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TRENDS IN ECONOMIC CONDITIONS IN THE SOUTHERN LONGLINE FISHERY

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Paper prepared by

Chris Reid¹ and Jason Raubani²

¹ Pacific Islands Forum Fisheries Agency (FFA), Honiara, Solomon Islands

² Vanuatu Fisheries Department, Port Vila, Vanuatu

ABSTRACT

Recent albacore stock assessments indicate that relative to MSY the stock is not overfished nor is overfishing occurring, however, many members of the WCPFC, particularly Pacific Island Countries and Territories (PICTs), have expressed concerns in relation to the impact on catch rates, and the economic viability of fleets, of the recent expansion in effort in the southern longline fishery. These concerns are reflected in the recommendations of the 10th meeting of the Scientific Committee with regard to albacore that “longline fishing mortality and longline catches be reduced to avoid further decline in the vulnerable biomass and possibly exceeding the biomass LRP, and so that economically viable catch rates can be maintained.” In this study an index of economic conditions in the southern longline fishery is developed in an attempt to obtain a better understanding of historical trends in economic conditions in the fishery and drivers of changes in it.

1 Introduction

The southern longline fishery¹ saw a period of sustained high catches between 2009 and 2013 with the catch across all species averaging around 111,000mt of which albacore, at around 62,500mt, accounted for 56% (Figure 1). This represented an increase in the average catch of around 20% or 19,000mt on that seen in the previous 5 year period (2004-08) and was primarily a result of an increase of around 13,000mt in the albacore catch which made up 70% of the increase in total catch (Figure 2).

The albacore stock – the main stock exploited in the fishery - is believed to remain in a biological healthy state, in that, it is not overfished and overfishing is not occurring. While the last currently available assessment of the south Pacific albacore stock was undertaken in 2012 (Hoyle et al., 2012)² and, hence, does not incorporate data from more recent years, other recent work involving projections of stock status from 2010 using catch levels reflecting that seen in recent years indicate that the higher catch of recent years were not sufficient to change the findings of Hoyle *et al* (WCPFC, 2014)³.

Despite the high catch levels and the biological healthy status of the albacore stock, economic conditions faced by a significant section of the southern longline fleet were reported to be poor for significant periods between 2009 and 2013 with vessels from a number of Pacific Island Countries and Territories (PICTs) tying up at various times, particularly in late 2012 and 2013. A major concern relating to the economic performance of these fleets was a decline in albacore catch rates. This concern was reflected in the recommendation of the 10th meeting of the WCPFC Scientific Committee that with regard to albacore “*longline fishing mortality and longline catches be reduced to avoid further decline in the vulnerable biomass and possibly exceeding the biomass LRP, and so that economically viable catch rates can be maintained.*”

While albacore catch rates are a major influence on economic conditions other factors including the catch rate for other species, fish prices and costs, particularly fuel costs, also play a significant role. In this study, an index of economic conditions in the southern longline fishery is developed in an attempt to obtain a better understanding of historical trends in economic conditions in the fishery and drivers of changes in it.

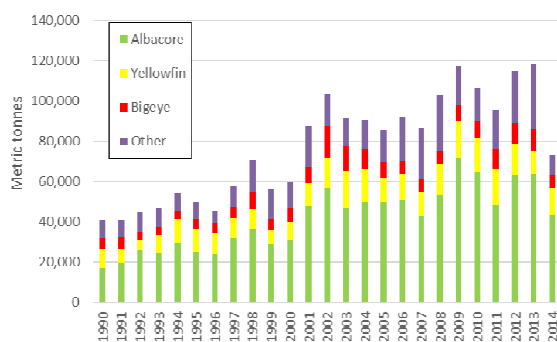


Figure 1: Catch by species in southern longline fishery, 1990-2014

Source: Pers. com. Peter Williams, SPC July 2105

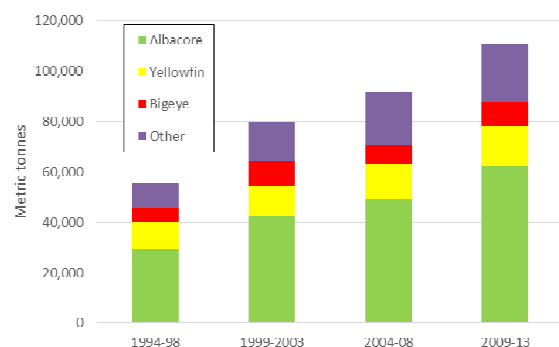


Figure 2: 5 year average catch by species in southern longline fishery

Source: Pers. com. Peter Williams, SPC July 2105

¹ In this paper the southern longline fishery is defined as the longline fishery that lies south of 10°S within the WCPFC area.

² Hoyle, S., Hampton, J. and Davies, N. (2012). Stock assessment of albacore tuna in the south Pacific Ocean. WCPFC-SC8-2012/SA-WP-04-REV1. <http://www.wcpfc.int/node/3233>.

³ WCPFC (2014). Summary Report of the Scientific Committee Tenth Regular Session; Majuro, Republic of the Marshall Islands; 6-14 August 2014. http://www.wcpfc.int/system/files/SC10%20-%20final_posted_rev.docx.

2 An index of economic conditions for the southern longline fishery

The objective of the index developed in this paper is to obtain a measure of relative economic conditions over time. The index does not provide an absolute measure of economic conditions in the fishery in a given year but rather a relative measure between years, that is for example, how do economic conditions in 2014 compare with those in 2013, are they the same, better or worse.

Economic conditions in a fishery are determined by prices received for the catch, the cost of fishing and catch rates with changes over time being driven by changes to each of these factors. The index used in this study is calculated as follows:

$$EC_y = ComPI_y \times CPUE I_y - C I_y \quad (1)$$

Where EC represents the index for economic conditions in year y , $ComPI$ represents the composite fish price index in year y , $CPUEI$ represents the catch rate index in year y and CI represents the fishing cost index in year y .

3 Components of the economic conditions indicator

To obtain the index of economic conditions it is necessary to obtain indices of prices, catch rates and fishing costs. In this section trends for each of these factors are examined and indices developed.

3.1 Fish prices

Prices received by operators vary depending on the market that the product is destined for and the costs of transporting the product to market. As such, there is no single price that will provide a perfect reflection of trends in the price received by operators for the various species caught in the southern longline fishery. In this paper, prices on certain specific markets for the three main tuna species (albacore, yellowfin and bigeye) are used as indicators of the trends in the price received by operators. It is important to note that it is not the absolute value of the product at a particular point of time that is of interest here but rather relative values over time. In addition market prices are reported in a range of currencies, to allow for a common currency all prices are specified in US dollars (USD) based on the exchange rate prevailing during the relevant time period.⁴ Finally, it is necessary to adjust nominal prices (that is, the price at a given point of time) to account for inflation and the changing a value of a currency unit over time. In this paper both nominal and real price trends are presented with real prices specified in 2014 USD and obtained by adjusting nominal USD prices using US CPI data.⁵

For albacore Thai import prices are used as the trend indicator as the main use of longline caught albacore is for canning, Thailand is a significant producer of canned albacore and that this is the longest data series available. As can be seen in Figure 3 while nominal prices since 1997 have fluctuated considerably over time the level around which they fluctuate has increased with peaks and troughs tending to occur at higher levels resulting in nominal prices trending upwards. In contrast while prices in real terms (specified in 2014 USD) also see significant fluctuations the level that it fluctuates around has remained relatively stable over time at around \$2,900/mt. Real prices were at their highest in 2012 (26% above the level average over the period 1997-2014) and lowest in 2007 (23% below). Since 2008 only in 2013 was the price significantly lower (12%) than the long term average.

For yellowfin and bigeye the price of fresh imports from Oceania into Japan was used as the indicator series. As can be seen from Figures 5 and 7 real USD prices for both products follow a similarly steady trend over time as for albacore although trend real yellowfin USD prices increased marginally and

⁴ Currency conversions are based on the interbank exchange rates from www.oanda.com/currency/historical-rates.

⁵ The CPI measure used is for All Urban Consumers from www.bls.gov/cpi/data.htm

trend real USD bigeye prices fell marginally. While the trend was similar as that for albacore the pattern of variation from the average price over the period differed in that real USD yellowfin and bigeye prices spent significant periods at lower/higher than average levels while albacore prices fluctuated between levels lower and higher than average more frequently (Figures 4, 6 and 8).

The real USD price series outlined above were used to construct a composite fish price index. This was done by first creating indices for each species where the index was specified as:

$$PI_{s,y} = \frac{Pr_{s,y}}{AvPr_{s,1997-2014}} \quad (2)$$

where PI is the price index for species s in year y , Pr is the real price of species s in year y and $AvPr$ the average real price of species s over the period 1997 to 2014. The prices index for other species was assumed to be the same as that for albacore and the composite price index specified as:

$$ComPI_y = 100 + \sum_s \left[(PI_{s,y} - 100) \times \frac{C_{s,y}}{TC_y} \right] \quad (3)$$

where $ComPI$ is the composite price index in year y , PI is price index of species s in year y , C is the catch of species s in year y and TC_y the total catch in year y . The composite price index obtained is shown in Figure 9.

3.2 Fishing costs

The only available time series in relation to fishing costs is that for fuel. Given this the approach used in this study is to assume that nominal fishing costs aside from fuel have increased at the same rate as US CPI, that is, that real non-fuel fishing costs have remained constant over time. If this is not the case and real non-fuel costs have risen faster (slower) than the CPI rate the economic conditions index will be lower (higher) in more recent years than would actually be the case.

The Singapore marine diesel price series provides a good indicator of the trends in the cost of fuel used by vessels operating in the southern longline fishery.⁶ Fuel prices from March 2011 to June 2014 were consistently between \$900 and \$1,000 per metric tonne (\$3.70-4.11 per US gallon/\$0.98 to 1.09 per litre) before beginning a sharp decline over the remainder of 2014. Prices in 2015 to mid-July date have averaged around \$540/mt (\$2.22 per US gallon/\$0.59 per litre).

According to Krampe (2006)⁷ fuel cost in 2006 constituted 40% of all production cost for albacore while Arita and Pan (2013) estimated that fuel cost accounted for 27% of total costs for the American Samoan longline fleet in 2009 and noted that a previous study estimated this at 15% in 2001⁸. Using this information, the Singapore marine diesel price series and the assumption the real non-fuel fishing costs have remained constant over time a fishing cost index was derived. This was done by adding a constant (representing real non-fuel costs) of 225 to the index of the yearly Singapore marine diesel real price index which resulted in fuel costs representing 18% of fuel cost in 2001, 34% in 2006 and 31% in 2009. The fishing cost index is shown in Figure 12.

⁶ For example, in the case of American Samoa a maximum allowable price (MAP) is set by the government for fuel, including marine diesel. The MAP is based on the Singapore refinery price for the relevant product plus a fixed mark-up (in 2006 the mark up for marine diesel was \$0.42 per US gallon (\$0.11 per litre) (Krampe 2006) and \$0.67c per gallon (\$0.18c per litre) in 2014 (SPC)).

⁷ Krampe, P. (2006), Rising fuel prices and its impact on the tuna Industry, Paper presented to Bangkok Tuna 2006.

⁸ Arita, S. and Pan, M. (2013), Cost-Earnings Study of the American Samoa Longline Fishery: Based on Vessel Operations in 2009, WCPFC-SC9-2013/MI-WP-06. <http://www.wcpfc.int/node/4734>.

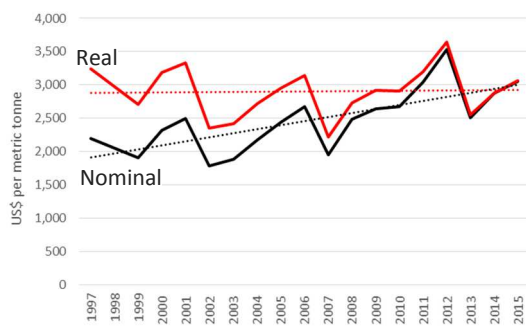


Figure 3: USD real and nominal prices for imports of albacore into Thailand

Note: 2015 prices for period to May 31.
Source: <http://www.customs.go.th/>

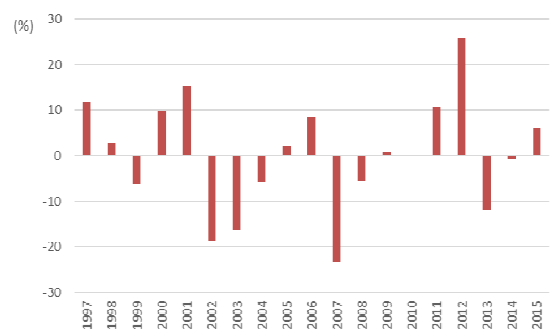


Figure 4: Variations in annual USD real prices for Thai albacore imports versus its long term average (1997-2014)

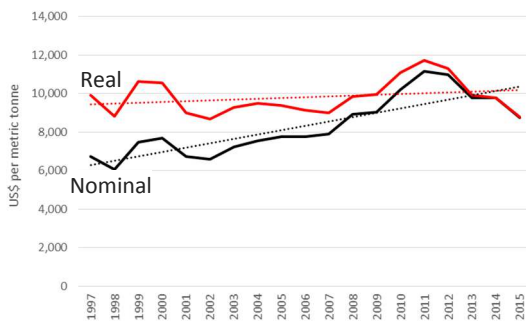


Figure 5: USD real and nominal prices for Japanese yellowfin imports from Oceania

Note: 2015 prices for period to May 31.
Source: www.customs.go.jp/toukei/info/tsdl_e.htm

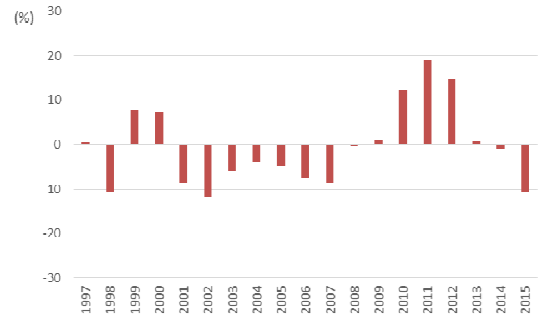


Figure 6: Variations in annual USD real prices for Japanese yellowfin imports from Oceania versus its long term average (1997-2014)

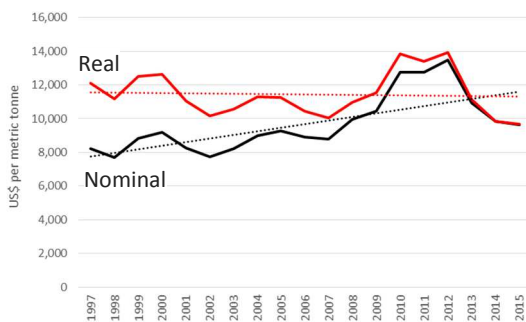


Figure 7: USD real and nominal prices for Japanese bigeye imports from Oceania

Note: 2015 prices for period to May 31.
Source: www.customs.go.jp/toukei/info/tsdl_e.htm

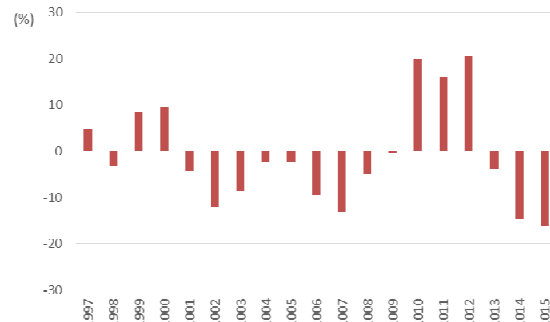


Figure 8: Variations in annual USD real prices for Japanese bigeye imports from Oceania versus its long term average (1997-2014)

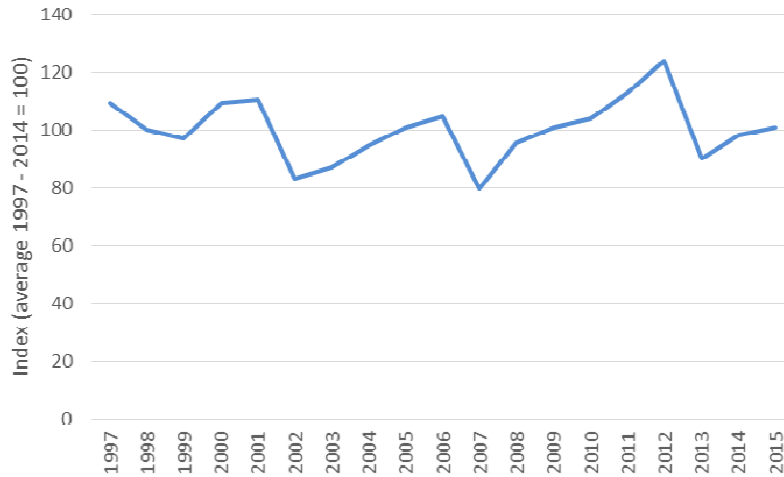


Figure 9: Composite price index

Note: The 2015 price index is based on data to May 31 and assumes the same catch composition as that for 2014

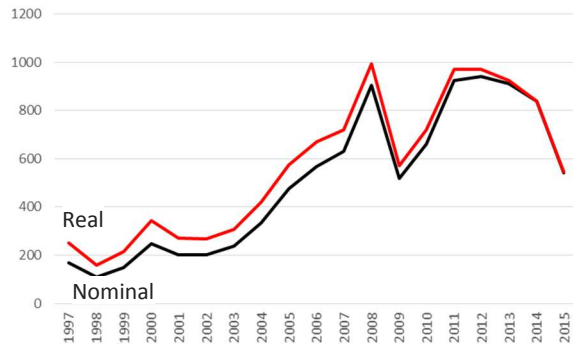


Figure 10: Singapore marine diesel oil (MDO) nominal and real price series

Source: www.bunkerworld.com/prices/port/sg/sin/

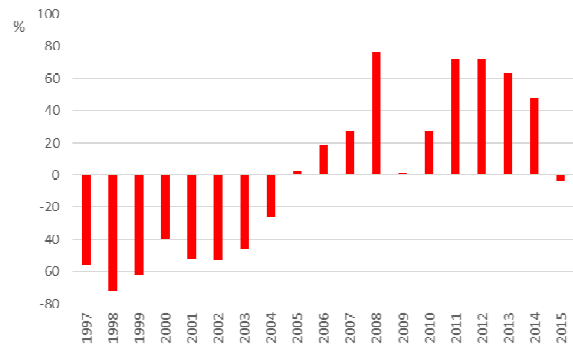


Figure 11: Variations in annual USD real prices for Japanese bigeye imports from Oceania versus its long term average (1997-2014)

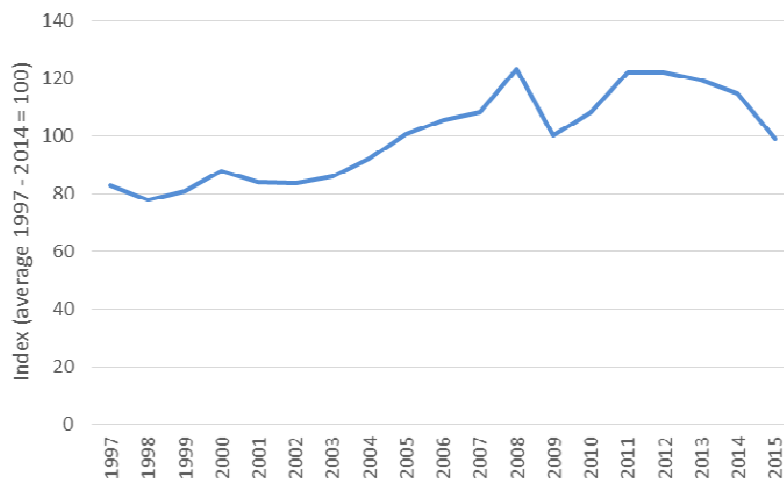


Figure 12: Fishing cost index

3.3 Catch rates

While catch rates (measured in kilograms caught per hundred hooks set) for both albacore and across all species appear to exhibit cyclical behaviour as shown in Figure 13 longer trends are also evident. During the 1990s catch rates were on an upward trend, however, since 1998 the trend has been one of decline with cyclical peaks and troughs tending to be attained at progressive lower levels while the rate at which catch rates recover after reaching a trough has slowed significantly. This phenomenon of lower peaks and troughs and slower recovery from troughs has resulted in average catch rates declining over time as reflected by the 5 year running average which is on a downward trend. The 5 year average over 2010-14 was 34.3 kg per hundred hooks 12% lower than that over 2002-06 (which was the lowest 5 year average seen prior to 2011) and 25% lower than to 2005-09. Similarly, 5 year average albacore catch rates over 2010-14 were 9% lower than the pre-2011 low (2003-2007) and 23% lower than for 2005-09. The catch rate index used is provided Figure 14 and based on total catch per hundred hooks set.

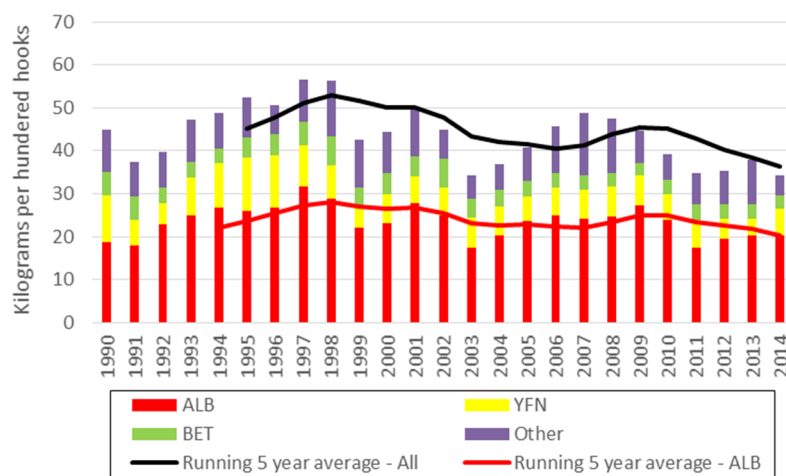


Figure 13: Annual catch rates by species and 5 year running average for albacore and total catch

Source: Pers. com. Peter Williams, SPC July 2015

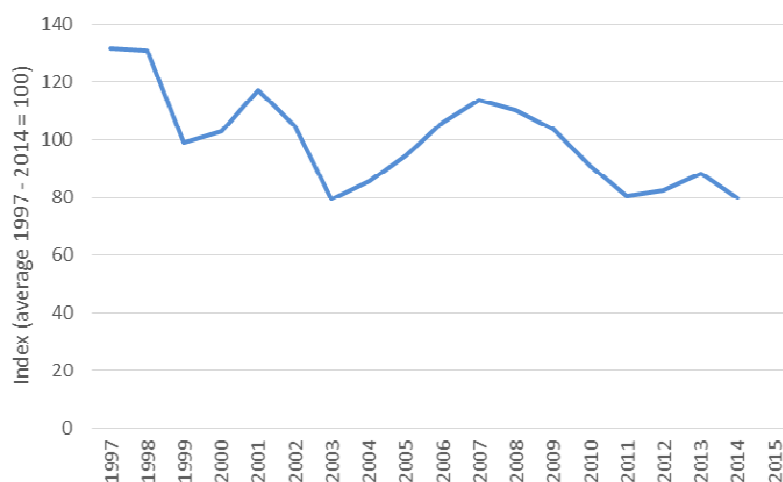


Figure 14: Catch rate index

While it is not the intent of this paper to provide an analysis of the drivers of the observed decline in catch rates Figures 15 and 16 show scatter plots of catch rates and effort levels and indicate a

correlation between increased fishing effort and declining albacore and total catch rates. Other factors including increasing fishing mortality from other areas, particularly for bigeye and yellowfin, are also likely to have impacted on catch rates, nonetheless the decline in catch rates do coincide with the period of expansion in effort levels within the southern longline fishery.

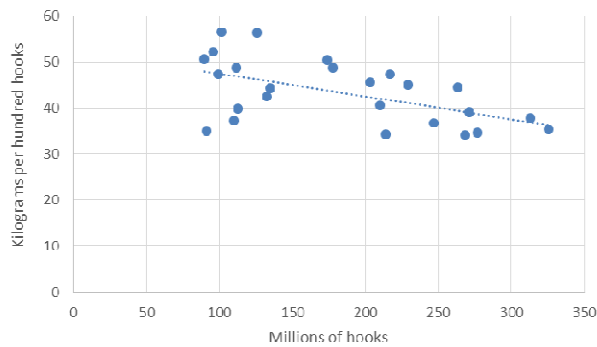


Figure 15: Scatter plot for total CPUE and fishing effort

Source: Pers. com. Peter Williams, SPC July 2015

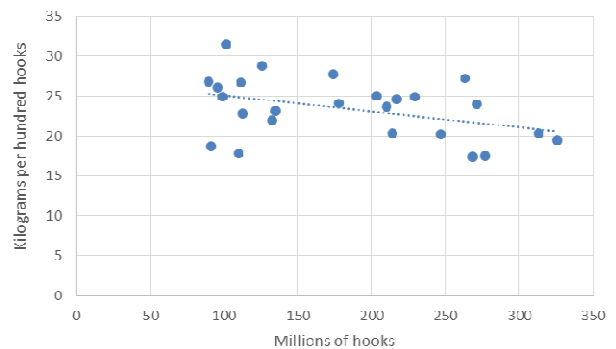


Figure 16: Scatter plot for albacore CPUE and fishing effort

Source: Pers. com. Peter Williams, SPC July 2015

4 An index of economic conditions in the southern longline fishery

The economic conditions index (ECI) calculated using equation 1 and the values for the various component indices outlined above is shown in Figure 17. An illustration of the influence of each of the component indices on the ECI in a given year is provided in Figure 18. For example, from Figure 17 it can be seen that in 2012 the economic index was at 80, 20% below that averaged over the period 1997-2014. As shown in Figure 18 this decline occurred despite prices being 24% higher than average as fishing costs were 22% higher and catch rates 20% lower than average. Based on the derived index, economic conditions in 2011 and 2012 were relatively poor as a result of low catch rates and high real fuel prices despite the fact that real fish prices were, respectively, at the second highest and highest levels over the period. In 2013 and 2014 with fish prices around or below average levels economic conditions deteriorated to period lows. While there is significant variability in economic conditions in the fishery the reductions in catch rates seen since 2011, if sustained, are likely to see future relatively good economic conditions occurring at levels around that averaged between 1997 and 2014 at best and economic conditions in future relatively poor years at levels around or below that seen in 2013 and 2014. In 2015 to date fuel and fish prices are around their long term (1997-2014) average, however, unless CPUE also recovers economic conditions, while likely to be an improvement on levels between 2011 and 2014, are likely to remain significantly below average 1997-2014 levels.

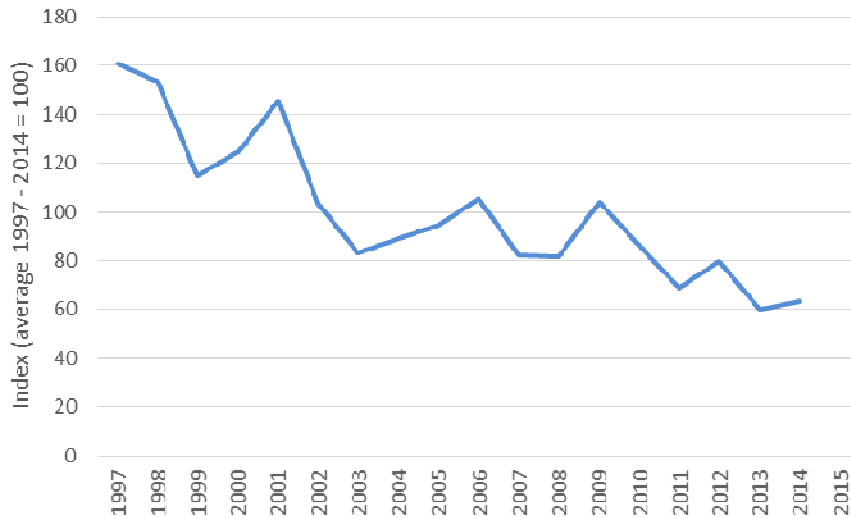


Figure 17: Economic conditions index for the southern longline fishery

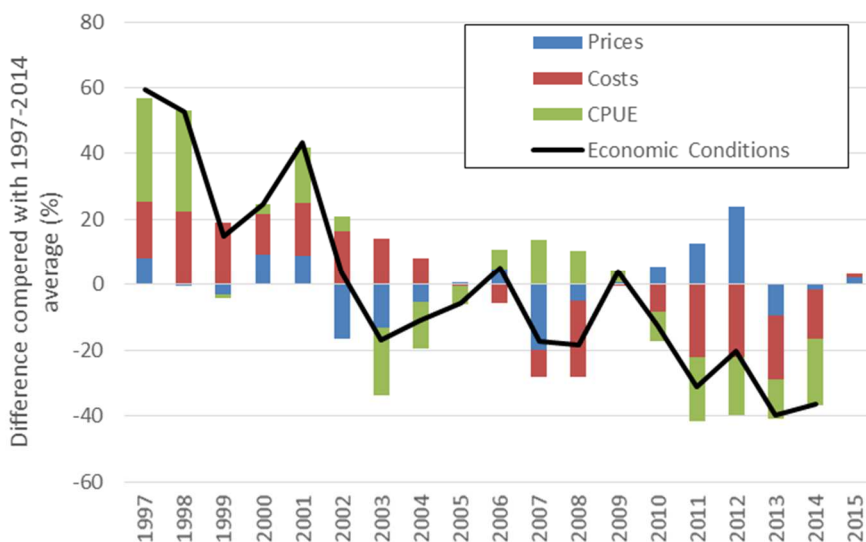


Figure 18: Variation of economic conditions index from average and the influence of component indices between a given year and average (1997-2014) conditions in selected EEZs

Note: The 2015 price index is based on data to May 31 and assumes the same catch composition as that for 2014

To examine variations in economic conditions across the fishery economic condition indices were also obtained for the EEZs of Pacific Island Countries and Territories (PICTs) that have significant longline fisheries (that is, an average longline catch between 2010 and 2014 of greater than 2,000mt) and where the average albacore catch represents more than 60% of the total catch. Based on these criteria economic conditions indices were obtained for the EEZs of six PICTs, American Samoa, Cook Islands, Fiji, New Caledonia, Samoa and Vanuatu. These economic condition indices were constructed using the approach outlined previously and EEZ level catch and catch rate data. Thus, while the cost index remains the same as for the fishery wide index the price index differs due to differences in the composition of the catch and the catch rate index of that from the given EEZ. Figure 19 shows the variation of the economic conditions index from average and the influence of component indices between a given year and the average 1997-2014 level in the selected EEZs. As can be seen with the exception of the EEZ of New Caledonia the index follows a similar pattern as that of the southern

longline fishery index generally being at low levels through much of the period from 2011 to 2014 as a result of high fuel prices and low catch rates. In contrast to other area economic conditions in the EEZ of New Caledonia have generally been above average levels since 2010 as a result of above average catch rates. It is also noticeable the while catch rates in the Cook Islands between 2011 and 2014 were lower than average it was to a lesser extent than in other EEZs (excluding New Caledonia) except in 2013 and economic conditions over the period more favourable.

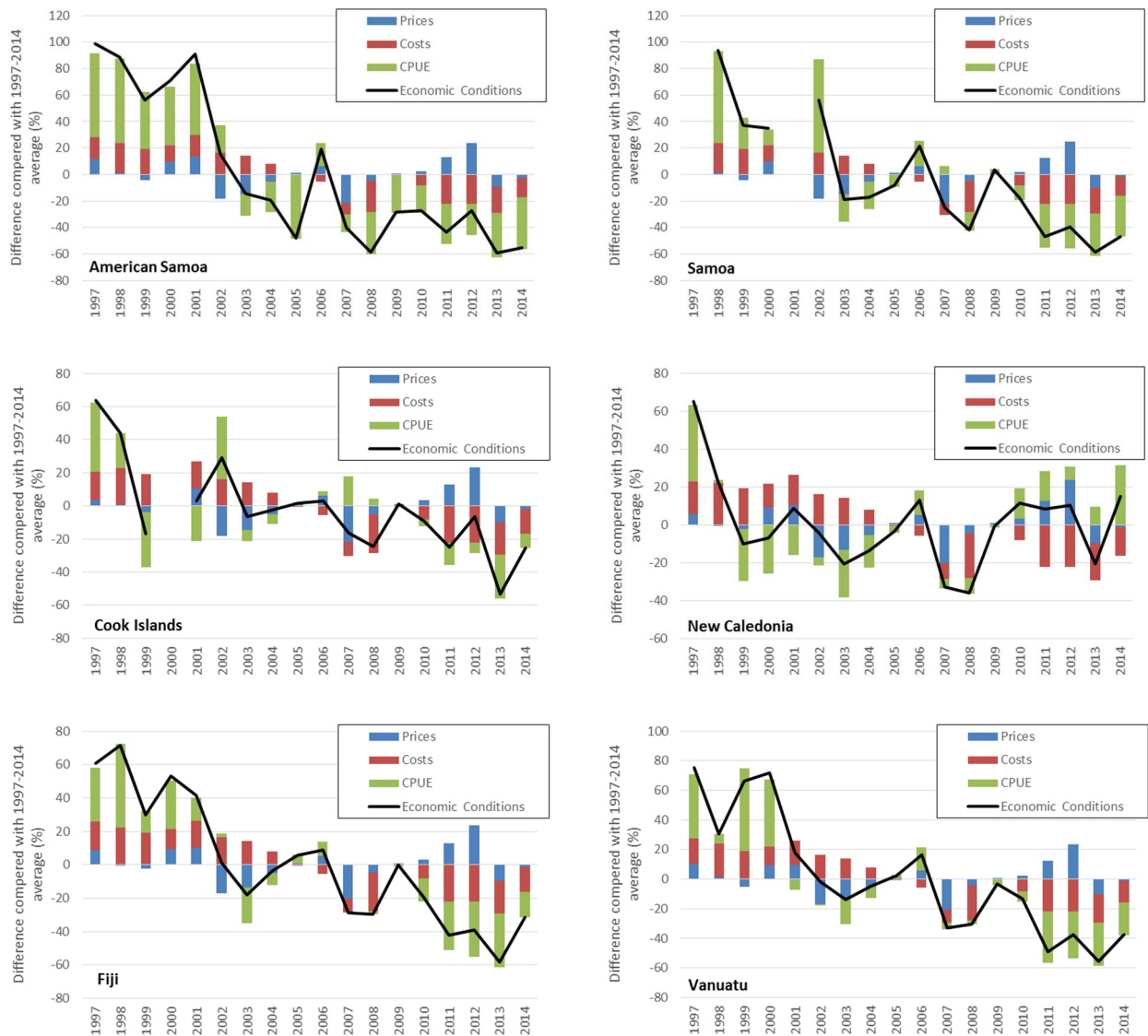


Figure 19: Variation of economic conditions index from average and the influence of component indices between a given year and average (1997-2014) conditions in selected EEZs

5 Discussion

The economic conditions index developed in this paper takes into account trends in real fish prices, real fishing costs and catch rates and compares annual economic conditions in the southern longline fishery with average economic conditions experienced over the period 1997 to 2014. The index clearly demonstrates that economic conditions in the fishery between 2013 and 2014 were poor driven by

high fuel prices and low catch rates. While conditions in 2011 and 2012 were better than that seen for 2013 and 2014 they were still significantly worse than average conditions over the period despite the fact that real fish prices were at the second highest and highest levels respectively.

With recent significant declines in fuel prices, which has returned fishing costs to around their period average, and fish prices also being around the period average significant improvements in economic conditions in 2015 are likely. However, if the reductions in catch rates seen since 2011 continue then future relatively good economic conditions will likely occur at levels that to date would have been deemed average and future relatively poor economic conditions at levels around or below that seen in 2013 and 2014. If good economic conditions are what used to be average economic conditions and poor economic conditions occur more frequently, as is likely if relatively low catch rates continue, many fleets from PICTs will likely struggle to be economically viable.