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Transitioning to alternative livelihoods: The case of PACE-Vaquita

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ABSTRACT

The transition of artisanal fishing communities to alternative livelihoods is a pressing issue around the world –due to either overexploitation of the fishing stock or climate change related impacts or biodiversity loss associated with by-catch. Learning the factors that increase the probability of a successful transition is useful for policy design purposes. In this context, this paper studies the factors associated with the probability that a fisher *in transition* to an alternative livelihood remains in such livelihood. We analyze data gathered in the Northern Gulf of California, Mexico, where a government program (PACE-Vaquita) was launched in 2008 to incentivize the transition to alternative livelihoods to avoid by-catch of the Vaquita Marina –an endangered species. We model the probability of a successful transition (measured as remaining in the alternative livelihood by 2012) as depending on fisher's characteristics, and alternative livelihood features. We find that a successful transition was more likely to happen if the fisher i) was a woman; ii) lived in the community of San Felipe; and iii) the alternative livelihood was initially funded not only using the money from PACE-Vaquita but also through a loan from another (not necessarily institutional, formal) source. These results point to the relevance of providing financial services that target women in the context of artisanal fisheries.

1. Introduction

In the context of a series of policies aiming to reduce fishing efforts in the Gulf of California to preserve Vaquita marina –the world's smallest porpoise that is endemic to the Northern Gulf of California in Mexico—, the Mexican government launched PACE-Vaquita in 2008. This program compensated artisanal fishers who retired either permanently or temporarily from fishing activities and assisted them in transitioning to alternative livelihoods. In 2008, around 16% of fishing permit holders enrolled in the permanent component of PACE-Vaquita. By 2012, around 63% of these fishers *in transition* remained in their alternative livelihoods. Why is it the case that some fishers remained in their alternative livelihoods while others did not complete such transition?

This paper studies the factors associated with the probability that a fisher in transition to an alternative livelihood remains in such livelihood at least until 2012. This year is used as reference because it is the year in which data was gathered via a face-to-face survey implemented in the two largest fishing communities of the Northern Gulf of California –San Felipe and Santa Clara.

We model the probability of a successful transition as depending on fisher's characteristics, and livelihood features. We find that a fisher in transition more likely remained in his/her alternative livelihood if the fisher i) was a woman; ii) lived in the community of San Felipe; and iii) the alternative livelihood was initially funded not only using the money from PACE-Vaquita but also through a loan from another (not necessarily institutional, formal) source. In section 6, we discuss how these results may inform the design of public policies aiming to support the transition of fishers to alternative livelihoods.

The rest of this paper is organized as follows. Section 2 describes previous literature focusing on the transition of fishing communities to alternative livelihoods. Section 3 describes the implementation of PACE-Vaquita. Section 4 describes our data. Section 5 reports results from logit specifications. Section 6 concludes by providing an interpretation and a discussion of our results.

2. Previous literature

Previous studies focusing on the transition of fishing communities to alternative livelihoods provide insights on the factors associated with a successful transition. For instance, the alternative livelihood that has

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been available to small-scale fishing communities in Papua New Guinea are closely linked to sportfishing tourism. A successful transition in this context has been documented to be associated with access to social capital (measured in terms of reciprocity within the social network) and not necessarily due to access to more conventional factors such as financial, physical and human capital (Diedrich et al., 2019). Engie (2015) focuses on small-scale fishing communities in the Galapagos Marine Reserve, where alternative livelihoods are also closely linked to recreational fishing tourism. Engie (2015) reports findings that are consistent with the emphasis on social capital suggested by Diedrich et al. (2019): a successful transition in Galapos Islands was reached by individuals with vertical social ties, and large family and social networks. In addition, Engie (2015) documents that education matters as well –individuals with tertiary education had a higher probability to succeed.

An important insight from previous literature is that, even if fishers are successful in acquiring skills to carry out alternative livelihoods, they may not necessarily exit fishing or reduce fishing effort (Ireland et al., 2004). Instead, fishers may decide to diversify their portfolio of economic activities. Brugere et al. (2008) report how small-scale fishers across Africa and Asia rely on income generating strategies that combine alternative livelihoods and fishing activities. For instance, Sievanen et al. (2005) document that artisanal fishers in southern Philippines and northern Indonesia engaged in seaweed farming –which is more lucrative than most fishing activities in the region— do not necessarily reduce fishing activities. Hill (2005) documents that small-scale fishers in Mozambique rely on a diversification strategy that combines ecotourism, farming and fishing.

In fact, keeping this diversification strategy in mind, nationally and internationally funded programs have promoted non-fisheries livelihoods aiming for short term effects that expectedly will reduce fishing effort only in the long term. Such is the case of the Spanish-funded Regional Fisheries Livelihoods Programme for South and Southeast Asia. This program has sought to reduce the vulnerability of small-scale fishing communities across Cambodia, Indonesia, Philippines, Sri Lanka, Timor-Leste and Vietnam by promoting non-fisheries livelihoods that, in the short term, empower women and positively impact the income of the participants. It is expected that these short term effects reduce the pressure on marine resources only over a longer period (Wedathanthrige et al., 2013).

In this context, a literature of interest is the one focused on the factors associated with fishers (not) exiting fishing. For instance, by focusing on a small-scale commercial fishery in the Bayawan Coastal Resource Management area in the Philippines, Slater et al. (2013) document that increasing livelihood diversity has the effect of reducing the likelihood to exit fishing as alternative livelihoods supplement and complement otherwise non-viable fishing. In contrast, Daw et al. (2012) document that livelihood diversity is associated with willingness to exit fishing activities among small scale fishers in five western Indian Ocean countries. Blythe (2015) documents the stated decisions of fishers in two coastal communities in Mozambique faced to a hypothetical 90% decline in catch rates. He reports that fishers with a strong attachment to the occupation would rather move to other fishing sites, and fishers with strong attachment to their location would shift to alternative livelihoods.

3. PACE-vaquita

Vaquita Marina is the world's smallest porpoise and is endemic to the Northern Gulf of California in Mexico. The efforts of conservation in this region can be divided in three periods (Bobadilla et al., 2011). The first period is from 1950 to 1970, when the main aim was to protect commercial fish stocks. The second period is from 1970 to 1990, when the main objective was to promote the growth of the small-scale fishing effort. From 1990 onward the effort has focused on sustainable development. Starting in 2007, the efforts were particularly focused on preserving Vaquita Marina.

In 2007, the Mexican government launched a program to monetarily compensate fishers who exit the fishing activity. In 2008, this program was labeled PACE-Vaquita (Action Program to Conserve Vaquita). PACE-Vaquita aimed to decrease fishing efforts in four ways. First, through a buy-out component which granted fishers the alternative to start a new business in exchange for a permanent canceling of their fishing license. Between 2007 and 2014, 370 licenses were cancelled in this way.

The second component of PACE-Vaquita was a rent-out strategy which provided monetary compensation to fishers that quit fishing inside the Refuge area (see Fig. 1). All licensed fishers were able to participate in this program, and around 876 received this compensation. The third component was an incentive to fish with a Vaquita-friendly technology. Under this option, fishers were compensated for participating in testing an alternative gear that reduced the by-catch of the Vaquita-marina at expenses of reducing the catch of the commercial species –38 licensed fishers participated in 2009 and 126 in 2010 (see Avila-Forcada et al. (2012) for further details).

4. Data

The data analyzed in this paper was gathered in 2012 via a face-to-face survey by personnel of PRONATURA –a non-for-profit conservation organization with a long story of environmental activism in the Upper Gulf of California. The survey took place in Santa Clara and San Felipe –the two communities with the highest levels of fishing effort near the Vaquita Refuge Area (Aragón-Noriega et al. (2010), see area B in Fig. 1).

The face-to-face survey was answered by 93 individual fishers and 20 representatives of cooperatives –practically reaching all fishers that initiated an alternative livelihood once they received a compensation from PACE-Vaquita. In this paper, we focus our analysis in the 93 observations reflecting individual behaviors –66 collected in Santa Clara and 27 in San Felipe.[1] Around 37% of the 93 respondents were not operating anymore at the moment of the survey –56% and 29% in San Felipe and Santa Clara, respectively.

Table 1 describes the variables included in the econometric specifications reported in section 5. The first row defines the dependent variable (operating) which takes value one if the alternative livelihood was operating in 2012, and zero otherwise. The probability of observing a livelihood in operation in 2012 is modeled as depending on two types of factors: individual characteristics of beneficiaries, and features describing the livelihood.

The econometric model controls for four characteristics of the individual PACE-Vaquita beneficiaries: age (in years); gender (1 if male, zero otherwise); diversification of sources of income (1 if fisher in transition had an additional source of income while operating the alternative livelihood, zero otherwise); and whether the beneficiary was member of a fishing cooperative before participating in PACE-Vaquita (1 if the condition is present, zero otherwise).

We control for age of the fisher because the literature on small businesses has documented that, among those who initiate a new business, younger entrepreneurs have higher chances to fail (Marom and Lussier, 2014; Lussier and Corman, 2015). For instance, in a comparative study of firms in Mexico and the US, Hayes et al. (2015) document that the owner's age is key for success of small businesses in both countries. Explanations for this result range from older people

[1] The strategy to run a business owned by a cooperative differs from how it is managed from an individual perspective. We do not have access to enough number of observations or variables at the cooperative level to carry out a specification focused on only cooperative businesses.

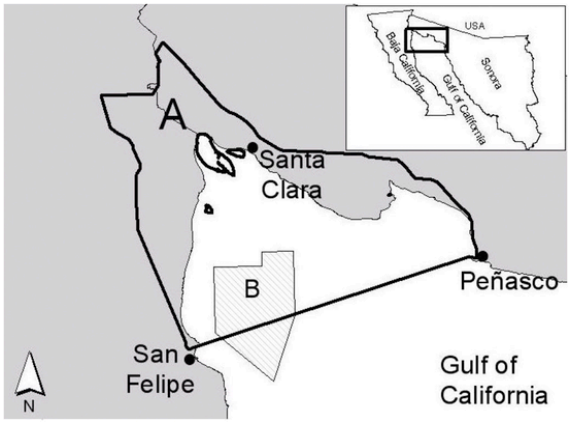

Fig. 1. Biosphere reserve of the Upper Gulf of California and Delta of the Colorado River (A) and Vaquita Refuge Area (B).

Table 1
Description of variables included in econometric specifications.

Variable	Description
Dependent variable	
Operating in 2012 (0/1)	One if the alternative livelihood was operating in 2012; zero otherwise.
Fisher's characteristics	
Age (years)	Age of fisher in transition to an alternative livelihood (divided by 10 for scaling purposes).
Male (0/1)	One if fisher in transition is male; zero otherwise.
Diversification (0/1)	One if fisher in transition had an additional source of income (e.g. another job, remittances); zero otherwise.
Former member of cooperative *i* (0/1)	Four variables taking value one if the fisher was member of fishing cooperative *i* (with $i = 1, 2, 3, 4$) prior to initiating his/her transition. Cooperatives are not identified by their official name for privacy concerns.
Livelihood features	
Tourist-oriented (0/1)	One if livelihood is tourist-oriented (e.g. cabins, restaurants, souvenir shops); zero otherwise.
Non tourist-oriented (0/1)	One if livelihood is not tourist-oriented (e.g. beauty salons, tortilla shops, stationery shops); zero otherwise.
Fishery-related	One if livelihood is fishery-related (e.g. freezer plants, aquaculture activities); zero otherwise.
Loan (0/1)	One if livelihood was partially funded by a loan from a source different than PACE-Vaquita; zero otherwise. The source of the loan may or may not be an institutional or formal one.
Santa Clara (0/1)	One if livelihood is located in Santa Clara; zero if located in San Felipe.
Pace 2008 (0/1)	One if livelihood was financed by PACE-Vaquita in 2008; zero otherwise.
Pace 2009 (0/1)	One if livelihood was financed by PACE-Vaquita in 2009; zero otherwise.

having more experience managing or operating businesses to older people being more self-motivated because they have more desire for autonomy.

We control for gender of the beneficiary because it has been documented that in some sectors and contexts, small firms have higher chances of success when owned by a woman. For instance, De Groot et al. (2017) conduct a meta-analysis and show that small food businesses owned by women, both in developed and developing countries, are more likely to thrive in comparison to those own by men. A potential reason for this result is that women have better organizational skills –Maksimov et al. (2017) have documented women's higher organization efficiency using a survey of 1273 small firms located in seven developing countries across Africa, Asia and the Middle East.

A diversified investment portfolio has been documented to increase the chances of success of businesses. A diversified portfolio allows the business owner to smooth his/her net revenues. Firm's value has been shown to increase when diversification occurs (Mackey et al., 2017). Diversification contributes to innovation (Klingebiel and Rammer, 2014). Even more, diversification of small firms has more influence in profitability, growth and survival than larger firms (Murphy and Tocher, 2017). As a way to control for this diversification, we include the binary variable capturing whether the beneficiary has an additional source of income while operating his/her business.

We control for whether the beneficiary was a member of a fishing cooperative prior to initiating a transition to an alternative livelihood.[2] We deem this variable as a proxy of social network because the fishing cooperatives may serve as a safety net when hardship occurs and, arguably, a fisher in transition can access such a safety net. There is consensus in the literature claiming that social capital, or the personal network of entrepreneurs has a positive influence in the performance of small firms (Jensen and Schott, 2015; Bhagavatula et al., 2010; Stam et al., 2014). As an iconic case, Pisani (2017) documents that *tienditas* (small grocery shops) owned by women are more likely to survive and suggest that their social network is a key factor behind this higher survival chance. For the particular case of transition of small-scale fishers to alternative livelihoods, Diedrich et al. (2019) documents that a successful transition in Galapos Islands was reached by individuals with vertical social ties, and large family and social networks.

The econometric model also controls for four features of the alternative livelihood: type of livelihood (tourist-oriented, non tourist-oriented, and fishery-related); whether the livelihood was financed with a loan in addition of the PACE-Vaquita compensation (1 if the condition is present, zero otherwise); village where the livelihood is located (Santa Clara or San Felipe); and the year in which the livelihood was initiated (2008, 2009, or 2010).

We classify the alternative livelihood under study into three types: i) tourist-oriented services which include cabins, restaurants and souvenir shops; ii) non tourist-oriented services which include beauty salons, tortilla shops, stationary shops, plumbing shops, seamstress shops; and iii) fishery-related which include freezer plants, and aquaculture activities.

We control for whether the alternative livelihood was financed not only with PACE-Vaquita compensations but also through a loan from another source. We must notice that the source of the loan is not specified during the survey. This means that we are not able to know whether this loan was obtained from an institutional, formal source or not. The distinction between formal and informal sources is relevant because it determines whether an interest rate is paid and whether the payments are made in accordance to a pre-agreed calendar. With this limitation in our data, we justify the inclusion of this variable based on the literature that documents the relevance of loans from formal sources –informal sources likely carry out similar investment decisions than formal ones, although their performance is less documented. Shahriar et al. (2016) find that finance institutions are more likely to extend loans to mature, less risky businesses. Consequently, a loan works as a signal that the project is worthwhile pursuing (Mosebach, 1999). In addition, if provided by a financial institution, a loan may be

[2] There are 20 cooperatives in the area of study. Individuals responding our survey were members of one of these cooperatives. We create four dichotomous variables to capture the social network of the cooperatives with more observations in our data –i.e. cooperatives 1 to 3. Cooperative 4 pools all other individuals that were members of different cooperatives.

accompanied by financial advice that increases the chances of success (Grieg-Gran et al., 2005).

We control for the village in which the alternative livelihood is located because there are differences in the main economic activities performed in each village. While in 2010 tourism had surpassed fishing in economic importance in San Felipe, Santa Clara remained a fishing village (Barlow et al., 2010). In San Felipe, 15% of the jobs were in the fishery sector compared to 80% in Santa Clara. In San Felipe, 64% of the workforce was employed in tourist-oriented activities compared to 30% in Santa Clara (see Avila-Forcada et al., 2012; and Erisman et al., 2015).

Finally, we also include the dichotomous variables for the year the alternative livelihood was initiated which is equivalent the year that the buyout was carried out –either 2007, or 2008, or 2009. These variables aim to control for differences in the probability of success associated with the year in which the alternative livelihood was initiated.

Table 2 reports the descriptive statistics of the variables included in the econometric specifications. Sixty-three percent of the 93 alternative livelihoods were operating in 2012. The average age of the respondent was 48.5, and 72% were males. Diversification in the form of obtaining income from an additional activity occurred in 75% of the cases.

We do not report the actual name of the cooperative to which fishers used to be part of. We only number them, and so 27% of respondents used to be part of cooperative 1; 5%, of cooperative 2 and cooperative 3, separately; and 10% were part of cooperative 4.

With respect to the livelihood features, 53% were tourist-oriented business, 30% were non tourist-oriented, and the rest were fishery-related livelihoods. Twenty-nine percent of the livelihoods were initiated with resources that included a loan; 71% were placed in Santa Clara; and 62% and 17% were initiated in 2008 and 2009, respectively.

5. Results

We estimate binary logit models to identify factors associated with the probability that a fisher in transition to an alternative livelihood remains in such a livelihood in 2012. Table 3 reports the results of two specifications. Model (I) includes all variables listed in Table 2, and model (II) in includes the interaction between the type of livelihood and the Santa Clara dichotomous variable. By including these interactions, we aimed to test whether a specific type of livelihood more likely thrived in a specific village –we were motivated by the differences in the main economic activities across the villages, as described in section 4. These interactions are not statistically significant and thus we focus our discussion on results from model (I).

Table 2
Descriptive statistics of variables included in econometric specification (n = 93).

Variable	Mean	Std. Dev.	Min	Max
Dependent variable				
Operating in 2012 (0/1)	0.63	0.48	0	1
Fisher's characteristics				
Age/10	4.85	1.18	2.1	8.6
Male (0/1)	0.72	0.44	0	1
Diversification (0/1)	0.75	0.43	0	1
Former member of cooperative 1 (0/1)	0.27	0.45	0	1
Former member of cooperative 2 (0/1)	0.05	0.23	0	1
Former member of cooperative 3 (0/1)	0.05	0.23	0	1
Former member of cooperative 4 (0/1)	0.10	0.30	0	1
Livelihood features				
Tourist-oriented (0/1)	0.53	0.50	0	1
Non tourist-oriented (0/1)	0.30	0.46	0	1
Loan (0/1)	0.29	0.46	0	1
Santa Clara (0/1)	0.71	0.46	0	1
PACE 2008 (0/1)	0.62	0.48	0	1
PACE 2009 (0/1)	0.17	0.38	0	1

Table 3
Coefficient estimates from a binary logit on operating in 2012 (n = 93).

Variable	(I)	(II)
Fisher's characteristics		
Age/10	0.273	0.133
	(0.241)	(0.238)
Male (0/1) [a]	−2.277***	−1.932**
	(0.607)	(0.672)
Diversification (0/1)	−0.231	−0.372
	(0.781)	(0.858)
Former member of cooperative 1 (0/1) [b]	−17.82***	−19.29***
	(1.808)	(2.707)
Former member of cooperative 2 (0/1) [b]	−1.820*	−1.371
	(0.733)	(0.777)
Former member of cooperative 3 (0/1) [b]	0.109	−0.17
	(1.014)	(1.021)
Livelihood features		
Tourist-oriented (0/1) [c]	1.078	0.387
	(0.967)	(0.801)
Non tourist-oriented (0/1) [c]	1.006	2.746*
	(0.924)	(1.393)
Loan (0/1)	3.697*	4.37*
	(1.456)	(2.299)
Santa Clara (0/1) [d]	−15.56***	−16.31***
	(1.832)	(-1.667)
Touristic-oriented*Santa Clara (0/1)		0.933
		(-1.585)
Non touristic-oriented*Santa Clara (0/1)		−2.219
		(-2.109)
PACE 2008 (0/1) [e]	−0.124	−0.398
	(0.995)	(-0.962)
PACE 2009 (0/1) [e]	0.424	0.259
	(1.032)	(-1.104)
Intercept	15.91***	17.40***
	(1.294)	(1.707)
Likelihood function	−42.63	−39.49
Pseudo R2	0.302	0.352

Coefficient significant at *** 1%, ** 5%, * 10%. Standard errors in parenthesis.
[a] Category of reference: female.
[b] Category of reference: former member of cooperative 4.
[c] Category of reference: fishing-related business.
[d] Category of reference: San Felipe.
[e] Category of reference: PACE 2010.

In terms of the fisher's characteristics associated with remaining in the alternative livelihood in 2012, the coefficients of gender of the fisher and his/her former affiliation to a cooperative are the ones that turn out to be statistically significant at 99% of confidence. If the fisher was a male, the probabilities of remaining in the alternative livelihood in 2012 were smaller in comparison to the case in which the fisher was a female. Also, former members of cooperatives 1 and 2 were less likely to keep their alternative livelihood running in comparison to those pooled in the reference category (cooperative 4). Age and income diversification are not statistically significant.

In terms of the livelihood features, the coefficients of loan and Santa Clara are the ones that turn out to be statistically significant –at 90% and 99% of confidence, respectively. Financing the livelihood with a (not necessarily institutional, formal) loan increases the probability of remaining in the livelihood 2012. An alternative livelihood in Santa Clara had less probability of remaining in operation in 2012 in comparison to a livelihood in San Felipe. The variables that were not found to

be associated with the likelihood of operation include the type of livelihood and the year the livelihood was initiated.

Indeed, coefficients reported in Table 3 can only inform about the direction of the associations but cannot depict an idea about the size of the difference in probabilities. For this information, we need to resort to Table 4. This table reports the odd ratios of the parameters that are statistically significant in Table 3.

According to Table 4, the variable that implies the largest difference in odd ratios is financing the alternative livelihood with an additional loan –livelihoods financed in this way had 34 more chances of remaining in operation in 2012. These positive odds surpass the combination of negative odds arising from being a male fisher in transition, a former member of cooperative 1 and the location of the livelihood in Santa Clara.

Table 5 reports an alternative way of illustrating the results of our analysis. This table reports the probability of remaining in an alternative livelihood in 2012 under different scenarios. These scenarios are constructed to reflect the relative effects from gender, village of location, additional loan and age of a fisher. Thus, for instance, the first row illustrates that the estimated probability of remaining in an alternative livelihood for a 50-year old female in San Felipe and with an additional loan is 0.98. Taking this probability as baseline, we can see in the second row of Table 5 that a similar female who is 30-years old had a slightly smaller probability of remaining in business (0.96) –this small effect is not surprising given that age is a non-significant factor in our multivariate analysis reported in Table 3. This same 30-years old female in San Felipe, however, had a probability of remaining in her alternative livelihood of only 0.75 when no additional loan was available. This large reduction in probability illustrates the relative effect of the additional loan –to the point that, as illustrated in rows 4 and 5 of Table 5, location is practically irrelevant as long as the female has access to a loan. A similar story can be told when we focus on the scenarios for a male which are also reported in Table 5.

Table 4
Statistically significant odd ratios (from specification (I) reported in Table 3).

Variable	(I)
Fisher's characteristics	
Male (0/1)	0.219*
	(0.181)
Former member of cooperative 1 (0/1)	5.73e-09***
	(1.11e-08)
Livelihood features	
Loan (0/1)	34.34**
	(48.12)
Santa Clara (0/1)	3.56e-08***
	(7.12e-08)

Coefficient significant at *** 1%, ** 5%, * 10%. Standard errors in parenthesis.

Table 5
Illustration of relative effect of variables associated to operating in 2012 (from specification (I) reported in Table 3).

Gender	Village	Loan	Age	Probability of remaining in alternative livelihood in 2012
Female	San Felipe	Yes	50	0.98
Female	San Felipe	Yes	30	0.96
Female	San Felipe	No	30	0.75
Female	Santa Clara	No	30	0.49
Female	Santa Clara	Yes	30	0.98
Male	San Felipe	Yes	50	0.93
Male	San Felipe	Yes	30	0.92
Male	San Felipe	No	30	0.47
Male	Santa Clara	No	30	0.14
Male	Santa Clara	Yes	30	0.96

The rest of the variables are kept at their sample mean.

6. Discussion and conclusions

Taking advantage of the in-site work that two of the co-authors have performed in the Gulf of California, we offer the following discussion on the implications of our statistical results. Let us begin with the lower odds in Santa Clara. This result seems to reflect the fact that San Felipe's economy is more diversified. People in Santa Clara heavily dependent on fishing, and the transition to another activity has not been as attainable as in San Felipe. Considering the possibility that future programs may resemble PACE-Vaquita, we wish to suggest that a way to avoid this type of result is allowing fishers in transition to use their monetary compensation to invest in human capital –either on themselves or another member of their family. Also, we believe that fishers in transition should be allowed to use their compensation to migrate, if that is what they decide. These alternatives are realistic in contexts where no economic activity other than fishing is a real option. Our suggestions on this respect are rooted on the usually overlooked fact that lack of labor malleability is an essential feature of fisheries around the world (Clark et al., 1979).

Our results suggest that using an additional loan to finance a business is strongly associated with a higher chance of remaining in the alternative livelihood. Indeed, a limitation of our study is that we are not able to identify whether this loan comes from a formal source. Some of these loans may come from informal sources –e.g. local pawn shop, a relative, etc. Despite this limitation, we believe that the strong effect of a loan indicates that the project has passed stricter feasibility revisions –an informal source likely implements a screening process to pick the projects that will finance. We suggest that this result is also of public policy implications because it implies that fishers in transition should be encouraged to seek additional resources before embarking in a new, alternative livelihood. The relative size of the odds justifies our suggestion –the effect of a loan by itself surpasses the negative odds associated with gender, and other factors. Also, our suggestion is in line with the recommendation by FAO that strategies to encourage livelihood diversification of small-scale fisher should include the offer of financial services that target a population that requires support in taking business decisions (APFIC, 2010).

Our result with respect to the higher chances associated to a business owned by a female are consistent with previous literature documenting that small firms have higher chances of success when owned by a female –as described in section 4. In the context of interest here, while women have been less active in fisheries, they instead have invested in projects related to the service sector such as hair styling. This experience may have been at the core of their higher chances of success with respect to males.

The current paper provides an examination on whether a buyout effort helps fishers to transition to an alternative livelihood. While our results are not widely representative of all fisheries, we shed some light into important considerations. First, the economic context of the community is relevant for the success of a transition to an alternative livelihood. Second, women have skills that allow their alternative liveli-

hoods to survive longer than those owned by men. And third, the endorsement and assistance of (not necessarily formal) lenders is associated with a higher survival probability.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ocecoaman.2019.104984.

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