

Factors affecting offshore fishing households' income in southern central coast of Vietnam

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CHRONICLE

ABSTRACT

Article history:

Received: October 3, 2019

Received in revised format: November 12 2019

Accepted: November 18, 2019

Available online:

November 18, 2019

Keywords:

Income

Fishermen

Factors

Offshore fishing

Southern Central Region

This paper uses econometrics models to estimate factors affecting the offshore fishing households' incomes in the Southern Central Coast of Vietnam. We estimate two basic models: one with total income as the dependent variable and the other with per capita income as the dependent variable. Since heteroscedasticity is in present, the study employs Ordinary Least Squares (OLS) estimations with Robust Standard Errors (OLSR). The models are further divided into a model with intercept dummies and the one with slope dummies. The estimation results for the intercept dummies indicate that fishing technology, number of days per trip, type of fishery, the residential characteristics, household size, number of dependents, captains' experience, fishing ground, consumer market, and the role of officers for fishing stimulation are the main factors having significant impacts on fishing household's income. Surprisingly, ship capacity, income diversification, career passion, household's educational background, and consumer market have no significant impact on fishing household's income. The results for the intercept and slope dummies, both, indicate that the Southern areas enjoy more benefits than the Northern areas in terms of income and utilizing the stimulation policies. The empirical results allow us to suggest some policy recommendations for central and provincial government aiming at improving offshore fishing household's income in the Southern Central Coast of Vietnam.

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1. Introduction

The Southern Central Coast of Vietnam spreads from Da Nang City to Binh Thuan Province. The East is adjacent to the Eastern Sea (the section of the Pacific Ocean along the Vietnamese sea coast) with two archipelagos, Paracel (belongs to Da Nang City) and Spratly (belongs to Khanh Hoa Province). This region has a large continental shelf and deep sea with multiple potentials and advantages for developing the marine economy, especially offshore fishing. In recent years, the offshore fishing industry in the Southern Central Coast has developed strongly and is a key livelihood for coastal fishing communities. In 2000, the Southern Central Coast had only 2,975 offshore fishing vessels, accounting for 28.6% of Vietnam's total offshore vessels. By 2015, the region's offshore fishing vessels reached 11,673 with a total capacity of 3,697.9 thousand CV, accounting for 39.4% of Vietnam's total offshore vessels, and accounting for 39.4% of Vietnam's total offshore capacity. As a result, the total output of fishing exploitation of this region has reached 887,485 tons in 2015, accounting for 29.2% of Vietnam's total

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fishing output. In particular, the region's total volume of marine fish accounts for 32.1% of Vietnam. It can be affirmed that the offshore fishing industry has gradually become an important economic sector of the Southern Central Coast. However, the development of offshore fishing industry in the South-Central Coast in recent years is still limited, such as backward fishing technology, small production scale, low education level of fishermen, weakness of fishing service infrastructure, especially the high differentiation in income among offshore fishing households, among local areas. Nonetheless, this Southern Central Coast currently has as many as 76 coastal communes and islands that are classified as among 311 coastal areas and islands in extremely difficult condition economically in Vietnam during 2013 - 2015 (roughly 25% the total coastal areas and islands are in extremely difficult conditions economically in the entire country). This fact implies that the development of offshore fishing has not been sustainable and has not made a good contribution to per capita income of the fishing residents, especially has not become the key economic sector that helps fishing residents improve their living standards from the ocean resources.

The traditional fishing ground contains many unstable elements while many risky conditions also affect offshore fishing activities (the risks on human lives, properties, the effectiveness of the fishing activities, etc.). This fact continues to create great pressure on the socio-economic development policies fostered by Vietnam's Central Government for the offshore fishing sector in the near future. Specifically, the Central and local governments need appropriate modifications of the policies toward improving and raising the income of the offshore-fishing households. These policies will inspire them to remain with the marine economy and fishing ground, gradually enriching their lives from the ocean resources. We believe that the key issue of the fishery development must be focusing on raising the income of the offshore-fishing community. Obviously, on the economic aspect, increasing the income of the fishing households will be the most plausible reason encouraging them to develop offshore fishing. It is also an important internal force for them to aggressively invest in the re-expansion of fishing activities in the remote waters of the country. This also implies that the research on the factors affecting income and the proposals of the practical solutions with systematic, radical, and long-term characteristics to improve and raise the income of the offshore-fishing households are very urgent issues. These policies help them truly escape poverty and gradually become rich from ocean resources and are crucial for the sustainable development of the Southern Central Coast. Using the primary data collected from results of survey questions sent to 300 offshore-fishing households belonging to nine communes of three areas in Southern Central Coast (Da Nang City, Quang Ngai Province, and Phu Yen Province), the research focuses on quantifying the factors that affect the income of the offshore-fishing households. Based on the results, the research provides policy suggestions to improve and raise the income of these fishing communities in the near future.

2. Theoretical Framework

The income of offshore-fishing households is the total of the various net earnings of households with fishermen engaged in offshore fishing. Among these earnings, the income from offshore fishing is the most important component of the total earnings of fishermen. Thus, the factors affecting the income of offshore fishing households are diverse. They are ranging from groups of factors that are regulated by the fishery characteristics of the offshore fishing industry, the government's policies supporting the development of the sector, to groups of factors associated with the natural, socio-economic and demographic characteristics of the fishermen community.

Sujithkumar (2008) finds that the gender structure of the household, the age and educational level of the household head, access to credit, electricity, and markets are important determinants of household non-farm income. Olale and Henson (2012, 2013) find that income diversification contributes to the increased income of fishermen. In addition, the level of education, membership of an association, and access to credit are important factors influencing income diversification among fishing households. Garoma et al. (2013) point out that the marginal incomes of fishermen who are fishing around Lake Ziway and Langanu in Ethiopia are very sensitive to climate change, especially to the rainfall and water levels in the lake. In addition, the turbidity and sedimentation level of the lake is a major disadvantage for fish populations and is an important factor in decreasing the fishing-household income. Finally, the freedom of fishing, the lax enforcement of fisheries management, the increase in the cost of catching materials, selling prices, and access to markets, are factors that significantly influence the income of the fishing communities.

Al Jabri et al. (2013) study the factors affecting the income of small fishers in the Batinah area of Oman. Estimation results show that increased weekly fishing costs, the number of crew members, difficulties in storing ice cold can reduce the level of fishermen income, while engine power, vessel length and number of weekly trips have significant implications for improving fisherfolk incomes. In addition, the authors conclude that cognitive ability and training and occupational experience play an important role in increasing income for coastal fishermen in Batinah.

In general, the above studies have mentioned some factors affecting the income of coastal fishing households. Concerning offshore fishing households, we group the factors affecting the income of these fishing households as follows: characteristics of residential locality; characteristics of fishery sectors; characteristics of demographic and socio-economic factors; and fishing stimulation policies. Detailed analysis of the factors affecting the income of offshore fishing households is presented in Fig. 1.

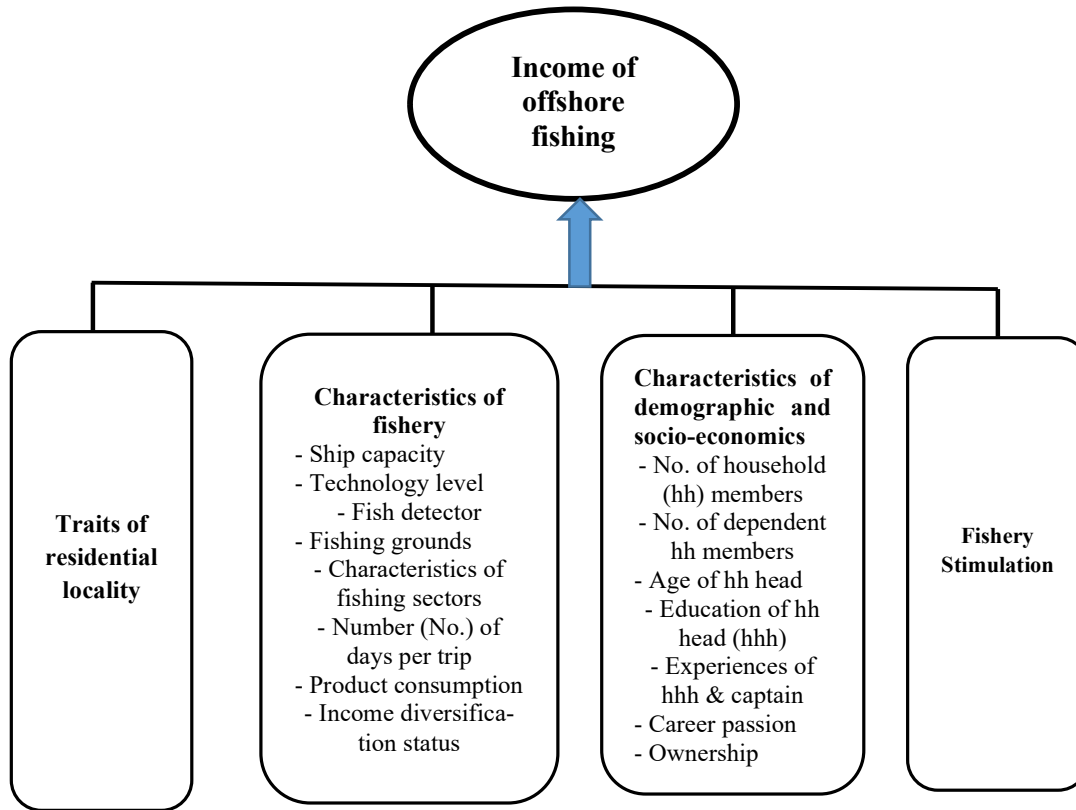


Fig. 1. Theoretical Framework of Factors Affecting the Income of Offshore Fishing Households

3. Models and Data

3.1 Models

Based on the above theoretical framework, we develop the basic model to estimate factors affecting the income of the offshore fishing households in Southern Central Coast as follows:

$$Y_i = \alpha_0 + \beta_1 \text{Regions}_i + \beta_2 \text{Characteristics of fisheries}_i + \beta_3 \text{Socioeconomic and Demographics}_{it} + \beta_3 \text{Fishing Stimulation} + \varepsilon_i \quad (1)$$

where: ε_i : the error term; i = fishing household i ; $i = 1, 2, \dots, 300$.

Model (1) employs only intercept dummies. In the next models, we add slope dummies for four variables that might have distinctive characteristics among regions: technology, using a fish detector, fishery stimulation, and ownership. Except for the dummy variables, all variables are in log forms. Models with each of these variables are estimated separately to avoid multicollinearity caused by interactive terms. The interaction of technology with the North is defined as TN, with Quang Ngai (Region 1) is called TR1, with Phu Yen (Region 2) is TR2, and so on. The model for technology is written as:

$$Y_i = \alpha_0 + \beta_1 \text{Regions}_i + \beta_2 \text{Other Characteristics of fisheries}_i + \beta_3 \text{Socioeconomic Demographics}_{it} + \beta_3 \text{Fishery Stimulation} + \beta_4 \text{TN} + \beta_4 \text{TR1} + \beta_4 \text{TR2} + \varepsilon_i \quad (2)$$

The models for the other variables are written in a similar manner with the following definitions for fishing detector, fishery stimulation, and ownership in the North: DN, SN, and ON; in Region 1: DR1, SR1, and OR1; and in Region 2: DR2, SR2, and OR2, respectively.

3.2 Data

This study used primary data collected from the questionnaire of 300 households engaged in offshore fishing in 9 communes/wards of three South Central Coastal provinces (including Da Nang, Quang Ngai, Phu Yen) in 2016. The description and measurement of the model variables are detailed in Table 1.

Table 1
Description and measurement of the model variables

Variables	Description	Notation	Measurement	Expected Sign
Dependent Variable (Y)	Ln income of the fishing households	LnTinc	Mill VND/year	
	Ln per capita income of the fishing households	LnPerca	Mill VND/year	
Variables on Residential Locality (Regions)	Region1	Region1	1: Quang Ngai; 0: other	(+/-)
	Region2	Region2	1: Phu Yen; 0: other	(+/-)
	Region3	Region3	1: Da Nang; 0: other	(+/-)
Variables on Characteristics of Fisheries	Ln ship capacity	LnCAP	CV	(+/-)
	Technology level	Tech	Likert scale 5 scales: (1) backward; (5) advanced	(-)
	Horizontal fish detector 360 ⁰	D360	1: used; 0: not used	(+/-)
	Northern fishing ground	North	1:Northern; 0: other	(+/-)
	Southern fishing ground	South	1: Southern; 0: other	(-)
	Type of fishing	Type1	1:Tuna fishing; 0: other	(+/-)
	Average days/trip	Day	Numbers of days	(+)
	Fish market	Market	1:out-of-province market; 0: inside market	(+/-)
	Household income diversification	Diver	1: non-fishing extra income; 0: fishing income only	(+/-)
	Variables on Characteristics of Socioeconomic and Demographics	Total numbers of household members	Numb	persons
Numbers of dependent members		Depn	persons	(-)
Household-head Age		Age	years of age	(+)
Education of household head		Edu	years of education	(+)
Fishing experience of captain		Exp	years of experience	(+)
Career passion		Career	5 scale Likert 5: (1) no passion & (5) very passionate	(+)
Ownership		Owner	1: ship owner; 0: employees	(+)
Fishing Stimulation	Roll of fishing stimulation	Stim	5 scale Likert: (1) least important; (5) very important	(+)

4. Methods, Procedures, and Estimated Results

First, the results for the tests of variance inflation factors/VIF as guided in Kennedy (2008) show that all VIF values in models are smaller than 5. These results allow us to conclude that the models do not have the multicollinearity problems among the variables. Next, we perform the Ramsey RESET procedure (Ramsey, 1969) to verify the possible omitted variables the models. The results show that the models do not have significant omitted variables at the 5% significant levels (that is, we fail to reject the null hypothesis). In other words, the model specifications are appropriate. The Breusch-Pagan / Cook-Weisberg test (Greene, 2000) is used to test the Heteroscedasticity. The test results indicate that model (1) has heteroscedastic errors, so we use OLS method with robust standard errors. First, the results for the tests of variance inflation factors/VIF as guided in Kennedy (2008) show that all VIF values in models are smaller than 5. These results allow us to conclude that the models do not have multicollinearity problems among the variables. Next, we perform the Ramsey RESET procedure (Ramsey, 1969) to verify the possible omitted variables the models. The results show that the models do not have significant omitted variables at the 5% significance levels (that is, we fail to reject the null hypothesis). In other words, the model specifications are appropriate. The Breusch-Pagan / Cook-Weisberg test (Greene, 2000) is used to test the Heteroscedasticity. The test results indicate that model (1) has heteroscedastic errors, so we use the OLS method with robust standard errors.

4.1 The OLSR Model with Intercept Dummies

We use the OLS regression with robust standard errors (OLSR) to estimate the above models. Table 2 presents the regression results for the models with intercept dummies. Columns (2.1) and (2.2) are for the models with total income as the dependent variable, whereas Columns (2.3) and (2.4) are for the models with per capita income as the dependent variable. Note that Columns (2.1) and (2.3) use all variables, whereas Columns (2.2) and (2.4) eliminate highly insignificant variables that have p-values greater than 0.800. Concerning residential locality, the estimated results indicate that the characteristics of the regions of residence have a significant impact on the income of coastal fishing households along the South Central Coast. In general, the average income of Phu Yen fishery households is significantly higher than the average income of fishermen in Quang Ngai and Da Nang. Concerning the characteristics of fisheries, the results show unexpected signs: the ship capacity does not have a significant impact on the fishing household income. As can be seen in practice, the larger the vessel capacity, the higher the operating costs, if catches do not reach the scale of exploitation, the efficiency of fishing operations will decline. As expected, the coefficient of variation in fishery equipment technology is positive and statistically significant at 1%, implying that the level of fishery equipment technology plays an important role. This is important in raising fisher households' income through increased fishing productivity. This estimation confirms the importance of modernizing fishing technology in raising income for offshore fishing. Although fishing detectors are only used for offshore fishing with netting (fin netting, gill netting), the coefficient estimate of this variable is positive at a significance level of 1% in all models. This indicates that net fishing households using modern detectors will have significantly higher incomes than other households. This again reaffirms the special importance of the application of advanced and modern fisheries technology in increasing the productivity of fishing, contributing to raising the income of fishermen. Fishing grounds plays an important role in fisheries income generation (Olale & Henson, 2012, Garoma et al., 2013). Estimates also show that fishermen fishing in the Phu Yen area (region 2) have much higher average income than fishing at other fishing sites at 1% significance level whereas income for the ones fishing in Quang Ngai area is only slightly higher and significant at 5% or 10% significance levels. This implies that the father Southern fishing households have more income than the Northern one.

As expected, the average number of fishing days per trip was positively correlated with household income. Accordingly, those with long days of seafaring will be able to generate higher incomes for fishermen. In addition to fishery specificity, this can also be interpreted in terms of fishermen to save considerable fuel costs as they are not regularly shore-based. As field results indicate, the dummy for ocean tuna fishing (Type 1) is negative, suggesting that the income of tuna fishing is significantly lower than for other trades. This implies that local governments need to study thoroughly before encouraging fishermen to expand ocean tuna fishing.

Table 2

Factors Affecting Offshore Income of Fishing Households in the South Central Coast : Model with Intercept Dummies

Model Variable	(2.1) LnTinc	(2.2) LnTinc	(2.3) LnPerca	(2.4) LnPerca
LnCAP	0.0263 (0.829)		0.0093 (0.938)	
Tech	0.4324*** (0.008)	0.4283*** (0.005)	0.4449*** (0.007)	0.4477*** (0.007)
D360	0.3480*** (0.007)	0.3469*** (0.007)	0.3481*** (0.011)	0.3438*** (0.005)
North	-0.0077 (0.952)		-0.0413 (0.746)	-0.0408 (0.748)
Day	0.0083** (0.020)	0.0084** (0.0016)	0.0086** (0.016)	0.0086** (0.012)
Type1	-0.4226** (0.017)	-0.4236** (0.015)	-0.4140** (0.018)	-0.4117** (0.018)
Market	-0.1014 (0.482)	-0.1058 (0.448)	-0.1162 (0.428)	-0.1133 (0.428)
Diver	-0.1412 (0.195)	-0.1397 (0.196)	-0.1713 (0.136)	-0.1728 (0.126)
Depn	-0.1647*** (0.006)	-0.1637*** (0.007)	-0.2328*** (0.000)	-0.2351*** (0.000)
Age	0.4603 (0.359)	0.4662 (0.196)	0.0577 (0.863)	0.0523 (0.769)
Edu	0.1650 (0.147)	0.1715 (0.224)	0.2272 (0.130)	0.2235 (0.118)
Exp	0.3102*** (0.006)	0.3107*** (0.006)	0.3439*** (0.003)	0.3529*** (0.001)
Career	0.0657 (0.483)	0.0647 (0.485)	-0.0616 (0.512)	0.0634 (0.498)
Region1	0.2491** (0.047)	0.2432** (0.012)	0.2475* (0.096)	0.2496* (0.099)
Region2	0.4350*** (0.005)	0.4311*** (0.006)	0.4295*** (0.005)	0.4305*** (0.006)
Owner	0.5182*** (0.000)	0.5144*** (0.000)	0.5338*** (0.000)	0.5380*** (0.000)
Numb	0.1239** (0.017)	0.1239** (0.017)		
Stim	0.1930*** (0.000)	0.1935*** (0.000)	0.2078*** (0.000)	0.2074*** (0.000)
Constant	1.3813 (0.361)	1.5314 (0.246)	2.3245 (0.101)	2.4609* (0.080)
Sample Size	300		300	300
R ²	0.3921		0.3857	0.3724
Breusch-Pagan/Cook-Weisberg Test	(0.036)		(0.000)	(0.040)
Ramsey RESET Test	(0.138)		(0.156)	(0.067)

Note: p-Value is in the parenthesis. * $p_{value} < 0.1$, ** $p_{value} < 0.05$, *** $p_{value} < 0.01$.

Surprisingly, income diversification has an insignificant effect on household incomes. This can be explained by the fact that the income gap between households with extra non-fishery income and households with only fishery income is negligible. In other words, the pure nature of fishing in offshore fishing households is very large, and the extra income from non-fishery activities accounts for an insignificant share of total fisherfolk income. Concerning characteristics of socioeconomic and demographics, estimated results indicate that the number of household members has a positive impact on the total income of the fisher households at a 5% statistical significance level. At the same time, the coefficient of the dependent variable is negative and is statistically significant at 1% level. This indicates that the total income of the household is heavily dependent on the income generating members, but the more dependent members will also reduce the total income and per capita income of the household. The age of the household head has an insignificant effect on household income. Unexpectedly, the educational level of the household head did not significantly affect the household income. Meanwhile, the captain's seafaring experience had a positive effect on household income at statistically significant levels of 1%. Surprisingly, career passion has no significant effect on the income of fishermen. On the contrary, we find a significant difference in income between the shipowner and the crew members. This also implies that the state support policy for offshore development should pay more attention to the relative equity of access to state support between the two. In other words, it is important to focus more on the employees when developing and carry out fishing policies. Concerning fishery stimulation, the results indicate that fishery stimulation has a significant impact on household income at a statistical significance level of 1%. In particular, when adding fishery stimulation to the model to separate the role of fishery stimulation, the influence of the fishery technology level on household

income becomes insignificant. This implies that stimulation is only effective for fishers who are aware of the role of fishing technology innovation. In other words, the low awareness and low educational attainment of fishermen are a major obstacle to the effectiveness of fishery stimulation.

4.2 Models with Slope Dummies

Since eliminating the variables with p-values greater than 0.800 does not change the results much, we keep these variables in all models in subsequent estimations. The results for the models with slope dummies are in Table 3. Concerning the slope effects, both variables Technology Level (Tech) and Fish Detector (D360) show no significant differences among the regions and so were not reported in Table 3. The interaction of the variable stimulation, as well as ownership, with each region, shows a higher effect for Phu Yen area at a 5% significance level for the model using total income and at a 10% significance level for the model using per capita income as the dependent variables. These imply that the father Southern fishing households have more experiences with using the stimulation funds and utilizing their ownership better than the ones further North. These could be the reasons the income and per capita income of the further Southern fishers are higher than those of the Northern fishers. Note that the negative signs of the regional coefficients do not imply negative effects only that the effects are smaller than those of other regions.

Table 3

Factors Affecting Offshore Income of Fishing Households in the South Central Coast : Model with Slope Dummies

Model Variable	-3.1	-3.2	-3.3	-3.4
	LnTinc	LnTinc	LnPerca	LnPerca
LnCAP	0.0108	0.0239	-0.0256	0.024
	-0.929	-0.846	-0.83	-0.864
Tech	0.4139***	0.4149**	0.4378***	0.0759
	-0.009	-0.012	-0.005	-0.444
D360	0.3605***	0.3390**	0.3694***	0.417***
	-0.01	-0.011	-0.009	-0.005
SN	-0.0322		-0.0459	
	-0.502		-0.232	
SR1	0.0554		0.0576	
	-0.303		-0.278	
SR2	0.1289**		0.1151*	
	-0.038		-0.061	
ON		0.0094		0.0593
		-0.949		-0.69
OR1		0.2038		0.1847
		-0.226		-0.29
OR2		0.3913**		0.3388*
		-0.036		-0.067
Day	0.0092**	0.0083**	0.0092**	0.0086**
	-0.016	-0.031	-0.015	-0.026
Type1	-0.4383**	-0.3925**	-0.3912**	-0.3569**
	-0.016	-0.029	-0.029	-0.044
Market	-0.0749	-0.0901	-0.0697	-0.0819
	-0.599	-0.533	-0.629	-0.575
Divers	-0.1508	-0.1402	-0.1481	-0.1427
	-0.172	-0.916	-0.171	-0.191
Depn	-0.1642***	-0.1655***	-0.1876***	-0.1887***
	-0.006	-0.006	-0.002	-0.002
Age	0.5045	0.5137	0.2508	0.2814
	-0.169	-0.113	-0.475	-0.427
Edu	-0.2127	-0.2171	-0.2611	-0.2662
	-0.149	-0.158	-0.181	-0.184
Exp	0.2921**	0.2734**	0.3308***	0.3093***
	-0.012	-0.014	-0.004	-0.005
Career	-0.0443	-0.0444	-0.0369	-0.0377
	-0.625	-0.626	-0.666	-0.679
Owner	0.5327***	0.3735***	0.5654***	0.4019***
	0	-0.01	0	-0.006
Numb	0.1188**	0.1175**		
	-0.02	-0.023		
Stim	0.1217**	0.1886***	0.1309**	0.2035***
	-0.3	0	-0.021	-0.001
Constant	1.6167	1.568	2.1965	1.956*
	-0.281	-0.299	-0.123	-0.08
Sample Size	300	300	300	300
R ²	0.3879	0.3861	0.3692	0.3655
Breusch-Pagan/Cook-Weisberg Test	0	-0.195	0	-0.04
Ramsey RESET Test	-0.249	-0.07	-0.156	-0.067

Note: * P_{value} < 0.1, ** P_{value} < 0.05, *** P_{value} < 0.01,

5. Conclusion and Policy Implications

5.1 Conclusion

This study used primary data collected from the questionnaire of 300 households engaged in offshore fishing in 9 communes/wards of three South Central Coastal provinces (including Da Nang, Quang Ngai, Phu Yen) to quantify factors affecting the income of these fishing households. Estimates indicate that the characteristics of the habitat have a significant effect on the income of these households. In terms of occupational characteristics, ship capacity, career passion, and income diversification have no significant impact on the income of fisher households. In the meantime, the level of technology of fishing equipment, fishing grounds, modern fish detectors, the average number of days per trip, and fishing sectors play great roles in raising the incomes of fishermen. Regarding the demographic factors and socioeconomic characteristics of the household, the total number of people, the number of dependents, the seafaring experience of the captain have a significant impact on the income of the household. fishermen. At the same time, the level of education of the household head, seafood market, and the age of the household head, have no direct impact on household incomes. Finally, the results of the estimation show that fishing stimulation has a significant impact on the income of fishermen, especially in terms of encouraging fishermen to apply modern fishing technologies into marine exploitation. The intercept dummies reveal that the father Southern fishing households have higher income and per capita income than those of the Northern fishers. A study of the slope dummies shows that these higher numbers might be the results of the Southerners being more experiences with using the stimulation funds and utilizing their ownership than the Northerners.

5.2. Policy Implications

The results of this study allow us to propose some policy implications to improve the income of offshore fishing households in the South Central Coast:

First, to further promote the shift of the fishing industry toward more offshore fishing, especially the development of in-depth offshore fishing and long-time fishing on the sea. In particular, central and local authorities should accelerate and strengthen state credit programs to assist fishermen in shifting to offshore fishing. Strong reform of administrative procedures is important in order to enable eligible fishermen to easily access credit from government programs. In particular, it is necessary to encourage fishermen to move quickly from fishing in the North and traditional fishing grounds to fishing in the Hoang Sa, Truong Sa and Southern Coastal fishing grounds of the country. This can both contribute to raising the income of fishermen and help to protect the sovereignty of the island. At the same time, special attention should be paid to the development of logistics services to improve the efficiency of offshore fishing. It is crucial to construct fishery service ports in Truong Sa and some coastal islands to help fishermen extend their seafaring time, reduce fuel costs. and improve fishing efficiency.

Second, focus and promote the modernization of offshore fishing and preservation technologies to improve the efficiency of fishing. In particular, attention should be paid to promoting the leading role of local authorities in building a channel for connecting fishermen and enterprises in the supply of modern machinery, equipment and technologies for exploitation activities. and seafood preservation. It is necessary to further enhance the role and effectiveness of the fishing stimulation activities in disseminating and encouraging fishermen to apply for advanced and modern equipment and technologies in fishing and preserving seafood. In particular, it is necessary to promote and encourage fishermen using the 360 fishing detectors to quickly bring the fishing net industry straight to the modern fishing, making a breakthrough in improving the fishing industry's productivity. It should be noted that the cost of modernizing equipment, fishing technology is quite large. As a result, credit policies to support large-scale shipbuilding, upgrading, and conversion of vessel capacity should also be accompanied by the provision of subsidized credit packages to fishermen in the modernization of fishing technology and equipment instead of focusing too heavily on loans to improve the capacities of the machine and ships as usually seen at the present time.

Third, pay attention to the development of the intensive training for the team of captains and chief, Regularly organize the team of captains and chief engineers to attend training courses on fisheries knowledge and dissemination of international and national laws in fishing; the ability to use modern equipment in the exploitation and preservation of seafood, training in advanced fishing skills, in collaboration with fishery equipment enterprises to introduce machines, modern and advanced fishing and preservation technology. Design separate programs to encourage young and qualified youth to participate in building and managing off-shore fishing facilities, especially with regard to the young fishers with education, experience or have a fishery tradition. This is an important way to gradually rejuvenate and qualify the team of captains in the fishermen community, reducing the negative impact of empiricism in the process of modernizing offshore fishing.

Fourth, consider income diversification an important direction in raising the overall income for the fishing community. It can be seen that offshore fishing is highly dependent on natural and climatic conditions. Therefore, the purely fishing income will cause uncertainty in the overall income of the fishers. Therefore, diversification of income is the key to breaking the purely fishing mentality thereby contributing to sustainable income for fishing communities in the near future.

Fifth, local authorities in the area must always pay attention to the effective implementation of family-planning policy in the fishing community. First and foremost, family planning measures need to be strengthened and maintained to reduce the fertility of the fishers. In particular, attention should be paid to practical propaganda in order to change the concept of having multiplying children simply to increase the workforce, as well as the male preferences to carry out the hereditary profession of the fishery. Finally, focus on improving the level of education in the community of fishermen. In particular, focus on

awareness of the importance of education for fishermen in the development of marine professions, especially the propaganda to eliminate the perennial thinking of the fishers on the profession as “do not need much study”; There should be mechanisms to support tuitions, exempt other fees, and create favorable conditions for children of low-income families, especially poverty and near poverty households to go to school at all levels; To attach importance to raising the quality of the education system in the fishing communities.

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