Fisheries Research 167 (2015) 156–163

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Trade and resources: Welfare effects of the Lake Victoria fisheries boom

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ARTICLE INFO

Article history:
Received 9 June 2014
Received in revised form
22 December 2014
Accepted 3 February 2015
Hadled by George A. Rose
Available online 11 March 2015

Keywords:
Fisheries
International trade
Lake Victoria
Nile perch
Poverty reduction
Tanzania

ABSTRACT

We examine the welfare implications of the Tanzanian fisheries boom resulting from Lake Victoria Nile perch exports during 1993–2008. In the literature, there are two opposing views on the effect of fish trade: some argue that fish trade can act as an engine of growth, while others contend that trade in fish negatively affects food security, local economies and incomes of the poor. We apply a micro level perspective using data from two years, the first from a 1993 World Bank household survey and the second, our own study from 2008, both covering about 520 households in the two regions, Mwanza and Mara, by Lake Victoria. Our results indicate increasing average income and a reduction in the share of household expenditure on food, both of which are positive indicators of welfare. For the poorest part of the population, urban areas had a substantial reduction in the fraction below the basic needs level, while the change in the rural areas was insignificant. However, growth in both areas was modest and inequality seems to have increased during the period. We conclude that there is more support in our data for a positive than a negative effect of the fish boom on the well-being of those residing in Mwanza and Mara.

1. Introduction

Fish is the main source of animal protein for 20% of the world's population. More than 40% of global fish production is traded internationally. The net exports of fishery commodities by developing countries, i.e., deducting their imports from the total value of their exports, increased to $27.7 billion in 2010. That figure exceeds the sum of total net exports of other important agricultural commodities for developing countries, such as coffee, cocoa, bananas and rubber (FAO, 2012). Tanzanian Nile perch exports amounted to $150 million in 2008, primarily to Europe. This was about 5% of Tanzania's total exports (NBS, 2011). In this paper, we assess the welfare implications of the Tanzanian fisheries boom following from the increase in quantities and prices of Nile perch exports from the Lake Victoria region since the early 1990s.

Economic theory in general supports trade liberalization. Countries can combine their resources in an optimal way to produce goods and services, and trade offers an opportunity to achieve higher levels of consumption compared to autarky. Hence, trade liberalization has been promoted with the idea that developing countries will be better off if rich countries lower their tariffs and allow imports to increase. However, trade liberalization combined with open access to a natural resource may imply welfare reductions for a country (Brander and Taylor, 1997).

Other contributions contend that trade in fish negatively affects food security, local economies and incomes of the poor. The dramatic increases in many of the important world food commodity prices in 2007–2008 reinforced concerns about whether trade liberalization may lead to reduced food security. A recent study notes that countries with low undernourishment are net importers of seafood from regions with high undernourishment, but argue that it is advantageous to generate surplus value from export than rather consuming it domestically (Smith et al., 2010). Particular concern is given to the poorest part of the world, i.e., Sub-Saharan Africa, where some hold that liberalizing fish trade has a pro-poor effect (Geheb et al., 2008), while others believe that it leads to negative effects on local populations' food security and welfare development (Abila, 2003; Bokea and Ikiara, 2000; Jansen, 1997). In particular, the view that the Lake Victoria Nile perch export has hurt the local

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http://dx.doi.org/10.1016/j.fishres.2015.02.015
0165-7836/

economy has become widespread outside the scientific community, due in part to the documentary "Darwin's Nightmare" (for a critical analysis of the film, see Molony et al., 2007). On the other hand, Geheb et al. (2008), while noting the high frequency of malnutrition among the population in the lake regions of all three countries surrounding Lake Victoria, strongly reject the claim that there is a direct linear relationship between local malnutrition and Nile perch exports.

By looking at different indicators of welfare, that is, mean income, percentage of the population below the poverty line and the Gini[1] coefficient, we hope to shed more light on the pro- and anti-fish trade arguments. We also examine to what extent the theory of trade in natural resources, in particular Brander and Taylor (1997), can help explain the Lake Victoria case. The Lake Victoria fisheries are poorly managed and may be characterized as open access. Thus, according to Brander and Taylor (1997), we may find that trade liberalization has led to declining harvests and, all other things equal, a potential decline in welfare levels. On the other hand, imperfect capital markets and informal rules may work as an entry barrier to the fishery, which would postpone the movement to the new, long-run open access equilibrium. If trade liberalization leads to an increased exploitation of a relatively virgin stock, there may be economic rents through the transitional stage when effort and landings increase. In the transition phase, welfare may temporarily increase, at least for those directly being involved in the fishery. Potentially, the rents can be re-invested in other parts of the economy.

There is no reason to doubt that the Lake Victoria fisheries have provided Tanzania with high export revenues. According to the "trickle down" theory, this should also improve livelihood for the poor (e.g., Aghion and Bolton, 1997). However, the anti-fish trade literature distrusts the "trickle down" effect, and contends that trade in food such as fish primarily leads to increasing fish prices, while too little of the growing income ends up with the poor in order to offset the increasing prices, leading to declining welfare levels for the poor (see, e.g., Jansen, 1997). Hence, we look at the welfare levels of all the residents in the Lake Victoria regions.

Béné et al. (2010) carry out a macro level study of the effect of liberalizing fish trade on economic growth and look at all sub-Saharan countries. In their econometric study, they do not find any significant relationship between trade and negative impact on food security, nor a positive pro-poor outcome, but point at the potential of investigating these issues on a more micro oriented level. In this study, we apply a micro level perspective. Our point of departure is a 1993 World Bank household survey of Tanzania, including the lake side regions (HRDS, 1996).[2] We use the data collected for the two regions, Mwanza and Mara, and compare them with our own household survey data, which were collected for a random sample in the same regions during October–November in 2008 using a questionnaire identical to the 1993 survey. Hence, we can quantitatively estimate changes from the beginning to the end of the period and assess the welfare effects in terms of both level and distributional impact.

[1] The Gini coefficient is a commonly used measure of inequality from 0 to 1 based on the Lorenz curve. The higher the Gini, the more unequal the society. World Bank 1995 data report Gini coefficients of 0.26 for Sweden, 0.37 for the UK, and 0.57 for South Africa.

[2] The 1993 data used in this paper come from a nationally representative survey of 5000 households in Tanzania. The survey was a joint effort undertaken by the Department of Economics of the University of Dar es Salaam, the Government of Tanzania, and the World Bank, and was funded by the World Bank, the Government of Japan, and the British Overseas Development Agency. The World Bank is not responsible for the estimations reported.

2. The artisanal Lake Victoria fisheries

Lake Victoria is the largest tropical lake in the world (68,000 square kilometers), with its waters shared by three countries: Tanzania, 49%, Uganda, 45%, and Kenya, 6%. In 1998, about one-third of the total population or about 30 million people were supported by the lake basin in Kenya, Tanzania and Uganda (LVFO, 1999). Commercial fishing has been carried out for a long time but the economic importance of fishing has increased dramatically since the late 1980s. In the 1950s and 1960s, the non-indigenous species Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*) were introduced to compensate for the depletion of commercial fisheries by converting from low-value small fish to more easily caught higher-value species. This had minor impact for many years, but during the 1980s landed quantities were radically amplified and even more so in terms of value. Fishers called Nile perch the *mkombozi*, savior in Kiswahili (Reynolds et al., 1995). Since then, a growing share of the Nile perch catch has been exported, primarily to Europe. However, the rapid growth of Nile perch came at the expense of a severe reduction of the available number of species. Lake Victoria was known for more than 600 endemic species of *Haplochromis* cichlids. About 40% of these species disappeared and the Nile perch seems to have been a key contributor to this mass extinction, with contributions from environmental changes (Balirwa et al., 2003). Today the fisheries mainly consist of three commercially important species: Nile perch, the sardine-like dagaa (*Rastrineobola argentea*) and the Nile tilapia. In 2006, Nile perch, dagaa and Nile tilapia contributed 24%, 54%, and 7%, respectively, of total Lake Victoria landings (LVFO, 2012). Fishers in Lake Victoria use open wood vessels, which sometimes have outboard motors, but most commonly are operated by sail or paddle. The total crew ranges from two to six persons (Eggert and Lokina, 2010).

In principle, entry into the Lake Victoria fisheries is open to anyone with enough capital and the necessary skills. However, getting the capital and acquiring the skills may take some time. There is no catch limit, so participating fishers can catch as much as they can, given the stock level and their vessels' capacity. Fishing requires an annual license fee that approximately equals the gross revenues from two days of fishing, which function as a friction to free entry (Eggert and Lokina, 2010).

3. Open-access fisheries and trade: potential welfare effects

Chichilnisky (1994) brought attention to the potential problem of combining trade liberalization with open-access natural resources. Brander and Taylor (1997) provided formal proofs that trade and open access may lead to welfare reductions. Since then, a rich literature has developed; for recent surveys, see, e.g., Bulte and Barbier (2005) and Fischer (2010). The Lake Victoria fisheries could provide a case to test the theory of trade in natural resources. In order to do that, we briefly review the Brander and Taylor (1997) model, and examine the potential empirical links between their model and the real world example of Tanzanian Nile perch exports from the Lake Victoria fisheries. Their model and their assumptions yield the following results: when an autarkic country starts to trade an open-access natural resource, labor shifts from manufacturing to harvesting of the natural resource, and harvests jump up to an unsustainable level. Then, as the stock of the natural resource is being depleted, harvests decline until a new, long run open-access equilibrium is reached. In the new long run equilibrium, the stock is reduced and yearly catches are lower than in the autarky equilibrium. Trade liberalization thus leads to a *de facto* inward shift of the production possibilities frontier, and, consequently, welfare for the country stabilizes at an inferior level. Although the transition stage