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Japanese Whaling and The International Whaling Commission

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INTRODUCTION:

The issue of commercial whaling has been a controversial and emotionally fueled political topic for nearing half a century. Despite this, the whaling industry has been a consistently under-researched field in economics. Additionally, much of what research has been done has been limited by political and bureaucratic influences. At the center of this controversy, is the Japanese whaling industry, research on which has been highly politicized on both sides of the issue.

In 1946, the International Whaling Commission (IWC) was established to regulate whaling and conserve whale stocks, which Japan, although not an original member of the IWC, joined in 1951. In 1982, members of the IWC voted to implement a ban on commercial whaling, which came into effect in 1986 ("Japanese Whaling" 2019). This moratorium applied to all whales in all waters, with few exceptions for aboriginal hunts and whaling for scientific surveys, to be conducted in order to estimate the current stock size (Conrad and Bjørndal 1991). Japan continued to hunt whales under scientific research permits, which the Japanese government would issue to the Institute of Cetacean Research (ICR), but meat and blubber were ultimately delivered to fish markets and government programs for consumption ("Japanese Whaling" 2019).

In 2013, Australia challenged the legality of Japan's Antarctic whaling program at the International Court of Justice (ICJ), and in 2014 the ICJ concluded that the whaling was "not for the purposes of scientific research" and ordered Japan to immediately cease its Antarctic whaling program. Japan complied with the order, but relaunched the program in 2015 with slightly different research objectives; however, the program was clearly meant to meet a commercial objective and in 2017 the Japanese Parliamentarians and Fisheries Agency officials publicly acknowledged that scientific whaling is Japan's means to secure an eventual return to

commercial whaling. In 2018, the IWC rejected Japan's proposal to resume commercial whaling, and in December of that year Japan announced its plan to withdraw from the International Whaling Commission. On June 30, 2019 Japan officially withdrew from the IWC and the next day, commercial whaling resumed ("Japanese Whaling" 2019; McCurry 2019).

Clearly, since Japan's somewhat sudden and unprecedented withdrawal from the International Whaling Commission, this is a topic that is in desperate need for academic analysis. There have been a number of theories for what this may mean moving forward, both for the whaling industry in Japan, and whale populations themselves. Critics of Japan have expressed concern that whale stocks will deplete as Japan will no longer be whaling under the guidance of the International Whaling Commission. Others have argued that the IWC has had little to no impact on how much Japan has been whaling, until the recent case in the International Court of Justice where Australia challenged the legality of Japan's Antarctic Whaling Program. Still more have considered that by commercial whaling freely instead of under the pretense of "scientific whaling," the Japanese market for whale products will be able to set the price level and quantity of whales caught, which may actually lower the total number of whales harvested. Regardless of which, if any of these theories will come to pass, it must first be determined whether the International Whaling Commission has had a significant impact on whaling in Japan.

LITERATURE REVIEW:

Although research into this field has been limited, there has been exploration into the theoretical results of the resumption of commercial whaling, as well as the political forces that have greatly affected the development of whaling management policies for the last several decades. Shortly after the establishment of the moratorium banning commercial whaling,

research into its economic effects had already began. A working paper by Jon Conrad and Trond Bjorndal in 1991 expanded research into creating a reliable bioeconomic model for the stock of minke whales in the Northeast Atlantic and examined economic arguments for the prohibition of commercial whaling. Conrad and Bjorndal discuss factors, such as price-cost ratio and productivity, which may determine the optimal stock size and harvest, if commercial whaling to resume (Conrad and Bjørndal 1991).

Several papers found that stock levels of various whale species had recovered to the point that the sustainable harvest of certain whale stocks is possible, under certain bioeconomic and political conditions (Conrad and Bjørndal 1991; Kuronuma and Tisdell 1994). However, these conditions are unlikely, if near impossible to achieve under the current political climate. As noted before, political and bureaucratic agendas have influenced both research and policy-making surrounding this issue. As such, several articles have indicated that the moratorium banning commercial whaling has remained in place because of political lobbying from conservationists who experienced negative externalities from whaling than because of true economic considerations to all parties involved (Blok 2008; Kuronuma and Tisdell 1994; Morishita 2006). In particular, economic compromise between pro-whaling and anti-whaling groups seems impossible since the former group seeks to form a resource management system for whales while the latter tries to prohibit whale exploitation completely (Kuronuma and Tisdell 1994; Morishita 2006). However, ethical considerations aside, it may be possible to reach a compromise if this issue can be treated as one of negative externalities that must be corrected for (Kuronuma and Tisdell 1994).

Research specifically into the Japanese whaling industry is rare, but what little research there is seems to come to a few consensuses. Research from the early 2000s' indicate that a

complete withdrawal from the International Whaling Commission would not immediately allow for profitable commercial whaling for Japan. Several obstacles prevent commercial whaling beyond just the 1986 moratorium by the IWC, including several other international conventions, large subsidies being provided to the whaling industry currently, and an apparent decrease in demand for whaling products over the last several decades (eftc 2009; Okubo 2007). Despite this, pro-whaling policies and sentiments remain relatively strong in Japan, which may be instigated by a Japanese pro-whaling identity created by a political countermovement throughout Japan. Through this, anti-whaling is made out to be emotional, irrational, and an attack on the historical legacies and integrity of Japanese whaling communities (Blok 2008). Overall, political forces on both sides of this issue make achieving an economically optimal outcome unfeasible.

DATA:

This research analyzes data from the International Whaling Commission, The Ministry of Agriculture, Forestry, and Fisheries in Japan, and the Statistics Bureau of Japan. The data consists of the quantity of whales harvested, average price per whale, population, GDP, the population born before 1940, number of catcher boats, and the whaling ban in a time-series from 1960—2012.

The quantity of whales harvested was measured in the number of whales caught annually. Average price was determined by dividing the total value of the harvest by the number of whales caught. The population is a just a measure of the total population of Japan in any given year. Population born before 1940 is a measure of consumer preference. Since consumption of whale meat increased after world war 2, the population of Japan who were children during that time tend to have more pro-whaling sentiments than younger generations and consume more whale

meat because it is a nostalgia food for them. The number of catcher boats is simply the number of vessels on whale hunting expeditions annually. The whaling ban is a dummy variable which indicates years when the moratorium banning commercial whaling was in place. These variables can be referenced in Table 1 below:

TABLE 1: VARIABLE DEFINITIONS

Variable	*Definition*
Quantity of Whales Harvested	The annual number of whales caught
Average Price	The total number of whales harvested divided by the total value of the harvest, annually
Population	Total population of Japan, annually
Population born before 1940	Total population of Japan born before 1940, annually
Boats	The number of catcher boats sent on hunting expeditions, annually
Ban	Dummy variable determining years when the moratorium was in effect
GDP	Total GDP of Japan, annually

There are some caveats to this data set. The quantity of whales harvested is measured in number of whales rather than tons, which would be a more precise measurement, and is not distinguished by whale species. As the size and value per whale is likely to vary greatly between whale, and between whale species, this means that it is likely that both the measurement for quantity and price are imprecise. Additionally, reporting processes for whaling have changed

over the last several decades, which indicates that the data for the quantity of whales harvested might be further skewed by inconsistent reporting.

EMPIRICAL ANALYSIS:

I utilized two regression techniques in order to build models for this paper. I began with an Ordinary Least Squares regression equation, using time-series data, described below:

$$Q = \beta_0 + \beta_1(Ban)_t + \beta_2(Price)_t + \beta_3(Pop)_t + \beta_4(Pre1940)_t + \beta_5(Boats)_t + \beta_5(Y)_t$$

Where:

- Q is the number of whales harvested
- (Ban) is a dummy variable for whether the Moratorium banning commercial whaling is in effect
- (Price) is the price per whale
- (Pop) is the population, (Pre1940) is the population born before 1940
- (Boats) is the number of vessels sent whaling expeditions
- (Y) is the GDP of Japan.

The results of this regression equation are displayed in Table 2 below.

TABLE 2. OLS REGRESSION RESULTS

Explanatory variable	EQ 1
Intercept	122285.4
	(24168.02) *
Whaling Ban	393.692
	(769.85)
Price	0.297
	(0.041) *
GDP	1.72e-09
	(1.03e-09)
Population	-1001.95
	(181.88) *
Population born before 1940	-219.615
	(139.08)
Catcher Boats	-12.282
	(24.29)
R^2	0.99
N	53

Note: standard errors in parentheses

* Denotes significance at the 95% confidence level.

The regression equation in Table 2 contained some unexpected results. Only two variables were found to be statistically significant: Price and Population. Additionally, the coefficient for Population had an unexpected sign. The coefficient for Price was 0.297, indicating that an increase in price lead to an increase in the quantity harvested, which is consistent with the law of supply. This could also possibly be due to the government programs purchasing whale

meat regardless of market value. This seems to be the most significant factor in determining quantity harvested. Additionally, the coefficient for population was -1001.95, indicating that an increase in the population decreased the quantity of whales harvested. Although this is surprising, I posit that perhaps the time-variable is leading to this unexpected relationship. The explanatory variable of interest, Whaling ban, was not found to be statistically significant, and the coefficient did not have the expected sign. The coefficient for Whaling ban was 393.692, which indicates that the quantity of whales harvested actually increased once the ban on commercial whaling was enacted.

Next, I used a dynamic model to try to explain the quantity of whales harvested, shown below:

$$Q_t = \beta_0 + \beta_1(Ban)_t + \lambda(Q)_{t-1}$$

Where:

- Q_t is the number of whales harvested in time t
- (Ban) is a dummy variable for whether the Moratorium banning commercial whaling is in effect
- Q_{t-1} is the number of whales harvested in time t-1.

The results of this regression can be seen in Table 3 below.

TABLE 3. DYNAMIC REGRESSION RESULTS

Explanatory variable	EQ 1
Intercept	-768.327
	(801.46)
Whaling Ban	609.536
	(799.15)
Lag of Quantity Harvested	1.00
	(0.045) *
R^2	0.98
N	52

Note: standard errors in parentheses

* Denotes significance at the 95% confidence level.

Some of the results for equation 2 were also unexpected. The lagged whaling quantity was statistically significant at the 95% confidence level and had a coefficient value of 1.00 indicating that the quantity of whales harvested in a previous year was significant in determining the harvested quantity in the current year. As with the previous equation, the Whaling ban was also found to not be statistically significant and had the unexpected sign. In order to check for serial correlation that may be causing bias in my dynamic model, A LM test was performed to test for serial correlation. However, it was determined that no serial correlation existed at the 95% confidence level.

CONCLUSION:

The purpose of this research was to determine the effect of the commercial whaling ban on the harvest of whales in Japan. According to my models, the most significant factor in determining the quantity of whales harvested was the price of the whales, indicating that the main influence behind whaling is the market forces. However, it is important to not that the market itself has been distorted by government subsidies and programs which purchased excess whale meat. The whaling ban was not found to be statistically significant in determining the quantity of whales harvested, which was unexpected. This could be due to a variety of reasons. To begin with, it has been suggested that political influences and bureaucratic interference within the International whaling commission lead to little effective oversight into the "scientific" endeavors conducted by Japan, until 2013 when Australia challenged Japan directly. Additionally, there were a number of limitations to my research which should be noted. Due to the nature of time-series studies, my sample size was relatively low. It is also likely that some of my data is inconsistent since survey-taking and reporting procedures for whaling outcomes have changed over the last half century. Additionally, a number of likely significant variables could not be included; the price of substitutes for whale meat and a strong measure of societal sentiments toward whaling and whale-meat could not be found. To further complicate this, the value of the whales may have been over-reported due to government subsidies and programs, which are likely to have paid more for whale meat than it would receive on the open market. Another significant factor that was not included is a prediction of the difficulty level of harvesting whales. A whale population bio-economic model would be important here, as a decrease in quantity could be due to simply being unable to find whales to harvest, as whale stocks decrease. It is also likely that a difference-in-difference comparing Japan to another

whaling country that did not impose the whaling ban would produce more reliable results. I would recommend future research to consider all these factors in future studies, as well as recommending future researchers to consider the gap between the vote to ban commercial whaling by the International Whaling Commission and when the ban was enacted.

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