Clam, Northern Quahog | Average Employment Rate | 108 | 0.482112 | 0.009494 | 0.467784 | 0.496891 |
| | | Exports/Pounds Landed | 108 | 0.698685 | 0.283157 | 0.156615 | 1.570347 |
| | | Food CPI | 108 | 232.3621 | 14.78101 | 204.3 | 253.4885 |
| | | Gini on Landings | 108 | 0.203746 | 0.033935 | 0.144968 | 0.253497 |
| | | Imports/Pounds Landed | 108 | 4.09201 | 1.466518 | 1.08226 | 7.84658 |
| | | Per-Capita Income | 108 | 17639.41 | 1163.024 | 15438.85 | 19924.95 |
| | | Pounds Landed (1000s) | 108 | 150.2918 | 79.93578 | 52.12 | 551.972 |
| | | Pounds-Weighted MA Price/lb | 108 | 5.41574 | 1.004612 | 2.54433 | 6.573083 |
| | | Price/lb | 108 | 5.603433 | 1.217234 | 1.870944 | 11.17184 |
| | | Share of Annual Landings | 108 | 0.083333 | 0.032536 | 0.032918 | 0.21207 |
| | | Share of Annual Landings/Gini | 108 | 0.421237 | 0.174286 | 0.133973 | 1.020733 |
| New England | Clam, Softshell | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.188021 | 0.070126 | 0.037888 | 0.518968 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.304363 | 0.053384 | 0.22385 | 0.474737 |
| | | Imports/Pounds Landed | 300 | 0.977492 | 0.327939 | 0.352602 | 2.346545 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Pounds Landed (1000s) | 300 | 221.5852 | 136.8511 | 0 | 754.663 |
| | | Pounds-Weighted MA Price/lb | 300 | 5.414798 | 1.677731 | 2.713364 | 11.52343 |
| | | Price/lb | 300 | 5.381015 | 1.898175 | 2.122724 | 12.65013 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.046351 | 0 | 0.238724 |
| | | Share of Annual Landings/Gini | 300 | 0.281445 | 0.156472 | 0 | 0.615882 |
| New England | Flounder, Summer | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 13.89165 | 11.54434 | 0.103104 | 86.22231 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.310435 | 0.075622 | 0.188601 | 0.508264 |
| | | Imports/Pounds Landed | 300 | 5.822867 | 1.953867 | 2.614401 | 18.11754 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 267.7455 | 167.3536 | 0.347 | 1188.862 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.270667 | 0.495804 | 1.326819 | 3.92856 |
| | | Price/lb | 300 | 2.376045 | 0.646521 | 0.957551 | 4.44696 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.049156 | 0.000122 | 0.315311 |
| | | Share of Annual Landings/Gini | 300 | 0.284541 | 0.167784 | 0.000241 | 0.805792 |
| New England | Goosefish | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.027182 | 0.020012 | 0 | 0.09037 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.13235 | 0.044658 | 0.074822 | 0.29027 |
| | | Imports/Pounds Landed | 300 | 0.0013 | 0.001884 | 0 | 0.014322 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 2675.616 | 1297.623 | 601.597 | 6234.516 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.818195 | 0.277094 | 0.338303 | 1.412332 |
| | | Price/lb | 300 | 0.826687 | 0.294848 | 0.269948 | 1.596682 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.020823 | 0.022695 | 0.153027 |
| | | Share of Annual Landings/Gini | 300 | 0.690042 | 0.248608 | 0.078186 | 1.369903 |
| New England | Hake, Silver | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.402774 | 0.643693 | 0 | 4.017195 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.219923 | 0.057202 | 0.120041 | 0.322017 |
| | | Imports/Pounds Landed | 300 | 0.184975 | 0.119537 | 0.037664 | 0.85842 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 1378.935 | 789.0019 | 271.772 | 5204.904 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.44634 | 0.128897 | 0.185537 | 0.793401 |
| | | Price/lb | 300 | 0.463608 | 0.164598 | 0.114272 | 1.106563 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.034474 | 0.021457 | 0.20723 |
| | | Share of Annual Landings/Gini | 300 | 0.40503 | 0.183957 | 0.0688 | 1.104533 |
| New England | Herring, Atlantic | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.558725 | 3.468585 | 0.000262 | 40.91068 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.345724 | 0.109341 | 0.158242 | 0.73686 |
| | | Imports/Pounds Landed | 300 | 0.450163 | 1.467944 | 0.009467 | 8.033565 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 12750.1 | 9581.716 | 0 | 40198.7 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.111532 | 0.127463 | 0.046412 | 1.000137 |
| | | Price/lb | 300 | 0.111148 | 0.167912 | 0.044977 | 2.07952 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.057186 | 0 | 0.466977 |
| | | Share of Annual Landings/Gini | 300 | 0.26263 | 0.170488 | 0 | 0.943964 |
| New England | Lobster, American | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.117408 | 0.092073 | 0.023803 | 0.4307 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.480258 | 0.026415 | 0.436428 | 0.527057 |
| | | Imports/Pounds Landed | 300 | 0.209226 | 0.102618 | 0.068652 | 0.660042 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 6907.132 | 7249.015 | 294.091 | 37209.19 |
| | | Pounds-Weighted MA Price/lb | 300 | 3.583403 | 0.733879 | 2.17077 | 5.85033 |
| | | Price/lb | 300 | 3.978802 | 1.068079 | 2.018956 | 8.306499 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.073718 | 0.005695 | 0.249547 |
| | | Share of Annual Landings/Gini | 300 | 0.174046 | 0.153404 | 0.010869 | 0.511384 |
| New England | Oyster, Eastern | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 13.12465 | 13.34281 | 0.245978 | 82.16193 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.314618 | 0.193427 | 0.097315 | 0.773682 |
| | | Imports/Pounds Landed | 300 | 53.09506 | 49.41592 | 5.804052 | 293.5829 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 14.45776 | 21.26889 | 0 | 288.504 |
| | | Pounds-Weighted MA Price/lb | 300 | 20.37874 | 16.62069 | 2.738294 | 68.49136 |
| | | Price/lb | 300 | 21.12212 | 17.82405 | 0.888889 | 102.6785 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.076446 | 0 | 0.824547 |
| | | Share of Annual Landings/Gini | 300 | 0.37882 | 0.27168 | 0 | 1.073776 |
| New England | Shrimp,Pandalid | Average Employment Rate | 88 | 0.481787 | 0.010421 | 0.467784 | 0.496891 |
| | | Exports/Pounds Landed | 88 | 0.474856 | 0.570869 | 0.092922 | 3.513821 |
| | | Food CPI | 88 | 228.314 | 13.36808 | 204.3 | 248.186 |
| | | Gini on Landings | 88 | 0.769519 | 0.052415 | 0.693995 | 0.839851 |
| | | Imports/Pounds Landed | 88 | 19.79472 | 23.03314 | 5.487975 | 146.5307 |
| | | Per-Capita Income | 88 | 17296.88 | 987.0129 | 15438.85 | 19197.68 |
| | | Pounds Landed (1000s) | 88 | 648.6695 | 1363.455 | 0 | 6396.016 |
| | | Pounds-Weighted MA Price/lb | 88 | 0.61132 | 0.331691 | 0.330515 | 1.807841 |
| | | Price/lb | 88 | 0.608273 | 0.350727 | 0.330515 | 1.928506 |
| | | Share of Annual Landings | 88 | 0.090909 | 0.15976 | 0 | 0.621265 |
| | | Share of Annual Landings/Gini | 88 | 0.117916 | 0.202957 | 0 | 0.748628 |
| New England | Skates | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 0.005516 | 0.015977 | 0 | 0.07485 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.217246 | 0.071907 | 0.105093 | 0.383949 |
| | | Imports/Pounds Landed | 300 | 5.48E-05 | 0.000247 | 0 | 0.002246 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 1960.493 | 960.0969 | 222.337 | 5403.169 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.188444 | 0.083128 | 0.079071 | 0.509266 |
| | | Price/lb | 300 | 0.196556 | 0.104346 | 0.073063 | 0.765171 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.034213 | 0.012013 | 0.210513 |
| | | Share of Annual Landings/Gini | 300 | 0.42565 | 0.202665 | 0.03513 | 1.060275 |
| New England | Squid, Longfin | Average Employment Rate | 300 | 0.483739 | 0.014311 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 300 | 3.903991 | 5.329314 | 0.124312 | 36.52911 |
| | | Food CPI | 300 | 189.9685 | 36.62225 | 137.4 | 253.4885 |
| | | Gini on Landings | 300 | 0.490119 | 0.197619 | 0.220688 | 0.882762 |
| | | Imports/Pounds Landed | 300 | 2.34736 | 2.605675 | 0.231501 | 15.69608 |
| | | Per-Capita Income | 300 | 13334.39 | 3781.472 | 7594.632 | 19924.95 |
| | | Pounds Landed (1000s) | 300 | 1131.675 | 1225.189 | 0 | 6589.339 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.768667 | 0.224705 | 0.130534 | 1.339526 |
| | | Price/lb | 300 | 0.796086 | 0.282426 | 0.102533 | 2.043289 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.11663 | 0 | 0.929056 |
| | | Share of Annual Landings/Gini | 300 | 0.197139 | 0.197954 | 0 | 1.052443 |
| New England | Tuna, Bluefin | Average Employment Rate | 294 | 0.483625 | 0.014431 | 0.454789 | 0.515199 |
| | | Exports/Pounds Landed | 294 | 3.623547 | 5.071211 | 0.256888 | 32.58196 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Food CPI | 294 | 190.6337 | 36.17477 | 138.4 | 252.201 |
| | | Gini on Landings | 294 | 0.707269 | 0.044276 | 0.616617 | 0.794038 |
| | | Imports/Pounds Landed | 294 | 53.93636 | 49.77356 | 9.429 | 340.1923 |
| | | Per-Capita Income | 294 | 13409.01 | 3725.988 | 7680.284 | 19924.95 |
| | | Pounds Landed (1000s) | 294 | 127.7261 | 228.2937 | 0 | 1040.037 |
| | | Pounds-Weighted MA Price/lb | 294 | 7.316401 | 1.980188 | 3.198642 | 16.80127 |
| | | Price/lb | 294 | 7.644373 | 3.216736 | 1.440389 | 20.30856 |
| | | Share of Annual Landings | 294 | 0.085034 | 0.126373 | 0 | 0.499327 |
| | | Share of Annual Landings/Gini | 294 | 0.120775 | 0.177554 | 0 | 0.707867 |
| Pacific | Clam, Pacific Geoduck | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.284631 | 0.347656 | 0 | 1.366044 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.167319 | 0.103903 | 0.057235 | 0.531744 |
| | | Imports/Pounds Landed | 300 | 0.085923 | 0.181978 | 0 | 1.456551 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 121.2632 | 56.38483 | 0 | 272.13 |
| | | Pounds-Weighted MA Price/lb | 300 | 15.86773 | 8.635736 | 1.433571 | 33.00996 |
| | | Price/lb | 300 | 16.16429 | 8.785573 | 1.324067 | 36.91061 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.029789 | 0 | 0.198845 |
| | | Share of Annual Landings/Gini | 300 | 0.614347 | 0.288009 | 0 | 1.721858 |
| Pacific | Lobster, California Spiny | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 6.863163 | 6.215541 | 0.83773 | 30.2395 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.690622 | 0.022236 | 0.645946 | 0.734665 |
| | | Imports/Pounds Landed | 300 | 11.24641 | 4.911712 | 3.849988 | 32.17259 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 59.50777 | 89.15412 | 0 | 463.818 |
| | | Pounds-Weighted MA Price/lb | 300 | 9.648249 | 4.309418 | 3.699405 | 23.7853 |
| | | Price/lb | 300 | 10.14949 | 4.739094 | 0.487719 | 23.7853 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.121571 | 0 | 0.513227 |
| | | Share of Annual Landings/Gini | 300 | 0.120788 | 0.175493 | 0 | 0.698587 |
| Pacific | Oyster, Pacific | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.051794 | 0.030134 | 0.004224 | 0.123368 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.170599 | 0.068605 | 0.1136 | 0.407613 |
| | | Imports/Pounds Landed | 300 | 0.197646 | 0.071557 | 0.035909 | 0.50783 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 715.0895 | 282.618 | 0 | 1819.86 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.916325 | 0.969253 | 1.418358 | 5.630085 |
| | | Price/lb | 300 | 2.954562 | 1.013618 | 1.218652 | 6.095464 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.029767 | 0 | 0.18275 |
| | | Share of Annual Landings/Gini | 300 | 0.539519 | 0.215403 | 0 | 1.204698 |
| Pacific | Salmon, Chinook | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 7.469887 | 8.301053 | 0.937911 | 48.73531 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.607608 | 0.051049 | 0.521666 | 0.72596 |
| | | Imports/Pounds Landed | 300 | 6.813307 | 4.541675 | 0.899859 | 19.1232 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 845.2211 | 1067.29 | 0 | 5361.185 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.278913 | 1.300896 | 0.735676 | 6.782063 |
| | | Price/lb | 300 | 2.669845 | 1.735082 | 0.491475 | 9.921836 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.100054 | 0 | 0.415623 |
| | | Share of Annual Landings/Gini | 300 | 0.138094 | 0.162787 | 0 | 0.579032 |
| Pacific | Salmon, Chum | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 8.428754 | 10.09518 | 1.156528 | 68.12049 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.840107 | 0.017257 | 0.801573 | 0.869823 |
| | | Imports/Pounds Landed | 300 | 7.584514 | 5.108956 | 0.997534 | 24.31383 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 802.6968 | 1956.716 | 0 | 9808.069 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.548742 | 0.338624 | 0.020555 | 2.68328 |
| | | Price/lb | 300 | 0.637901 | 0.529147 | 0.020008 | 3.19973 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.1876 | 0 | 0.777393 |
| | | Share of Annual Landings/Gini | 300 | 0.099236 | 0.222871 | 0 | 0.893737 |
| Pacific | Salmon, Sockeye | Average Employment Rate | 293 | 0.415436 | 0.015029 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 293 | 190.9308 | 566.7133 | 1.556583 | 4740.864 |
| | | Food CPI | 293 | 188.2598 | 35.23201 | 132.8958 | 251.0185 |
| | | Gini on Landings | 293 | 0.868403 | 0.033118 | 0.770738 | 0.911318 |
| | | Imports/Pounds Landed | 293 | 214.0655 | 466.4896 | 1.055947 | 1892.257 |
| | | Per-Capita Income | 293 | 11569.94 | 3024.028 | 6991.894 | 17615.14 |
| | | Pounds Landed (1000s) | 293 | 337.23 | 1366 | 0 | 12819.64 |
| | | Pounds-Weighted MA Price/lb | 293 | 1.254139 | 0.38917 | 0.391032 | 2.500253 |
| | | Price/lb | 293 | 1.159381 | 0.427897 | 0.337638 | 2.500253 |
| | | Share of Annual Landings | 293 | 0.085324 | 0.221154 | 0 | 0.968882 |
| | | Share of Annual Landings/Gini | 293 | 0.098416 | 0.252604 | 0 | 1.063165 |
| Pacific | Sardine, Pacific | Average Employment Rate | 298 | 0.41554 | 0.014924 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 298 | 0.07464 | 0.078383 | 0.004501 | 0.855718 |
| | | Food CPI | 298 | 187.324 | 35.66349 | 132.025 | 251.0185 |
| | | Gini on Landings | 298 | 0.504714 | 0.144613 | 0.278009 | 0.767191 |
| | | Imports/Pounds Landed | 298 | 0.110007 | 0.264858 | 0.012876 | 1.675749 |
| | | Per-Capita Income | 298 | 11492.02 | 3057.419 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 298 | 10216.24 | 13108.56 | 0 | 72443.88 |
| | | Pounds-Weighted MA Price/lb | 298 | 0.059584 | 0.02463 | 0.034773 | 0.192187 |
| | | Price/lb | 298 | 0.059253 | 0.027788 | 0.027863 | 0.222812 |
| | | Share of Annual Landings | 298 | 0.083893 | 0.091953 | 0 | 0.517007 |
| | | Share of Annual Landings/Gini | 298 | 0.180541 | 0.17601 | 0 | 0.760259 |
| Pacific | Sea Urchins | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.030268 | 0.024076 | 0.00082 | 0.139855 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.152346 | 0.046373 | 0.081274 | 0.274864 |
| | | Imports/Pounds Landed | 300 | 0.03081 | 0.025022 | 0 | 0.102326 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 1650.254 | 1211.038 | 214.261 | 6789.023 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.755171 | 0.172935 | 0.428096 | 1.151282 |
| | | Price/lb | 300 | 0.749045 | 0.188811 | 0.405221 | 1.555097 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.023782 | 0.018789 | 0.145018 |
| | | Share of Annual Landings/Gini | 300 | 0.597964 | 0.233326 | 0.068357 | 1.255156 |
| Pacific | Shellfish | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.364486 | 0.128846 | 0.149201 | 0.678679 |
| | | Imports/Pounds Landed | 300 | 0 | 0 | 0 | 0 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 322.5131 | 485.1204 | 9.838 | 4753.181 |
| | | Pounds-Weighted MA Price/lb | 300 | 4.710206 | 2.153885 | 0.732023 | 10.75984 |
| | | Price/lb | 300 | 5.605033 | 2.950987 | 0.218387 | 13.6682 |

**Table A3 continued from previous page**

| Region | Species | Variable | Count | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Share of Annual Landings | 300 | 0.083333 | 0.06652 | 0.003911 | 0.381618 |
| | | Share of Annual Landings/Gini | 300 | 0.260109 | 0.194749 | 0.005959 | 1.012953 |
| Pacific | Shrimp, Ocean | Average Employment Rate | 295 | 0.415485 | 0.01499 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 295 | 0.094632 | 0.053311 | 0.022025 | 0.337385 |
| | | Food CPI | 295 | 187.883 | 35.40797 | 132.6667 | 251.0185 |
| | | Gini on Landings | 295 | 0.553839 | 0.046792 | 0.490721 | 0.664431 |
| | | Imports/Pounds Landed | 295 | 2.470323 | 1.634322 | 0.484659 | 8.003231 |
| | | Per-Capita Income | 295 | 11538.9 | 3037.127 | 6991.894 | 17615.14 |
| | | Pounds Landed (1000s) | 295 | 3386.223 | 3936.267 | 0 | 16591.21 |
| | | Pounds-Weighted MA Price/lb | 295 | 0.448866 | 0.120977 | 0.22881 | 0.785481 |
| | | Price/lb | 295 | 0.462413 | 0.130832 | 0.222415 | 0.841996 |
| | | Share of Annual Landings | 295 | 0.084746 | 0.086093 | 0 | 0.362376 |
| | | Share of Annual Landings/Gini | 295 | 0.15401 | 0.154676 | 0 | 0.545392 |
| Pacific | Squid, California Market | Average Employment Rate | 299 | 0.415537 | 0.014899 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 299 | 0.100565 | 0.103975 | 0.006537 | 0.853404 |
| | | Food CPI | 299 | 187.5381 | 35.79553 | 132.025 | 251.3358 |
| | | Gini on Landings | 299 | 0.562786 | 0.112838 | 0.345645 | 0.788512 |
| | | Imports/Pounds Landed | 299 | 0.103609 | 0.213455 | 0.010347 | 1.7724 |
| | | Per-Capita Income | 299 | 11512.5 | 3072.758 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 299 | 12532.75 | 17241.84 | 0 | 104984.2 |
| | | Pounds-Weighted MA Price/lb | 299 | 0.197659 | 0.088918 | 0.05476 | 0.358992 |
| | | Price/lb | 299 | 0.206798 | 0.101345 | 0.051169 | 0.907216 |
| | | Share of Annual Landings | 299 | 0.083612 | 0.096742 | 0 | 0.470151 |
| | | Share of Annual Landings/Gini | 299 | 0.155388 | 0.168498 | 0 | 0.624835 |
| Pacific | Tuna, Albacore | Average Employment Rate | 300 | 0.415538 | 0.014874 | 0.388338 | 0.443143 |
| | | Exports/Pounds Landed | 300 | 0.178172 | 0.171513 | 0.024852 | 1.00356 |
| | | Food CPI | 300 | 187.7516 | 35.92635 | 132.025 | 251.5712 |
| | | Gini on Landings | 300 | 0.739573 | 0.037402 | 0.649193 | 0.823766 |
| | | Imports/Pounds Landed | 300 | 3.273091 | 3.781904 | 0.903152 | 29.95779 |
| | | Per-Capita Income | 300 | 11532.84 | 3087.783 | 6882.084 | 17615.14 |
| | | Pounds Landed (1000s) | 300 | 1887.199 | 3219.044 | 0 | 13759.42 |
| | | Pounds-Weighted MA Price/lb | 300 | 0.988708 | 0.279662 | 0.523583 | 2.062198 |
| | | Price/lb | 300 | 1.016948 | 0.324654 | 0.067019 | 2.405249 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.135103 | 0 | 0.532072 |
| | | Share of Annual Landings/Gini | 300 | 0.112969 | 0.181521 | 0 | 0.653126 |
| South Atlantic | Flounder, Summer | Average Employment Rate | 300 | 0.433585 | 0.024703 | 0.388174 | 0.482048 |
| | | Exports/Pounds Landed | 300 | 19.23183 | 29.23996 | 0.099655 | 250.2488 |
| | | Food CPI | 300 | 190.0899 | 36.20407 | 134.2 | 257.624 |
| | | Gini on Landings | 300 | 0.702258 | 0.110895 | 0.437054 | 0.89396 |
| | | Imports/Pounds Landed | 300 | 7.044652 | 5.361275 | 2.681901 | 43.24704 |
| | | Per-Capita Income | 300 | 9985.642 | 2329.733 | 6029.875 | 14057.25 |
| | | Pounds Landed (1000s) | 300 | 258.298 | 416.6442 | 0.164 | 2297.46 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.876563 | 0.392035 | 0.998515 | 2.728424 |
| | | Price/lb | 300 | 1.901407 | 0.404699 | 0.948908 | 3.527619 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.140372 | 5.52E-05 | 0.968881 |
| | | Share of Annual Landings/Gini | 300 | 0.122283 | 0.190459 | 8.66E-05 | 1.083807 |
| South Atlantic | Mackerel, King And Cero | Average Employment Rate | 300 | 0.433585 | 0.024703 | 0.388174 | 0.482048 |
| | | Exports/Pounds Landed | 300 | 1.4253 | 1.734748 | 0.025562 | 8.980092 |
| | | Food CPI | 300 | 190.0899 | 36.20407 | 134.2 | 257.624 |
| | | Gini on Landings | 300 | 0.301252 | 0.092371 | 0.193114 | 0.648608 |
| | | Imports/Pounds Landed | 300 | 1.324349 | 1.089756 | 0.295758 | 8.657428 |
| | | Per-Capita Income | 300 | 9985.642 | 2329.733 | 6029.875 | 14057.25 |
| | | Pounds Landed (1000s) | 300 | 254.7589 | 160.0095 | 1.783 | 970.654 |
| | | Pounds-Weighted MA Price/lb | 300 | 1.716779 | 0.380902 | 1.071103 | 3.188076 |
| | | Price/lb | 300 | 1.790532 | 0.47041 | 0.950818 | 3.589155 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.049328 | 0.003138 | 0.283802 |
| | | Share of Annual Landings/Gini | 300 | 0.295642 | 0.168198 | 0.004838 | 0.860248 |
| South Atlantic | Oyster, Eastern | Average Employment Rate | 300 | 0.433585 | 0.024703 | 0.388174 | 0.482048 |
| | | Exports/Pounds Landed | 300 | 1.616726 | 1.107633 | 0.088026 | 5.436255 |
| | | Food CPI | 300 | 190.0899 | 36.20407 | 134.2 | 257.624 |
| | | Gini on Landings | 300 | 0.543484 | 0.027116 | 0.488688 | 0.606283 |
| | | Imports/Pounds Landed | 300 | 6.407567 | 3.235567 | 0.528786 | 17.57414 |
| | | Per-Capita Income | 300 | 9985.642 | 2329.733 | 6029.875 | 14057.25 |
| | | Pounds Landed (1000s) | 300 | 115.3305 | 234.2198 | 0 | 1387.058 |
| | | Pounds-Weighted MA Price/lb | 300 | 3.641859 | 1.187473 | 0.738977 | 5.655086 |
| | | Price/lb | 300 | 3.602869 | 1.275641 | 0.560388 | 6.426005 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.08314 | 0 | 0.316086 |
| | | Share of Annual Landings/Gini | 300 | 0.153716 | 0.152813 | 0 | 0.521351 |
| South Atlantic | Shrimp, Brown | Average Employment Rate | 295 | 0.433582 | 0.024866 | 0.388174 | 0.482048 |
| | | Exports/Pounds Landed | 295 | 1.190568 | 0.599081 | 0.369376 | 3.145391 |
| | | Food CPI | 295 | 190.5951 | 35.74039 | 134.2 | 256.9465 |
| | | Gini on Landings | 295 | 0.74737 | 0.030307 | 0.683252 | 0.803428 |
| | | Imports/Pounds Landed | 295 | 30.28861 | 16.17953 | 5.756136 | 98.03206 |
| | | Per-Capita Income | 295 | 10025.16 | 2291.637 | 6123.595 | 14057.25 |
| | | Pounds Landed (1000s) | 295 | 513.9774 | 948.4235 | 0 | 5118.974 |
| | | Pounds-Weighted MA Price/lb | 295 | 2.155729 | 0.54078 | 1.078941 | 3.580186 |
| | | Price/lb | 295 | 2.418108 | 0.65995 | 1.068814 | 4.674774 |
| | | Share of Annual Landings | 295 | 0.084746 | 0.141709 | 0 | 0.55077 |
| | | Share of Annual Landings/Gini | 295 | 0.113597 | 0.189096 | 0 | 0.716783 |
| South Atlantic | Shrimp, White | Average Employment Rate | 300 | 0.433585 | 0.024703 | 0.388174 | 0.482048 |
| | | Exports/Pounds Landed | 300 | 0.499577 | 0.181741 | 0.198614 | 1.466242 |
| | | Food CPI | 300 | 190.0899 | 36.20407 | 134.2 | 257.624 |
| | | Gini on Landings | 300 | 0.484342 | 0.059919 | 0.362728 | 0.627206 |
| | | Imports/Pounds Landed | 300 | 13.26923 | 7.173592 | 3.320742 | 37.88553 |
| | | Per-Capita Income | 300 | 9985.642 | 2329.733 | 6029.875 | 14057.25 |
| | | Pounds Landed (1000s) | 300 | 1083.386 | 1037.966 | 10.601 | 5424.434 |
| | | Pounds-Weighted MA Price/lb | 300 | 2.560264 | 0.502724 | 1.718483 | 4.564388 |
| | | Price/lb | 300 | 2.672905 | 0.66559 | 1.388643 | 4.715813 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.075879 | 0.000962 | 0.342643 |
| | | Share of Annual Landings/Gini | 300 | 0.174648 | 0.155915 | 0.0018 | 0.567927 |
| South Atlantic | Swordfish | Average Employment Rate | 300 | 0.433585 | 0.024703 | 0.388174 | 0.482048 |
| | | Exports/Pounds Landed | 300 | 0.01281 | 0.030698 | 0 | 0.385782 |
| | | Food CPI | 300 | 190.0899 | 36.20407 | 134.2 | 257.624 |
| | | Gini on Landings | 300 | 0.232235 | 0.065146 | 0.13909 | 0.40382 |
| | | Imports/Pounds Landed | 300 | 1.175751 | 0.735162 | 0.131719 | 3.71983 |
| | | Per-Capita Income | 300 | 9985.642 | 2329.733 | 6029.875 | 14057.25 |
| | | Pounds Landed (1000s) | 300 | 145.3837 | 81.0752 | 0 | 427.695 |
| | | Pounds-Weighted MA Price/lb | 300 | 3.046317 | 0.468841 | 2.102126 | 4.568524 |
| | | Price/lb | 300 | 3.044092 | 0.539479 | 1.597489 | 5.304982 |
| | | Share of Annual Landings | 300 | 0.083333 | 0.036652 | 0 | 0.224944 |
| | | Share of Annual Landings/Gini | 300 | 0.386408 | 0.183156 | 0 | 0.847318 |

# Table A4. Individual Fishery Results for All Fisheries

| Species/ Species Group | Season Length | Price—FPI | | | Price—FPI, Placebo Test | | | Summary | | Price—SCM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fractional Logit | Parallel Trends p-value | DID Est., Huber-White SEs | DID Est., Newey-West SEs | Parallel Trends p-value | Huber-White SEs | Newey-West SEs | Huber-White SEs | Newey-West SEs | Mean Gap ($) | Mean Gap (%) | p-value |
| Sea Scallop (A) | -0.3536*** | 0.9493 | 0.3057*** | 0.3057*** | 0.7208 | -0.0269 | -0.0269 | Pass | Pass | | | |
| | (0.0136) | | (0.0360) | (0.0400) | | (0.0396) | (0.0527) | | | | | |
| Pacific Halibut (AK) | -0.1421*** | 0.0967 | 1.3327*** | 1.3327*** | 0.6826 | -0.0298 | -0.0298 | Pass | Pass | 0.2189 | 0.2127 | 0.3699 |
| | (0.0194) | | (0.2015) | (0.3358) | | (0.1125) | (0.1094) | | | | | |
| Gag (GOM) | -0.1909*** | 0.7334 | 0.0567* | 0.0567 | 0.8638 | -0.0165 | -0.0165 | Pass | Pass | -0.3760* | -0.1143 | 0.0270 |
| | (0.0514) | | (0.0236) | (0.0558) | | (0.0256) | (0.0616) | | | | | |
| Red Snapper (GOM) | -0.0820* | 0.9842 | 0.0749** | 0.0749 | 0.9214 | -0.0112 | -0.0112 | Pass | Pass | 0.5656* | 0.2096 | 0.0161 |
| | (0.0349) | | (0.0262) | (0.0642) | | (0.0285) | (0.0602) | | | | | |
| Golden Tilefish (MA) | -0.2069*** | 0.2748 | 0.0157 | 0.0157 | 0.0130 | 0.0842 | 0.0842 | Pass | Pass | 0.1249 | 0.0500 | 0.5263 |
| | (0.0353) | | (0.0436) | (0.0845) | | (0.0834) | (0.1996) | | | | | |
| White Hake (NE) | -0.1205*** | 0.5270 | -0.1595*** | -0.1595* | 0.0019 | -0.0459 | -0.0459 | Pass | Pass | -0.1266 | -0.1242 | 0.6250 |
| | (0.0305) | | (0.0472) | (0.0795) | | (0.1542) | (0.3005) | | | | | |
| Winter Flounder (NE) | 0.0906*** | 0.5388 | -0.0897* | -0.0897 | 0.0097 | 0.1035 | 0.1035 | Pass | Pass | 0.0908 | 0.0488 | 0.5313 |
| | (0.0222) | | (0.0427) | (0.0754) | | (0.1284) | (0.2702) | | | | | |
| Witch Flounder (NE) | -0.0186 | 0.7790 | -0.1544*** | -0.1544+ | 0.0657 | 0.0174 | 0.0174 | Pass | Pass | -0.1885 | -0.0886 | 0.3125 |
| | (0.0299) | | (0.0457) | (0.0834) | | (0.0700) | (0.1444) | | | | | |
| Yellowtail Flounder (NE) | 0.1251*** | 0.2955 | -0.2312*** | -0.2312** | 0.0185 | -0.1463 | -0.1463 | Pass | Pass | 0.0555 | 0.0374 | 0.6250 |
| | (0.0307) | | (0.0507) | (0.0810) | | (0.1285) | (0.2406) | | | | | |
| Bocaccio Rockfish (P) | -0.0376+ | 0.6472 | 0.1205 | 0.1205+ | 0.9434 | -0.2007+ | -0.2007+ | Pass | Pass | -0.0226 | -0.0359 | 0.5333 |
| | (0.0211) | | (0.0763) | (0.0727) | | (0.1049) | (0.1087) | | | | | |
| Lingcod (P) | 0.0091 | 0.1947 | 0.0466 | 0.0466 | 0.7886 | -0.0243 | -0.0243 | Pass | Pass | -0.1951 | -0.2617 | 0.3667 |
| | (0.0387) | | (0.0814) | (0.0728) | | (0.0774) | (0.0994) | | | | | |
| Petrale Sole (P) | -0.1485*** | 0.2555 | 0.1877*** | 0.1877** | 0.4665 | -0.0541 | -0.0541 | Pass | Pass | 0.1682 | 0.1683 | 0.4333 |
| | (0.0206) | | (0.0340) | (0.0598) | | (0.0361) | (0.0724) | | | | | |
| Yellowtail Rockfish (P) | -0.0634*** | 0.7022 | -0.1274* | -0.1274* | 0.2082 | -0.0109 | -0.0109 | Pass | Pass | -0.0287 | -0.0574 | 0.3000 |
| | (0.0144) | | (0.0531) | (0.0594) | | (0.0594) | (0.0713) | | | | | |
| Deep Water Grouper (GOM) | -0.3164*** | 0.9894 | -0.0097 | -0.0097 | 0.9100 | -0.0654** | -0.0654 | Ambiguous | Pass | -0.2257+ | -0.0752 | 0.0811 |
| | (0.0221) | | (0.0255) | (0.0565) | | (0.0241) | (0.0547) | | | | | |
| Other Shallow Water Grouper (GOM) | -0.2263*** | 0.7076 | 0.0120 | 0.0120 | 0.9149 | -0.0508* | -0.0508 | Ambiguous | Pass | -0.4216* | -0.1324 | 0.0270 |
| | (0.0269) | | (0.0226) | (0.0531) | | (0.0241) | (0.0612) | | | | | |
| Red Grouper (GOM) | -0.3020*** | 0.8003 | -0.0393 | -0.0393 | 0.7750 | -0.1043*** | -0.1043 | Ambiguous | Pass | -0.0993* | -0.0406 | 0.0270 |
| | (0.0304) | | (0.0244) | (0.0559) | | (0.0284) | (0.0660) | | | | | |
| Sablefish (fixed gear) (P) | -0.3057*** | 0.0601 | 0.1404*** | 0.1404+ | 0.4653 | -0.1098** | -0.1098 | Ambiguous | Pass | -0.0125 | -0.0083 | 0.6512 |
| | (0.0514) | | (0.0341) | (0.0816) | | (0.0346) | (0.0706) | | | | | |
| Tilefish (GOM) | -0.5248*** | 0.2911 | 0.2726*** | 0.2726** | 0.9867 | -0.2357*** | -0.2357* | Ambiguous | Ambiguous | 0.7344 | 0.5435 | 0.2703 |
| | (0.0465) | | (0.0584) | (0.0884) | | (0.0618) | (0.0929) | | | | | |
| Acadian Redfish (NE) | 0.0704** | 0.8883 | 0.1032* | 0.1032 | 0.4136 | -0.3904*** | -0.3904*** | Ambiguous | Ambiguous | 0.2592+ | 0.5001 | 0.0625 |
| | (0.0257) | | (0.0426) | (0.0742) | | (0.0480) | (0.1070) | | | | | |
| Atlantic Cod (NE) | -0.0753*** | 0.6630 | 0.1377** | 0.1377+ | 0.8823 | -0.2730*** | -0.2730** | Ambiguous | Ambiguous | 0.3833 | 0.2671 | 0.1563 |
| | (0.0178) | | (0.0472) | (0.0773) | | (0.0527) | (0.0905) | | | | | |
| Haddock (NE) | 0.1069*** | 0.3444 | 0.1699** | 0.1699 | 0.1119 | -0.3654*** | -0.3654* | Ambiguous | Ambiguous | 0.3976+ | 0.3563 | 0.0938 |
| | (0.0202) | | (0.0590) | (0.1432) | | (0.0643) | (0.1403) | | | | | |
| Arrowtooth Flounder (P) | -0.0946** | 0.6914 | 0.0028 | 0.0028 | 0.2443 | -0.2072*** | -0.2072*** | Ambiguous | Ambiguous | | | |
| | (0.0290) | | (0.0259) | (0.0599) | | (0.0224) | (0.0506) | | | | | |
| Chilipepper Rockfish (P) | 0.1797** | 0.9205 | 0.0176 | 0.0176 | 0.8834 | -0.2089* | -0.2089* | Ambiguous | Ambiguous | -0.0487 | -0.0769 | 0.3667 |
| | (0.0595) | | (0.0590) | (0.0651) | | (0.0856) | (0.0943) | | | | | |
| Dover Sole (P) | 0.0296 | 0.5820 | 0.1109*** | 0.1109+ | 0.4100 | -0.2419*** | -0.2419*** | Ambiguous | Ambiguous | 0.0561 | 0.1630 | 0.2000 |
| | (0.0351) | | (0.0223) | (0.0582) | | (0.0267) | (0.0658) | | | | | |
| Pacific Ocean Perch Rockfish (P) | 0.2037*** | 0.6165 | -0.0373 | -0.0373 | 0.4187 | -0.1349*** | -0.1349** | Ambiguous | Ambiguous | -0.0875 | -0.1820 | 0.1333 |
| | (0.0419) | | (0.0314) | (0.0416) | | (0.0213) | (0.0475) | | | | | |
| Sablefish (trawl) (P) | 0.0382* | 0.3243 | -0.0410 | -0.0410 | 0.2690 | 0.4982*** | 0.4982*** | Ambiguous | Ambiguous | -0.0929 | -0.0497 | 0.3333 |
| | (0.0179) | | (0.0572) | (0.1513) | | (0.0523) | (0.1223) | | | | | |
| Shortspine Thornyhead (P) | 0.0127 | 0.8523 | 0.0312 | 0.0312 | 0.1531 | -0.3327*** | -0.3327*** | Ambiguous | Ambiguous | -0.0010 | -0.0015 | 0.1000 |
| | (0.0291) | | (0.0271) | (0.0554) | | (0.0297) | (0.0690) | | | | | |
| Starry Flounder (P) | 0.0648 | 0.8780 | 0.6304*** | 0.6304*** | 0.0408 | -0.2475** | -0.2475* | Ambiguous | Ambiguous | 0.2183 | 0.3846 | 0.1000 |
| | (0.0654) | | (0.1588) | (0.0969) | | (0.0927) | (0.1191) | | | | | |
| Yelloweye Rockfish (P) | 0.1226+ | 0.0596 | 0.3464 | 0.3464 | 0.5470 | -0.5795*** | -0.5795*** | Ambiguous | Ambiguous | 0.0670* | 0.1307 | 0.0333 |
| | (0.0647) | | (0.2509) | (0.2755) | | (0.1535) | (0.1465) | | | | | |
| American Plaice Flounder (NE) | -0.1049* | 0.3874 | -0.1234* | -0.1234 | 0.2985 | -0.2331** | -0.2331+ | Fail | Pass | -0.2749 | -0.1876 | 0.5313 |
| | (0.0432) | | (0.0600) | (0.0871) | | (0.0752) | (0.1285) | | | | | |
| Canary Rockfish (P) | -0.0602 | 0.4741 | -0.1402*** | -0.1402*** | 0.7328 | -0.0903* | -0.0903 | Fail | Pass | -0.0913 | -0.1785 | 0.1333 |
| | (0.0412) | | (0.0319) | (0.0403) | | (0.0402) | (0.0617) | | | | | |
| Darkblotched Rockfish (P) | -0.0700* | 0.6004 | -0.0941** | -0.0941* | 0.9363 | -0.0993** | -0.0993 | Fail | Pass | -0.1066 | -0.2156 | 0.1667 |
| | (0.0350) | | (0.0334) | (0.0364) | | (0.0352) | (0.0614) | | | | | |
| English Sole (P) | 0.0231 | 0.8199 | -0.0509** | -0.0509 | 0.3886 | -0.1700*** | -0.1700*** | Fail | Ambiguous | -0.0329 | -0.1011 | 0.6000 |
| | (0.0588) | | (0.0173) | (0.0357) | | (0.0229) | (0.0499) | | | | | |
| Splitnose Rockfish (P) | 0.0071 | 0.6717 | -0.1878*** | -0.1878*** | 0.0114 | -0.3601** | -0.3601* | Fail | Fail | -0.1076 | -0.2908 | 0.2667 |
| | (0.0605) | | (0.0257) | (0.0373) | | (0.1104) | (0.1631) | | | | | |
| Widow Rockfish (P) | -0.1411*** | 0.1144 | -0.2160* | -0.2160* | 0.1592 | -0.3189* | -0.3189* | Fail | Fail | -0.0690 | -0.1684 | 0.6000 |

**Table A4 continued from previous page**

| Species/ Species Group | Season Length | Price—FPI | | | Price—FPI, Placebo Test | | | Summary | | Price—SCM | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fractional Logit | Parallel Trends p-value | DID Est., Huber-White SEs | DID Est., Newey-West SEs | Parallel Trends p-value | Huber-White SEs | Newey-West SEs | Huber-White SEs | Newey-West SEs | Mean Gap ($) | Mean Gap (%) | p-value |
| | (0.0412) | | (0.0835) | (0.0929) | | (0.1244) | (0.1424) | | | | | |
| Sablefish (AK) | -0.2100*** | 0.0389 | | | | | | | | 0.9156+ | 0.8115 | 0.0704 |
| | (0.0256) | | | | | | | | | | | |
| Pollock (NE) | 0.0495 | 0.0283 | | | | | | | | 0.1291 | 0.2371 | 0.4063 |
| | (0.0374) | | | | | | | | | | | |
| Pacific Cod (P) | -0.0508 | 0.0295 | | | | | | | | -0.0450 | -0.0934 | 0.7333 |
| | (0.0466) | | | | | | | | | | | |
| Pacific Whiting Hake (P) | -0.0949+ | 0.0285 | | | | | | | | | | |
| | (0.0542) | | | | | | | | | | | |

Note: FPI results not shown for fisheries that fail the test for parallel trends ($p < .05$). The SCM mean gap is calculated as the average difference between the treated fishery price and control fishery price across the 36 post-intervention months. SCM $p$-value column shows results using the conservative cutoff (retains placebos whose mean square prediction error is not greater than five times that of the treated unit's); however, results are similar for stricter cutoffs. SCM treatment effects are converted to percentages based on the pounds-weighted average price for the 36 months prior to catch share implementation. SCM results not shown for three fisheries whose prices were too high (sea scallop) or too low (arrowtooth flounder and Pacific whiting/hake) to have viable donors.
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A5. Synthetic Control Weights

| Program | Species/Species Group | Control | Weight |
|---|---|---|---|
| Alaska Halibut | Pacific Halibut | California Market Squid (P) | 0.614 |
| Alaska Halibut | Pacific Halibut | Skates (NE) | 0.166 |
| Alaska Halibut | Pacific Halibut | Crayfishes Or Crawfishes (GOM) | 0.089 |
| Alaska Halibut | Pacific Halibut | Pacific Geoduck Clam (P) | 0.080 |
| Alaska Halibut | Pacific Halibut | White Shrimp (GOM) | 0.050 |
| Alaska Halibut | Pacific Halibut | Other Controls (<5 Percent Each) | 0.002 |
| Alaska Sablefish | Sablefish | Shortspine Thornyhead (P) | 0.734 |
| Alaska Sablefish | Sablefish | Golden Tilefish (MA) | 0.115 |
| Alaska Sablefish | Sablefish | Caribbean Spiny Lobster (GOM) | 0.101 |
| Alaska Sablefish | Sablefish | Other Controls (<5 Percent Each) | 0.049 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | Summer Flounder (SA) | 0.332 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | King And Cero Mackerel (SA) | 0.206 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | Atlantic Herring (NE) | 0.128 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | Swordfish (SA) | 0.125 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | Other Controls (<5 Percent Each) | 0.082 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | California Spiny Lobster (P) | 0.075 |
| Gulf of Mexico Grouper-Tilefish | Deep Water Grouper | Brown Shrimp (SA) | 0.052 |
| Gulf of Mexico Grouper-Tilefish | Gag | Pacific Oyster (P) | 0.482 |
| Gulf of Mexico Grouper-Tilefish | Gag | Atlantic Herring (NE) | 0.163 |
| Gulf of Mexico Grouper-Tilefish | Gag | Albacore Tuna (P) | 0.144 |
| Gulf of Mexico Grouper-Tilefish | Gag | Other Controls (<5 Percent Each) | 0.080 |
| Gulf of Mexico Grouper-Tilefish | Gag | California Spiny Lobster (P) | 0.076 |
| Gulf of Mexico Grouper-Tilefish | Gag | Brown Shrimp (SA) | 0.055 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | Pacific Oyster (P) | 0.440 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | Atlantic Herring (NE) | 0.164 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | Other Controls (<5 Percent Each) | 0.126 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | Albacore Tuna (P) | 0.107 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | Sablefish (fixed gear) (P) | 0.106 |
| Gulf of Mexico Grouper-Tilefish | Other Shallow Water Grouper | California Spiny Lobster (P) | 0.056 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | Pacific Oyster (P) | 0.316 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | Atlantic Herring (NE) | 0.222 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | Albacore Tuna (P) | 0.132 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | American Lobster (MA) | 0.104 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | Pacific Sardine (P) | 0.096 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | Other Controls (<5 Percent Each) | 0.080 |
| Gulf of Mexico Grouper-Tilefish | Red Grouper | American Lobster (NE) | 0.050 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | California Market Squid (P) | 0.432 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | Ocean Shrimp (P) | 0.178 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | Chum Salmon (P) | 0.128 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | Other Controls (<5 Percent Each) | 0.113 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | American Lobster (MA) | 0.094 |
| Gulf of Mexico Grouper-Tilefish | Tilefish | Summer Flounder (MA) | 0.055 |
| Gulf of Mexico Red Snapper | Red Snapper | Summer Flounder (NE) | 0.234 |
| Gulf of Mexico Red Snapper | Red Snapper | Yelloweye Rockfish (P) | 0.182 |
| Gulf of Mexico Red Snapper | Red Snapper | American Lobster (MA) | 0.146 |
| Gulf of Mexico Red Snapper | Red Snapper | Eastern Oyster (SA) | 0.114 |
| Gulf of Mexico Red Snapper | Red Snapper | White Hake (NE) | 0.095 |
| Gulf of Mexico Red Snapper | Red Snapper | Other Controls (<5 Percent Each) | 0.083 |
| Gulf of Mexico Red Snapper | Red Snapper | White Shrimp (SA) | 0.073 |
| Gulf of Mexico Red Snapper | Red Snapper | American Lobster (NE) | 0.073 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | Silver Hake (NE) | 0.261 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | White Shrimp (GOM) | 0.194 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | Sablefish (fixed gear) (P) | 0.165 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | Softshell Clam (NE) | 0.132 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | Other Controls (<5 Percent Each) | 0.099 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | Pink Shrimp (GOM) | 0.088 |
| Mid-Atlantic Golden Tilefish | Golden Tilefish | Caribbean Spiny Lobster (GOM) | 0.061 |
| Northeast Groundfish | Acadian Redfish | Pacific Sardine (P) | 0.557 |
| Northeast Groundfish | Acadian Redfish | Northern Shortfin Squid (MA) | 0.323 |
| Northeast Groundfish | Acadian Redfish | Ocean Shrimp (P) | 0.079 |
| Northeast Groundfish | Acadian Redfish | Other Controls (<5 Percent Each) | 0.040 |

**Table A5 continued from previous page**

| Program | Species/Species Group | Control | Weight |
|---|---|---|---|
| Northeast Groundfish | American Plaice Flounder | Ocean Shrimp (P) | 0.285 |
| Northeast Groundfish | American Plaice Flounder | Albacore Tuna (P) | 0.284 |
| Northeast Groundfish | American Plaice Flounder | Brown Shrimp (GOM) | 0.152 |
| Northeast Groundfish | American Plaice Flounder | Chinook Salmon (P) | 0.109 |
| Northeast Groundfish | American Plaice Flounder | Crayfishes Or Crawfishes (GOM) | 0.085 |
| Northeast Groundfish | American Plaice Flounder | Other Controls (<5 Percent Each) | 0.085 |
| Northeast Groundfish | Atlantic Cod | Sea Urchins (P) | 0.494 |
| Northeast Groundfish | Atlantic Cod | Ocean Shrimp (P) | 0.126 |
| Northeast Groundfish | Atlantic Cod | American Lobster (MA) | 0.116 |
| Northeast Groundfish | Atlantic Cod | Other Controls (<5 Percent Each) | 0.102 |
| Northeast Groundfish | Atlantic Cod | Albacore Tuna (P) | 0.096 |
| Northeast Groundfish | Atlantic Cod | Brown Shrimp (GOM) | 0.066 |
| Northeast Groundfish | Haddock | Pacific Sardine (P) | 0.748 |
| Northeast Groundfish | Haddock | American Lobster (MA) | 0.204 |
| Northeast Groundfish | Haddock | Other Controls (<5 Percent Each) | 0.048 |
| Northeast Groundfish | Pollock | Pacific Sardine (P) | 0.736 |
| Northeast Groundfish | Pollock | Longfin Squid (MA) | 0.188 |
| Northeast Groundfish | Pollock | Other Controls (<5 Percent Each) | 0.077 |
| Northeast Groundfish | White Hake | Pacific Sardine (P) | 0.408 |
| Northeast Groundfish | White Hake | Ocean Shrimp (P) | 0.200 |
| Northeast Groundfish | White Hake | White Shrimp (SA) | 0.159 |
| Northeast Groundfish | White Hake | Chinook Salmon (P) | 0.117 |
| Northeast Groundfish | White Hake | Crayfishes Or Crawfishes (GOM) | 0.072 |
| Northeast Groundfish | White Hake | Other Controls (<5 Percent Each) | 0.044 |
| Northeast Groundfish | Winter Flounder | Northern Shortfin Squid (MA) | 0.278 |
| Northeast Groundfish | Winter Flounder | Pacific Sardine (P) | 0.254 |
| Northeast Groundfish | Winter Flounder | American Lobster (MA) | 0.198 |
| Northeast Groundfish | Winter Flounder | Swordfish (SA) | 0.135 |
| Northeast Groundfish | Winter Flounder | Brown Shrimp (GOM) | 0.065 |
| Northeast Groundfish | Winter Flounder | Chinook Salmon (P) | 0.058 |
| Northeast Groundfish | Winter Flounder | Other Controls (<5 Percent Each) | 0.013 |
| Northeast Groundfish | Witch Flounder | Albacore Tuna (P) | 0.304 |
| Northeast Groundfish | Witch Flounder | Brown Shrimp (GOM) | 0.235 |
| Northeast Groundfish | Witch Flounder | American Lobster (MA) | 0.154 |
| Northeast Groundfish | Witch Flounder | Northern Quahog Clam (MA) | 0.111 |
| Northeast Groundfish | Witch Flounder | Sea Urchins (P) | 0.110 |
| Northeast Groundfish | Witch Flounder | Brown Shrimp (SA) | 0.052 |
| Northeast Groundfish | Witch Flounder | Other Controls (<5 Percent Each) | 0.033 |
| Northeast Groundfish | Yellowtail Flounder | Pacific Sardine (P) | 0.471 |
| Northeast Groundfish | Yellowtail Flounder | Northern Shortfin Squid (MA) | 0.199 |
| Northeast Groundfish | Yellowtail Flounder | American Lobster (MA) | 0.181 |
| Northeast Groundfish | Yellowtail Flounder | Other Controls (<5 Percent Each) | 0.095 |
| Northeast Groundfish | Yellowtail Flounder | Shellfish (P) | 0.055 |
| Pacific Groundfish | Bocaccio Rockfish | Atlantic Herring (NE) | 0.618 |
| Pacific Groundfish | Bocaccio Rockfish | King And Cero Mackerel (SA) | 0.211 |
| Pacific Groundfish | Bocaccio Rockfish | Northern Shortfin Squid (MA) | 0.128 |
| Pacific Groundfish | Bocaccio Rockfish | Other Controls (<5 Percent Each) | 0.043 |
| Pacific Groundfish | Canary Rockfish | Atlantic Herring (NE) | 0.666 |
| Pacific Groundfish | Canary Rockfish | Other Controls (<5 Percent Each) | 0.144 |
| Pacific Groundfish | Canary Rockfish | Northern Shortfin Squid (MA) | 0.107 |
| Pacific Groundfish | Canary Rockfish | King And Cero Mackerel (SA) | 0.083 |
| Pacific Groundfish | Chilipepper Rockfish | Atlantic Herring (NE) | 0.477 |
| Pacific Groundfish | Chilipepper Rockfish | Northern Shortfin Squid (MA) | 0.297 |
| Pacific Groundfish | Chilipepper Rockfish | Brown Shrimp (GOM) | 0.127 |
| Pacific Groundfish | Chilipepper Rockfish | Other Controls (<5 Percent Each) | 0.099 |
| Pacific Groundfish | Darkblotched Rockfish | Atlantic Herring (NE) | 0.684 |
| Pacific Groundfish | Darkblotched Rockfish | King And Cero Mackerel (SA) | 0.167 |
| Pacific Groundfish | Darkblotched Rockfish | Northern Shortfin Squid (MA) | 0.087 |
| Pacific Groundfish | Darkblotched Rockfish | Longfin Squid (MA) | 0.050 |
| Pacific Groundfish | Darkblotched Rockfish | Other Controls (<5 Percent Each) | 0.012 |
| Pacific Groundfish | Dover Sole | Atlantic Herring (NE) | 0.761 |
| Pacific Groundfish | Dover Sole | Northern Shortfin Squid (MA) | 0.142 |
| Pacific Groundfish | Dover Sole | Other Controls (<5 Percent Each) | 0.098 |

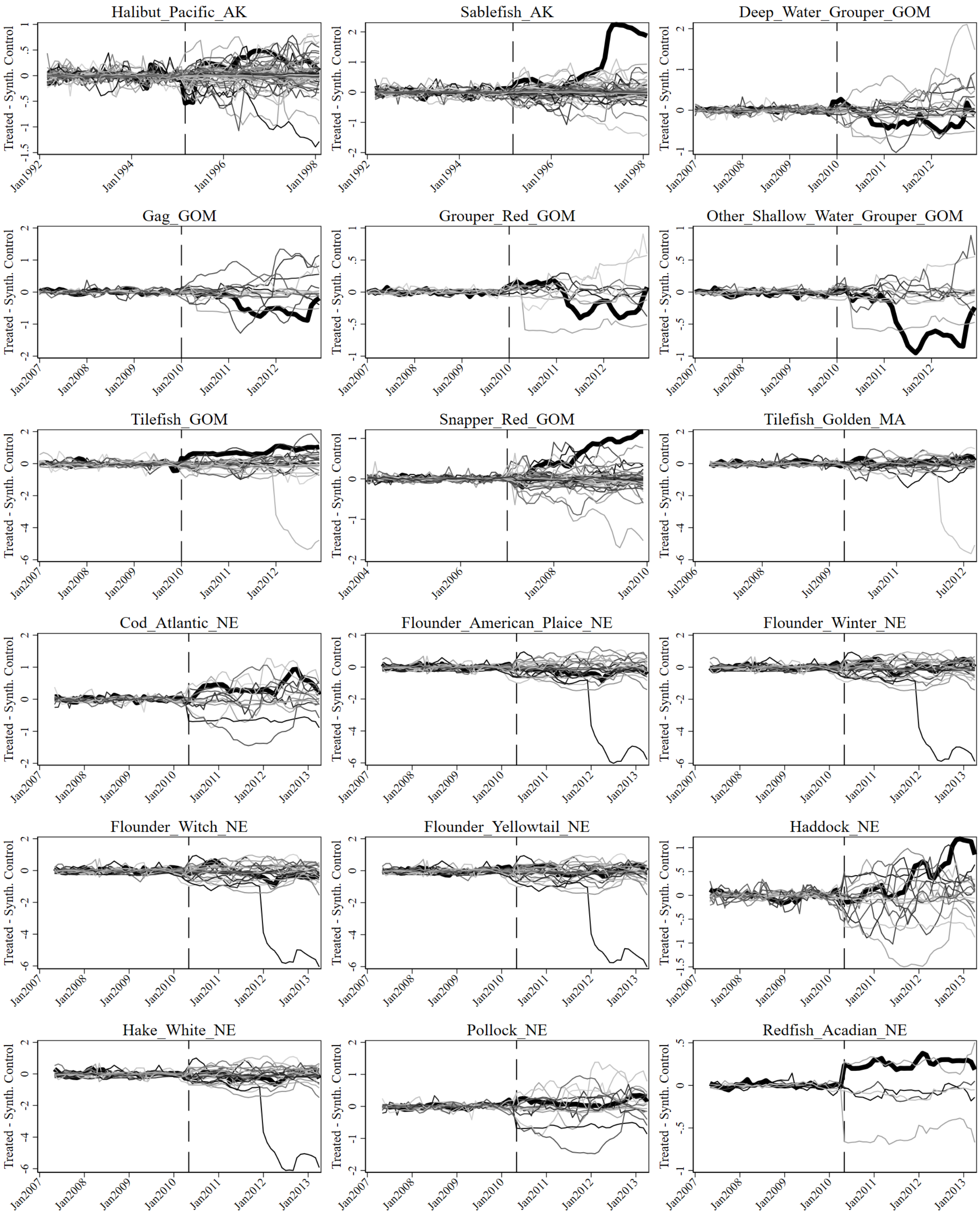
**Table A5 continued from previous page**

| Program | Species/Species Group | Control | Weight |
|---|---|---|---|
| Pacific Groundfish | English Sole | Atlantic Herring (NE) | 0.722 |
| Pacific Groundfish | English Sole | Crayfishes Or Crawfishes (GOM) | 0.180 |
| Pacific Groundfish | English Sole | Northern Shortfin Squid (MA) | 0.076 |
| Pacific Groundfish | English Sole | Other Controls (<5 Percent Each) | 0.022 |
| Pacific Groundfish | Lingcod | Atlantic Herring (NE) | 0.521 |
| Pacific Groundfish | Lingcod | King And Cero Mackerel (SA) | 0.228 |
| Pacific Groundfish | Lingcod | Longfin Squid (MA) | 0.154 |
| Pacific Groundfish | Lingcod | Crayfishes Or Crawfishes (GOM) | 0.065 |
| Pacific Groundfish | Lingcod | Other Controls (<5 Percent Each) | 0.032 |
| Pacific Groundfish | Pacific Cod | Atlantic Herring (NE) | 0.457 |
| Pacific Groundfish | Pacific Cod | Northern Shortfin Squid (MA) | 0.254 |
| Pacific Groundfish | Pacific Cod | Crayfishes Or Crawfishes (GOM) | 0.201 |
| Pacific Groundfish | Pacific Cod | White Shrimp (GOM) | 0.088 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | Atlantic Herring (NE) | 0.680 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | King And Cero Mackerel (SA) | 0.125 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | Northern Shortfin Squid (MA) | 0.064 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | Longfin Squid (MA) | 0.061 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | Crayfishes Or Crawfishes (GOM) | 0.057 |
| Pacific Groundfish | Pacific Ocean Perch Rockfish | Other Controls (<5 Percent Each) | 0.014 |
| Pacific Groundfish | Petrale Sole | Skates (NE) | 0.331 |
| Pacific Groundfish | Petrale Sole | Longfin Squid (MA) | 0.248 |
| Pacific Groundfish | Petrale Sole | Summer Flounder (SA) | 0.217 |
| Pacific Groundfish | Petrale Sole | Other Controls (<5 Percent Each) | 0.109 |
| Pacific Groundfish | Petrale Sole | Atlantic Herring (NE) | 0.094 |
| Pacific Groundfish | Sablefish (trawl) | Longfin Squid (MA) | 0.561 |
| Pacific Groundfish | Sablefish (trawl) | Eastern Oyster (GOM) | 0.205 |
| Pacific Groundfish | Sablefish (trawl) | Red Snapper (GOM) | 0.122 |
| Pacific Groundfish | Sablefish (trawl) | Atlantic Herring (NE) | 0.057 |
| Pacific Groundfish | Sablefish (trawl) | Other Controls (<5 Percent Each) | 0.054 |
| Pacific Groundfish | Shortspine Thornyhead | Atlantic Herring (NE) | 0.571 |
| Pacific Groundfish | Shortspine Thornyhead | Northern Shortfin Squid (MA) | 0.147 |
| Pacific Groundfish | Shortspine Thornyhead | Brown Shrimp (GOM) | 0.080 |
| Pacific Groundfish | Shortspine Thornyhead | King And Cero Mackerel (SA) | 0.080 |
| Pacific Groundfish | Shortspine Thornyhead | Pink Shrimp (GOM) | 0.072 |
| Pacific Groundfish | Shortspine Thornyhead | Other Controls (<5 Percent Each) | 0.049 |
| Pacific Groundfish | Splitnose Rockfish | Atlantic Herring (NE) | 0.742 |
| Pacific Groundfish | Splitnose Rockfish | Northern Shortfin Squid (MA) | 0.116 |
| Pacific Groundfish | Splitnose Rockfish | King And Cero Mackerel (SA) | 0.064 |
| Pacific Groundfish | Splitnose Rockfish | Crayfishes Or Crawfishes (GOM) | 0.051 |
| Pacific Groundfish | Splitnose Rockfish | Other Controls (<5 Percent Each) | 0.026 |
| Pacific Groundfish | Starry Flounder | Atlantic Herring (NE) | 0.395 |
| Pacific Groundfish | Starry Flounder | Longfin Squid (MA) | 0.175 |
| Pacific Groundfish | Starry Flounder | Northern Shortfin Squid (MA) | 0.168 |
| Pacific Groundfish | Starry Flounder | Skates (NE) | 0.145 |
| Pacific Groundfish | Starry Flounder | Other Controls (<5 Percent Each) | 0.068 |
| Pacific Groundfish | Starry Flounder | Crayfishes Or Crawfishes (GOM) | 0.050 |
| Pacific Groundfish | Widow Rockfish | Atlantic Herring (NE) | 0.638 |
| Pacific Groundfish | Widow Rockfish | Crayfishes Or Crawfishes (GOM) | 0.172 |
| Pacific Groundfish | Widow Rockfish | Northern Shortfin Squid (MA) | 0.084 |
| Pacific Groundfish | Widow Rockfish | Brown Shrimp (GOM) | 0.068 |
| Pacific Groundfish | Widow Rockfish | Other Controls (<5 Percent Each) | 0.039 |
| Pacific Groundfish | Yelloweye Rockfish | Atlantic Herring (NE) | 0.730 |
| Pacific Groundfish | Yelloweye Rockfish | Other Controls (<5 Percent Each) | 0.095 |
| Pacific Groundfish | Yelloweye Rockfish | Eastern Oyster (GOM) | 0.065 |
| Pacific Groundfish | Yelloweye Rockfish | Crayfishes Or Crawfishes (GOM) | 0.056 |
| Pacific Groundfish | Yelloweye Rockfish | Northern Shortfin Squid (MA) | 0.054 |
| Pacific Groundfish | Yellowtail Rockfish | Atlantic Herring (NE) | 0.568 |
| Pacific Groundfish | Yellowtail Rockfish | Longfin Squid (MA) | 0.219 |
| Pacific Groundfish | Yellowtail Rockfish | Crayfishes Or Crawfishes (GOM) | 0.090 |
| Pacific Groundfish | Yellowtail Rockfish | Northern Shortfin Squid (MA) | 0.087 |
| Pacific Groundfish | Yellowtail Rockfish | Other Controls (<5 Percent Each) | 0.036 |
| Pacific Sablefish | Sablefish (fixed gear) | Crayfishes Or Crawfishes (GOM) | 0.237 |
| Pacific Sablefish | Sablefish (fixed gear) | Atlantic Herring (NE) | 0.211 |

**Table A5 continued from previous page**

| Program | Species/Species Group | Control | Weight |
|---|---|---|---|
| Pacific Sablefish | Sablefish (fixed gear) | Summer Flounder (MA) | 0.140 |
| Pacific Sablefish | Sablefish (fixed gear) | Eastern Oyster (GOM) | 0.122 |
| Pacific Sablefish | Sablefish (fixed gear) | Tilefish (GOM) | 0.108 |
| Pacific Sablefish | Sablefish (fixed gear) | Goosefish (NE) | 0.087 |
| Pacific Sablefish | Sablefish (fixed gear) | Softshell Clam (NE) | 0.075 |
| Pacific Sablefish | Sablefish (fixed gear) | Other Controls (<5 Percent Each) | 0.021 |

Note: A=Atlantic; AK=Alaska; GOM=Gulf of Mexico; MA=Mid-Atlantic; NE=New England; P=Pacific; SA=South Atlantic.


Halibut_Pacific_AK
Sablefish_AK
Deep_Water_Grouper_GOM
Gag_GOM
Grouper_Red_GOM
Other_Shallow_Water_Grouper_GOM
Tilefish_GOM
Snapper_Red_GOM
Tilefish_Golden_MA
Cod_Atlantic_NE
Flounder_American_Plaice_NE
Flounder_Winter_NE
Flounder_Witch_NE
Flounder_Yellowtail_NE
Haddock_NE
Hake_White_NE
Pollock_NE
Redfish_Acadian_NE
Treated - Synth. Control

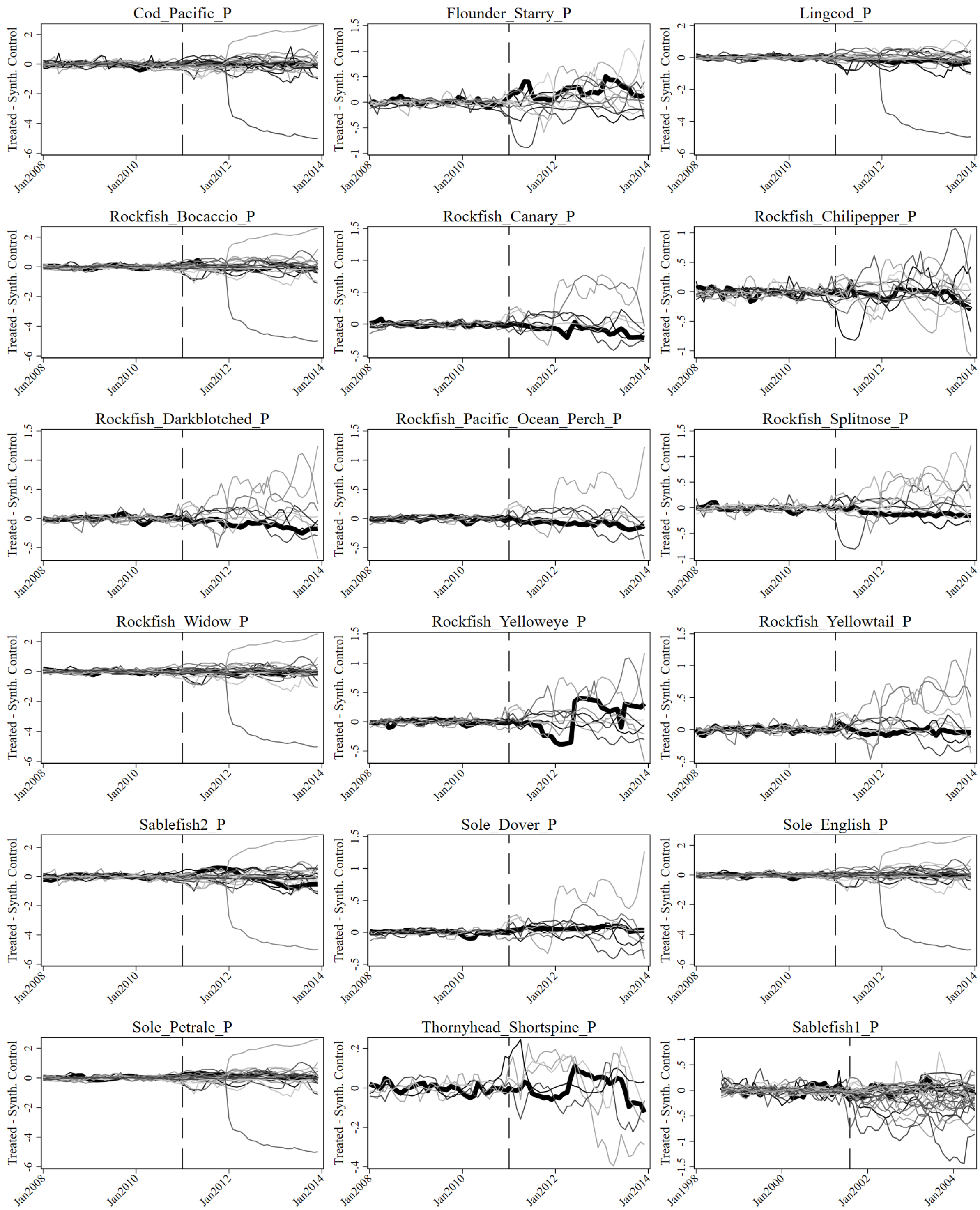



Figure A1. Results of synthetic control placebo tests for all fisheries.

Placebo/falsification tests assign the "treatment" to each control in the allowable donor pool and place the true treatment fishery in the control pool. The synthetic control matching routine is then completed for each control (as if it were the treated fishery). Gaps between "treated" fishery prices and synthetic control prices are plotted on the y-axis. The thick black lines represent the outcome for the true treated fisheries. Following **?**, we filter the set of placebos according to how the pre-intervention mean squared prediction error (MSPE) compares to that of the true treatment fishery. Results are similar across a range of cutoffs; this figure shows placebos whose MSPE is less than double that of the true treatment fishery's as an example.

## Appendix B

We provide brief descriptions below of the catch share programs included in our analysis, as well as the institutional contexts that preceded rights-based management in these treatment fisheries.

### Northeast and Mid-Atlantic

The Northeast General Category Atlantic Sea Scallop IFQ Program, overseen by the New England Fishery Management Council (NEFMC), is compared to the larger non-catch share sea scallop fishery managed by the same council. In 1994 a limited-entry permit program was introduced that utilized days-at-sea (DAS) limits and harvest limits. Open access was maintained for smaller boats, a group described as the "General Category Scallop Fishery." Growth in the share of landings in this category prompted the implementation of the sea scallop IFQ Program in 2010. This IFQ program applied to the General Category fishery (with some minor exceptions), and the IFQ fleet is allocated 5.5% of the total scallop catch limit (Brinson and Thunberg, 2013).

The Northeast Multispecies Sector Program, also overseen by the NEFMC, was implemented in 2010. It has nine species under catch share management, all of which are included in our analysis (four additional species under this program are not managed with catch shares). Prior to the sector program these fisheries were managed with increasingly restrictive DAS restrictions and area closures (Holland et al., 2014). An allocation of quota (and an associated opt-out privilege from some effort controls) was given in 2004 to a cooperative of voluntarily participating vessels for one stock of cod (Georges Bank). This was the initial version of the sector program, which was then extended to other species and stocks in 2010, largely replacing DAS restrictions (Holland and Wiersma, 2010; Brinson and Thunberg, 2013). By 2011, the sector program covered 99% of the total allowable catch (TAC) allocated to commercial fishermen for these species in the Council's region and approximately 99% of total commercial harvest.

The Mid-Atlantic Golden Tilefish IFQ program is also managed by the MAFMC. Prior to catch share introduction in 2009, the golden tilefish fishery was managed with a limited-entry, tiered permitting system that allocated a proportion of the overall quota to each tier. Inclusion of fishermen within a tier was based on prior level of fishery participation. Implementation of catch share management was initially hindered by Congress's moratorium on catch shares, which was in effect from 1996 to 2004. However, fishermen in the full-time tier one category arranged sub-allocations of their tier's quota among themselves voluntarily (i.e., an informal catch share), allowing members to optimize harvest times with market conditions. Fishermen in other tiers were unable to come to a self-organized sub-allocation, leading to early closures of those parts of the fishery in some years. The cooperation of the tier-one fishermen, along with the failures of other tiers to cooperate, prompted the MAFMC to formalize and expand the catch share system in 2009 (Brinson and Thunberg, 2013).

#### Southeast

The Gulf of Mexico Red Snapper ITQ Program was implemented by the Gulf of Mexico Fishery Management Council (GMFMC) in 2007. Previously the commercial harvest was regulated with limited-entry permits, trip limits, and season closures, and faced overfishing, derby-style fishing conditions, and market gluts (Gulf of Mexico Fishery Management Council, 2006). Commercial quota was reduced by one third at the time of implementation.

The GMFMC's Grouper-Tilefish Program, implemented in 2010, manages 13 species, allocating individual quotas for categories rather than for each individual species—namely gag, red grouper, other shallow-water groupers, deep-water groupers, and tilefishes (National Marine Fisheries Service, 2013). Prior to program implementation, trip limits and limited-entry permits failed to prevent quota overages and early season closures (Brinson and Thunberg, 2013).

#### Pacific Northwest

The Pacific Coast Sablefish Stacking Program, operated by the Pacific Fishery Management Council (PFMC), was implemented sequentially. Individual quota was attached to the pre-existing limited-entry permit system in 1994 but did not prevent early season closures due to aggregate quota allocations that were much higher than the TAC (preserving incentives to race). Adjustments in the form of reduced individual quotas alleviated season constraints partially in 2001 and fully in 2002 by bringing aggregate quota in line with the TAC and stacking provisions that enabled consolidation (Holland et al., 2014). Derby conditions were severe in the years preceding full implementation (Brinson and Thunberg, 2013). The program covers only the fixed gear sablefish fishery (approximately one third of the total). Sablefish are also harvested in a large trawl fishery (covered by a different catch share program not implemented until 2011, described below) as well as smaller open access, trip-limited, and tribal fisheries. Permits are "stacked" in the sense that one vessel may hold multiple permits representing a unit of quota.

The PFMC's Pacific Groundfish Trawl Rationalization Program was introduced in 2011. It consists of an ITQ program for a shore-based fleet and a cooperative program for at-sea mothership and catcher/processor fleets. The at-sea fleets focus on whiting, while the shore-based fleet is split between whiting and other groundfish species (with separate management provisions) (Holland et al., 2014). Prior to the program, the shore-based non-whiting fleet was managed with two-month cumulative trip limits, season closures and effort restrictions. The trip limits reduced racing for target species but did not provide individual accountability for bycatch species (necessitating season closures and/or other restrictions). The mothership and shore-based whiting fleets were managed with season closures, leading to racing. The catcher/processor whiting fleet had already voluntarily formed cooperatives and was thus largely unaffected by the program's implementation (Pacific Fishery Management Council, 2010). In total, the program allocates quota for 25 species categories, of which we analyze 19 (those that represent individual species, are not affected by data limitations, and are not managed only as bycatch). A number of species in the Groundfish Trawl Rationalization Program (Pacific Ocean perch, canary, widow, darkblotched, cowcod, bocaccio, and yelloweye rockfishes) had relatively low quotas during the analysis period due to overfishing concerns. Most of the catch of these species was discarded prior to 2011, and they were generally considered incidental—not target—species up until 2013.

#### Alaska

The Alaska Halibut and Sablefish Fixed Gear IFQ program, implemented in 1995, operate in the Bering Sea Aleutian Islands (BSAI) and the Gulf of Alaska with multiple area categories. Each species/areas category has its own TAC, set by the International Pacific Halibut Commission (IPHC) for halibut and North Pacific Fishery Management Council (NPFMC) for sablefish. In the years preceding catch share implementation, management relied on a combination of gear limits, area closures, and season closures. Season length shrank to just a few days in the most important categories of the halibut fishery (National Research Council, 1999).

## REFERENCES

Brinson, A. A. and E. M. Thunberg (2013). The economic performance of u.s. catch share programs. *NOAA Technical Memorandum NMFS-F/SPO-133, 160p*.

Gulf of Mexico Fishery Management Council (2006). Final Amendment 26 to the Gulf of Mexico Reef Fishery Management Plan to Establish a Red Snapper Individual Fishing Quota Program. Technical report, Gulf of Mexico Fishery Management Council.

Holland, D. S., E. Thunberg, J. Agar, S. Crosson, C. Demarest, S. Kasperski, L. Perruso, E. Steiner, J. Stephen, A. Strelcheck, and M. Travis (2014). U.S. Catch Share Markets: A Review of Characteristics and Data Availability. Technical report, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Holland, D. S. and J. Wiersma (2010). Free form property rights for fisheries: The decentralized design of rights-based management through groundfish "sectors" in new england. *Marine Policy 34*(5), 1076–1081.

National Marine Fisheries Service (2013). Gulf of Mexico 2013 Grouper-Tilefish Individual Fishing Quota Annual Report. Technical Report SERO-LAPP-2014-08, NMFS Southeast Regional Office, St. Petersburg, FL.

National Research Council (1999). *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas*. Washington, DC: The National Academies Press.

Pacific Fishery Management Council (2010). Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery: Final Environmental Impact Statement. Technical report, Pacific Fishery Management Council.