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Evidence from Benin's shrimp sector

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Abstract

The inability of Benin to comply with EU standards led to a ban on its shrimp exports. The ban had a negative impact on the exporting firms, the fishmongers and the artisanal fishermen, even several years after it was lifted. Exports did not revive because local and international institutions failed to resolve the sector's increased perceived riskiness and its inadequate financial and technical resources. For the fishermen, the impact of the ban persisted because they were locked in the fishery sector, and the local shrimp demand could not fully compensate for the loss of the EU market.

Keywords: EU food safety standards, Aid for Trade, export ban, shrimp, Benin

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1. Introduction

The WTO agreements on sanitary and phyto-sanitary standards in 1995 coincided with important changes in the food safety and quality standards of major food importing economies (e.g., the EU, the USA and Japan). More food standards were being imposed that apply to more products and to more substances. The standards have also become tighter, and full traceability is required through Hazard Analysis Critical Control Points (HACCP[1]) in the food-processing industries of these countries as well as in those of their trade partners. Furthermore, there are now more internal and border controls, which increase the probability of detection of non-compliance (European Commission, 2009).

While these measures are likely to have achieved their primary objective of improved consumer-health protection in developed economies (e.g., Golan et al., 2000), they have come at a cost as producers need to devote additional financial and human resources to complying with them. Producers are also facing new risks, including withdrawal of their product from the market, rejection of exports at the border, destruction of shipments, or, in the worst case – an outright export ban on all products from the company or the sector involved (e.g., Batz and Morris, 2011). These additional costs and risks have raised concerns that standards may act as barriers to trade for those countries and small-scale producers with relatively few resources and limited expertise, possibly leading to their exclusion from lucrative export markets (e.g., Athukorala and Jayasuriya, 2003; Garcia Martinez and Poole, 2004; Gibbon, 2003; Henson, and Loader, 2001; Kherralah, 2000; Reardon et al. 1999; Key and Runsten, 1999; Farina and Reardon, 2000; Unnevehr, 2000).

Other observers have noted that the new landscape of stringent and rapidly evolving standards may provide opportunities for developing countries to upgrade their export sectors by means of increased foreign direct investment and vertical integration (e.g., Jaffee and Henson, 2005; Henson and Jaffee, 2006). For example, in order to comply with standards, multinational firms involved in food exports from a developing country may invest more resources, interact more with the local small-scale producers, and provide them with inputs and technology (Gow and Swinnen, 1998; Maertens and Swinnen, 2009). Besides by the private sector, the upgrading of the food supply chain of developing countries may also be facilitated by donors and multilateral institutions through their commitment to Aid for Trade, a program initiated by the WTO with the objective to help these countries overcome internal barriers to trade such as lack of knowledge, excessive red tape, inadequate financing, and poor infrastructure.[2] A recent review by OECD-WTO (2011) describes Aid for Trade success cases as well as failures (OECD-WTO, 2011).

The mixed empirical evidence on the impact of standards on food-export sectors in developing countries suggests that no simple general conclusion can be drawn regarding the effectiveness of Aid for Trade and private investments in upgrading these sectors. Research efforts

[1] HACCP is a systematic preventive approach to food safety that addresses physical, chemical, and biological hazards. The system is used at all stages of the food-production and preparation processes; including packaging and distribution, in order to assure traceability of hazards throughout the entire supply chain.

[2] Aid for Trade was launched in 2005. The WTO Task Force on Aid for Trade explains the initiative as follows (WT/AFT/1, 27 July 2006): "*Aid for Trade is about assisting developing countries to increase exports of goods and services, to integrate into the multilateral trading system, and to benefit from liberalized trade and increased market access*". In order to achieve these objectives, the Aid for Trade program works jointly with other international institutions. For instance, the Enhanced Integrated Framework (EIF) is a joint international platform through which developing countries can coordinate donors' support and mobilize more resources for Aid for Trade. In the same way, the Standards and Trade Development Facility (STDF) program was established (by FAO, OIE, World Bank, WHO and WTO) in order to help LDCs to mobilize more resources and to ensure their effective use for building their capacity related to SPS measures.

should therefore be directed to uncovering the reasons underlying the heterogeneous effects. In doing so, the metric for success should not be confined to the volume or value of exports, but also include actual development outcomes, i.e. trade should be evaluated as a means to an end (Rodrik, 2001). In the words of the WTO task force on Aid for Trade: "Effective Aid for Trade will enhance growth prospects and reduce poverty, as well as complement multilateral trade reforms and distribute the global benefits more equitably across and within developing countries" (WT/AFT/1, 27 July 2006).

This paper presents an in-depth case study of Benin's shrimp export sector, which was confronted with a ban[3] on exports to the EU in July 2003 after more than 30 years of export partnership. The ban was triggered by the failure of the sector to comply with EU-food safety standards and lasted for almost two years, being lifted only in February 2005 following significant Aid for Trade inflows.

We study the short and medium-run effects of the ban at the level of the exporting firms and the small-scale actors (fishermen and fishmongers). A number of studies have looked at the impact of an export ban triggered by non-compliance with food standards (e.g., Alavi, 2009, Dey et al., 2005, Yunus, 2009, Cato and Santos, 2000, Calzadilla-Sarmiento, 2002, Keizire, 2004; UNIDO, 2002). While most of these studies document huge compliance costs and thus negative short-run effects when the ban is imposed, they also show a revival of the export market when the ban is lifted, and in general find the medium- and long-run impacts to be positive.[4]

Our study diverts from the existing body of research in two ways. First, we examine a case in which the export sector did not resume, even after the ban was lifted and despite considerable Aid for Trade flows to Benin's fishery sector. Second, keeping in mind that trade should be a means to an end and not an end in itself (Rodrik, 2001), we evaluate the impact of the ban not only in terms of export performance but also on the basis of a welfare analysis at the level of small-scale producers. In contrast, previous studies on export bans have been concerned almost exclusively with the sector- or firm-level impact.

The next section presents the background of this study. Section 3 gives a narrative account of the ban and its aftermath. Section 4 relies on survey data to examine the impact on small-scale actors. Section 5 contains discussion and concluding remarks.

[3] The ban was actually self-imposed by the Beninese government under pressure by the EU; see Section 2 for details.

[4] For instance, Yunus (2009) estimates the short-run cost of the 1997 EU ban on Bangladesh shrimp export at $25 million but estimates the gain at $18 million in the first year and additional yearly gains of $35 million starting from the second year. Keizire (2004) and Henson and Mitullah (2004) reach similar qualitative conclusions for the impacts of an EU ban on the fishery export sector of Uganda and Kenya, respectively.

2. Background

We first present the general background of this study, i.e. the interplay between EU standards and fishery exports from developing countries. Then, we sketch the specific context of our study, giving an overview of the Beninese shrimp sector and its actors.

2.1. EU food standards and fishery exports from developing countries

A recent study by Batz and Morris (2011) indicates that the EU's food standards are among the most stringent in the world. The EU uses three strategies to maintain its system of quality control on its food imports. First, regular missions are undertaken by the veterinary office staff (DG SANCO) to screen the entire supply chain of the EU trade partners. Second, border controls are applied systematically to goods entering the EU market. Third, internal quality controls are conducted on products that are already on the EU market.

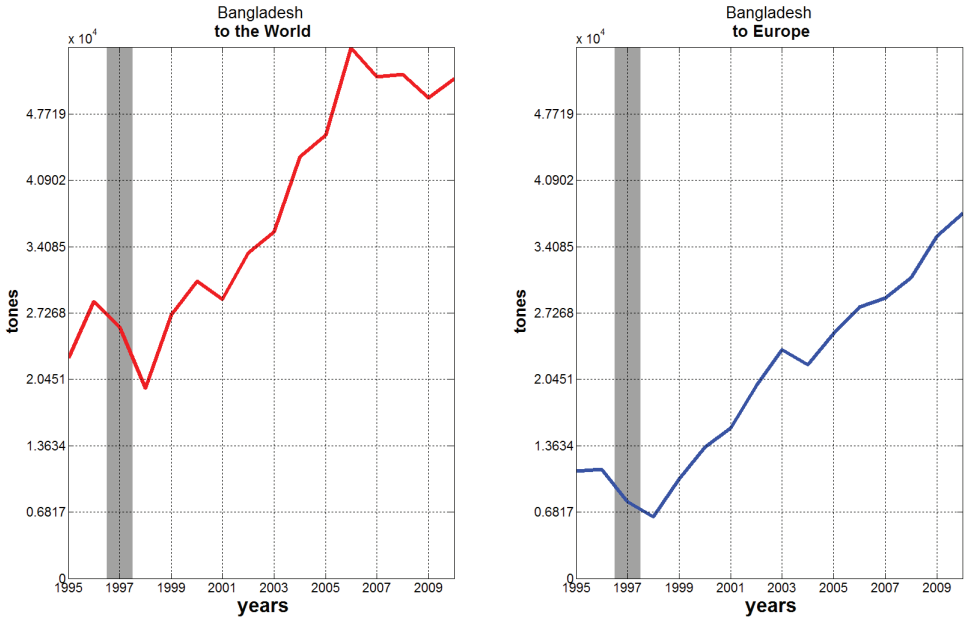
Due to the intrinsic product-specific sanitary risk, the fishery sector is profoundly affected by the EU food safety standards. For instance, data from the Rapid Alert System for Food and Feed (RASFF[5]) indicate that fishery products (fisheries and crustaceans) account, on average, for the largest share of notifications among all imports of food and feed products (42% in 1995-2011) and the second largest share for borders refusals (43% in 2008-2011). Despite these challenges, fishery exports from developing countries have increased. For instance, over the period 1988-2005 fishery imports from developing countries to the EU almost doubled as a share of total EU food imports, rising from 5.6% to 10.9% (Jaud et al., 2009). The sector's growth in the face of increasingly stringent standards is consistent with the view that food standards may act as catalysts that stimulate vertical integration, capacity building and innovation, thus increasing the sector's efficiency and competitiveness. However, other reasons may play a role as well, such as an increased demand for these products in advanced countries and economic growth in the exporting economies. Moreover, these aggregate figures hide a great degree of heterogeneity.

This is highlighted in Panels (a) and (b) of Figure 1, which shows shrimp-export data from Benin and from Bangladesh. Both countries faced a ban on exports, the year of the ban being indicated in the figures with a vertical grey line. Panel (a) of Figure 1 shows that, upon the 2003 export ban, shrimp exports from Benin to the EU completely collapsed and remained close to zero even after the ban was lifted in 2005. Panel (b) shows the contrasting case of shrimp exports from Bangladesh to the EU, which dropped only slightly during the 1997 ban (which was effective from August to December) and afterwards skyrocketed, far exceeding their pre-ban levels. That the collapse of Beninese exports is related to the export ban, and not to a supply shock due to some natural phenomena affecting the regional shrimp stock is supported by Panel (c) of Figure 1, which shows that shrimp exports from other West-African countries to the EU remained relatively stable throughout the period.

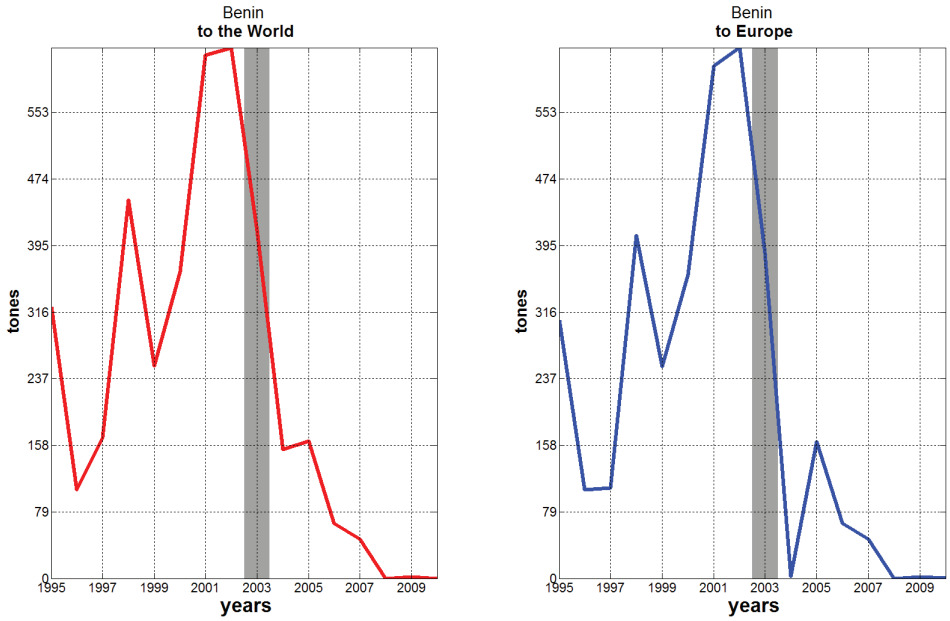
[5] RASFF enables member countries to share information about the risks related to food and feed items in real time. The legal basis for the RASFF was put into place in 2002, but the system has been in operation since 1979. Current members of RASFF include all of the EU Member States along with Iceland and Liechtenstein. The number of notifications in RASFF has increased over time. Over the period 2003-2011, for instance, the number of alert notifications increased from 452 to 617 while information notifications and border rejections increased from 302 to 1,253 and from 1,550 to 1,816 respectively (European Commission, 2010 and 2011).

Figure 1: Shrimp exports from Benin, Bangladesh and West-Africa to the EU

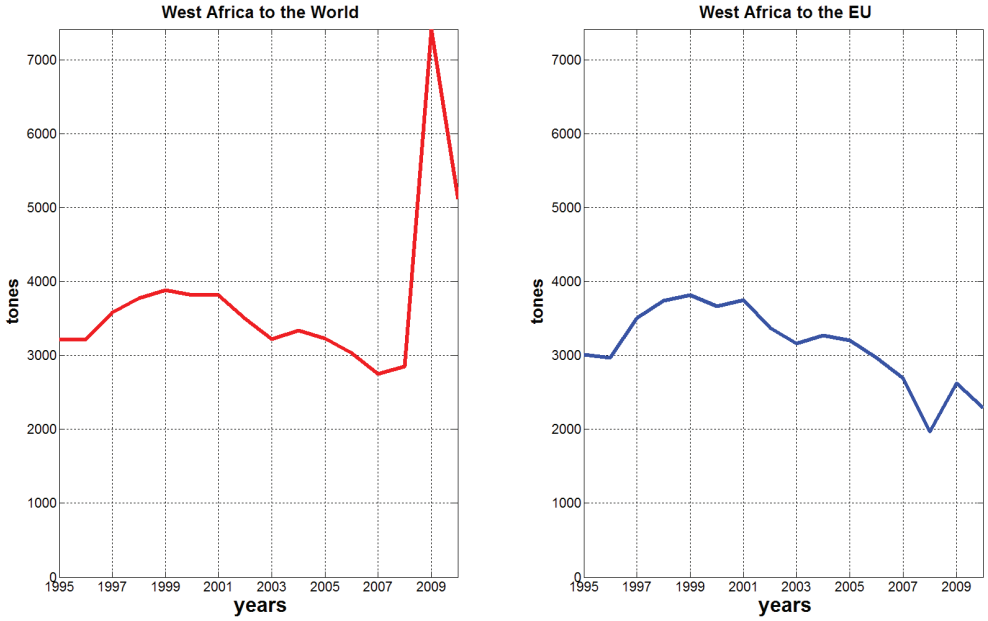
Panel (a): Bangladesh



Panel (b): Benin



Panel (c): Other West African Countries



Note: the West African data are obtained as a simple average of the following five countries: Cote d'Ivoire, Ghana, Nigeria, Senegal, and Togo. The grey area shows the year of the EU ban.

Sources: Data is taken from BACI database, which present the UN Comtrade database in a consistent way; see http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1, November 10, 2013

2.2. Background on Benin's shrimp export sector

The main shrimp specimen in Benin is *Penaeus duorarum burkenroad*,[6] which migrates from the sea to inland waters to mature and (when not caught in the inland waters) returns to the sea after having reached adult size.[7] The shrimp are mainly caught in the southern lakes of Nokoué and Ahémé and in the lagoon of Porto Novo.[8] Shrimp fishing is a seasonal activity that takes place during an 8-month period, from January, when the shrimp migrate to the inland waters, to August, when they return to the sea. The stock of inland shrimp available to fishermen fluctuates between years with rainfall playing the greatest role by determining the amount of nutrients in, and the salinity of, the water.

The inland fisheries of Benin are dominated by artisanal fishermen (male, with a few exceptions), who use small wooden canoes with paddles and/or sails. After being caught by the fishermen, fishmongers (mostly the fishermen's wives) collect the shrimp on the water from the canoes or at numerous landing sites and sell them directly to local consumers, to other intermediate traders, or to the collectors recognized by the exporting firms. In the last case, the shrimp are sent by vehicles fitted with isothermal containers to the exporting plants.

[6] This species represents more than 97% of the total shrimp production of the country and is also caught in other West African countries such as Cote d'Ivoire, Senegal, Cameroon and Nigeria.

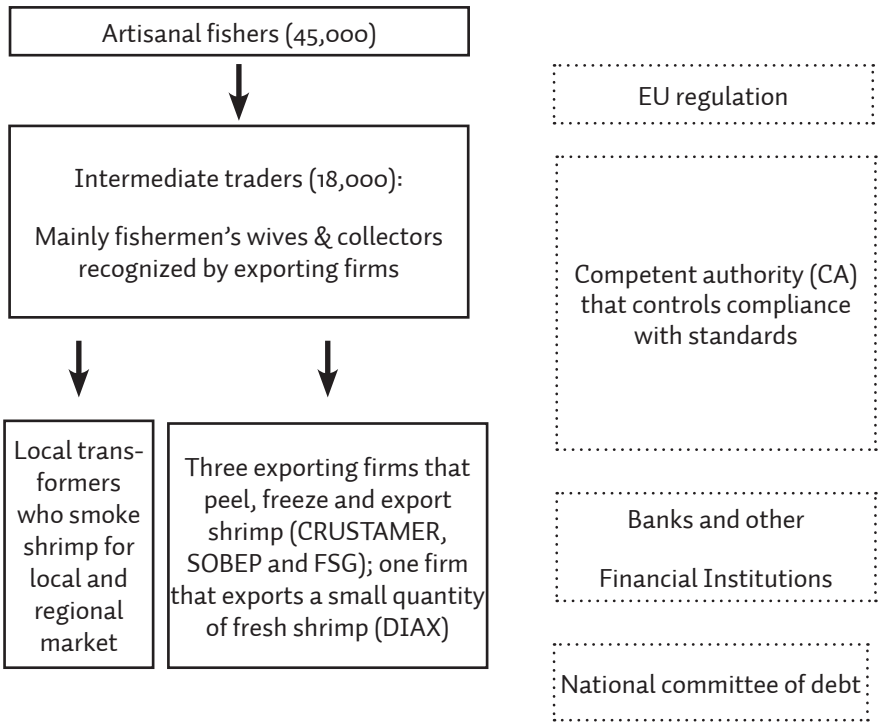
[7] The shrimp lay their eggs in the sea. The larvae grow in the sea till about 7 to 8 mm and then migrate to the brackish water in the lagoon during the dry season when the inland water level is low (from January till March). The shrimp mature in the inland water and migrate back to the sea when the salinity of the inland water has decreased and the water level has increased after the rainy season (around July-August). By that time, the shrimp have grown to a length of about 10 cm (Cummings, 1961; Hoestlandt, 1966).

[8] Lake Nohoué is the biggest contributor to the supply of shrimp. According to data reported by Allegre and Dupret (2010), its share is estimated at about 2/3 of the total shrimp supply, the combined share of Lake Ahémé and the Lagoon of Porto Novo is 1/6. The remaining 1/6 stems from other small lakes around the Djegbadji region.

Before the imposition of the ban in July 2003, there were three exporting firms: CRUSTAMER, SOBEP and SFG. During the ban none of the three could operate. Following the lift of the ban in February 2005, CRUSTAMER and SFG re-opened but stopped exporting shrimp a few months later. In 2005, a new firm called DIAX entered the market. It is also the only firm operating at the moment (November 2013). DIAX is a relatively small firm that specializes in the export of fresh langoustines, fish and shrimp. The other companies mainly exported frozen shrimp. For instance, the shrimp purchased by the largest company, CRUSTAMER, were peeled, frozen at –45° C, and exported mainly to Spain from where they are further distributed to other European countries (Colette, 2003).

Figure 2 gives an overview of the actors along the supply chain of inland shrimp. In addition to the three actors mentioned above, the overview includes two additional ones: the banks that provide the exporting firms with credit and the Directorate of Fisheries, which is the competent authority that controls and regulates fisheries in Benin. Their role in the supply chain is discussed below.

Figure 2: Benin's inland shrimp supply chain



Source: Our own compilation of information from several reports (e.g., SFP, 2003 and EU-DG SANCO, 2003)

The shrimp sector represents an important source of employment in Benin. It has been estimated that, in 2002 (prior to the ban on export to the EU), the sector provided income to 45,000 fishermen, 18,500 female intermediate traders, 150 collectors recognized by the exporting firms, and 50 permanent employees and 1,200 seasonal employees (mostly women) of the exporting firms (BTC, 2007; Le Ry et al., 2007). In total, the shrimp sector created employment for 64,900 people, and so, when dependents are included – contributed to the livelihood of about 250,000 people in Benin or about 4% of the population.

In 2002, approximately a third of the 3,000 tonnes of shrimp caught on the three most important inland waters of Southern Benin (Lakes Ahémé and Nokoué and the Laguna of Porto Novo) were designated for export of mainly frozen shrimp destined for the EU market (BTC, 2007; Le Ry et al., 2007).[9] The remaining 2,000 tonnes, usually of a smaller size and poorer quality (in function of their freshness, cleanness, size and color) were dried, smoked or cooked and consumed locally.

Panel (a) in Figure 1 shows a sharp increase of Benin's shrimp exports from about 300 to almost 630 tons of frozen peeled shrimp in 1999-2001, which corresponds to a bit less than 1000 tons of fresh unpeeled shrimp. This rise was due to the expanding production capacity of CRUSTAMER (Colette, 2003). By 2002, shrimp was Benin's second most important export product after cotton. However, from 2002 onwards, the exports declined rapidly, falling from about 630 tons in 2002 to zero tons in 2004, the first year in which the ban on the export of shrimp was in force all twelve months of the year.[10] After 2004, the export turned slightly positive again but then plunged back to only 0.2 ton in 2010.

3. A narrative account of the 2003 ban and its aftermath

This narrative account is largely based on semi-structured interviews we conducted in 2009 with the exporting firms, fishmongers, government staff, donors, and credit managers in the banking sector.

3.1. The ban

In August 2002, Spain sent a notification to the RASFF about the presence of a high proportion of bacteria (*enterobacteriaceae*) and micro-organisms (*aerobic mesophiles*) detected in a sample of frozen shrimp imported from Benin. Following this notification, the EU Food and Veterinary Office (FVO) conducted its first inspection of Benin's shrimp sector in October 2002.

The inspection report pointed to the following six main deficiencies (EU DG SANCO, 2003): (1) shortcomings in Benin's legislation with respect to hygiene and the control of fishery products; (2) lack of human resources at the competent authority; (3) lack of EU-accredited laboratories to monitor the safety norms applied to shrimp; (4) the non-conform use of chlorine and additives by exporting firms; (5) the non-application of HACCP in exporting firms; and (6) bad practices with respect to hygiene and the environment at the level of the fishermen and fishmongers. Among others, this last deficiency refers to the practice of fishermen keeping the

[9] Fresh and chilled packaging for export are also used.

[10] The revenue of exporting firms in 2002 amounted to 1,319 million XOF for CRUSTAMER, 792 million for SOBEB, and 1,066 million XOF for FSG. In the years from 2003 to 2006, however, revenues were lower at 746 million XOF; 279 million XOF; 644 million XOF; and 518 million XOF for CRUSTAMER and 545 million XOF; 0 XOF; 74 million XOF; and 0 XOF for FSG (PASP, 2007; no data available for SOBEB). As the official exports presented in Figure 1 were zero in 2004, CRUSTAMER's revenue of 279 million XOF in that year may have been the result of informal exports to neighboring countries or other activities.

shrimp on the surface of their wooden canoes instead of preserving them in isothermal containers with ice.

Given these deficiencies, the FVO suggested that the Beninese government suspend its fishery exports to the EU and correct them. Not doing so would increase the risk of an official EU ban on Benin's fishery exports (SFP, 2003). Hence, following the decision of the Beninese Minister charged with fisheries, the self-imposed ban on exports to the EU was signed on July 11, 2003.[11],[12]

Since the shrimp season extends from January to August, the exporting firms had large quantities of frozen shrimp in stock when the auto-suspension was signed. The FVO requested that 189 tons of shrimp be destroyed (Le Ry et al., 2007).[13] More importantly, the entire export sector was officially put on non-active for almost 20 months until the ban was lifted.

3.2. Improvements in the aftermath of the ban

The ban was lifted in February 2005 following significant improvements in conforming to the EU safety norms. In particular, the government updated the legal codes, strengthened the Competent Authority, and upgraded three laboratories. The exporting firms resolved the nonconformities and adopted the HACCP system (Hazard Analysis and Critical Control Points) (UNIDO, 2010).

One of the biggest challenges was ensuring the traceability and responsibility of all the actors along the chain. Since 2004, the EU regulations have required auto-controls at all levels of the supply chain rather than leaving the control up to a central laboratory. In order to enable fishermen to respect safety norms and collectors to control the quality of shrimp purchased, facilities were constructed, which included the transformation of rudimentary landing sites into *transfer platforms* (TP) for receiving, selecting and rinsing shrimp before putting them in isothermal containers with ice.[14] In addition to the TPs, *control units* (CU) were established to sample loads of shrimp for quality control.

These improvements were to a large extent financed by the donor community and implemented in collaboration with the Beninese government agencies and other local actors. Figure 3 illustrates the increased support of the international community to Benin's fishing sector, showing a spectacular increase in foreign aid commitments to the sector in 2003, the year of the export ban. Aid disbursements to the sector also increased considerably from $ 0.16 million in 2002 to $ 7.4 million in 2005, the year the ban was lifted.

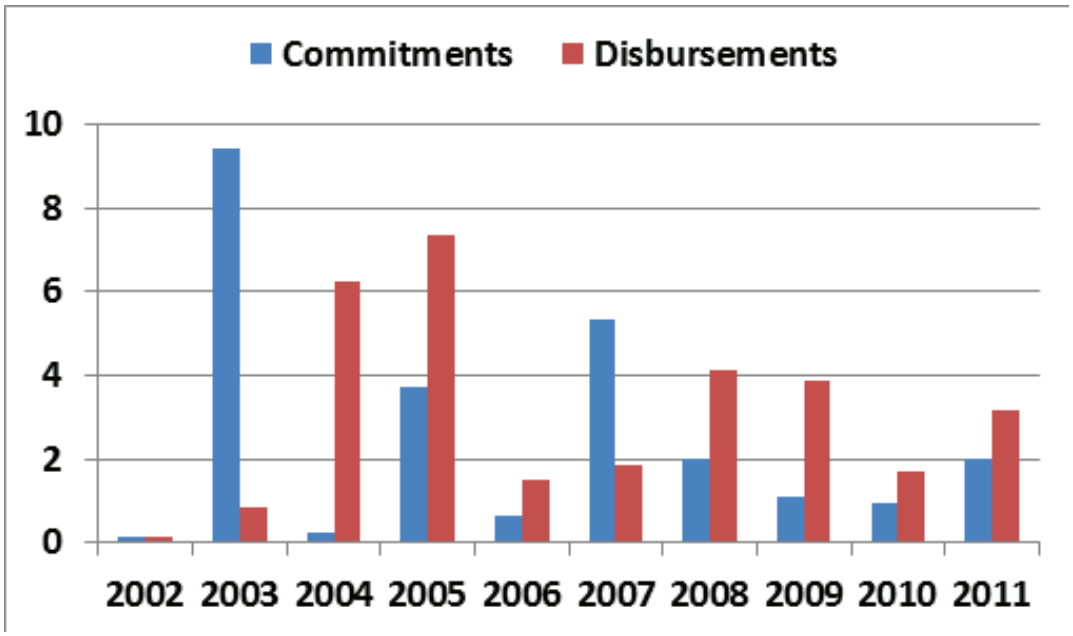
[11] This decision is also triggered by an *alert notification* sent in June 2003 to the RASFF by the Netherlands that reported the presence of a prohibited substance (chloramphenicol) in shrimp imported from Benin.

[12] Since this was a self-imposed ban and not a suspension officially imposed by the EU, Benin remained officially on the list of countries that could export fishery products to EU.

[13] A document by Allegre and Dupret (2010) mentions that these 189 tons are distributed across the three firms as follows: 73 tonnes for CRUSTAMER; 68 tonnes for SOBEB; and 48 tonnes for FSG. The value of these stocks are estimated at 307,727,061 XOF, 201,492,600 XOF; and 183,278,100 XOF (Allegre and Dupret, 2010). These numbers represent about 181%, 183% and 183% of the value of the capital stock CRUSTAMER, SOBEB and FSG, respectively.

[14] The location of TPs around the lake should allow fishermen to reach a TP within less than an hour and a half. At the site of the CUs, ice ought to be produced in order to refill the containers used by collectors and fishermen. The infrastructure works at Lake Ahémé, financed by Belgian Technical Co-operation, were completed in 2010. Four TPs are still under construction in the lagoon of Porto Novo with financial support of the government and several donors (Beyens, 2010).

Figure 3: Foreign Aid Received by the Beninese Fishing Sector (2011 USD millions)



Source: OECD Aid database http://stats.oecd.org/qwids, November 10, 2013

Thanks to these efforts, Benin made it to *List 1* in December 2009, which gives a select number of "harmonized" or "approved" countries that are allowed to export fishery products to all EU countries without being subject to additional legislation on the part of individual EU countries.[15]

3.3. Failure to restart export activities

So far, this story shows that the standards acted as catalysts for investment and innovation in Benin's shrimp export sector. However, as we write, a stable reunion of the sector with the EU is far from established. While the compliance gap between the sector and the EU norms has been reduced, there is much uncertainty about whether it can keep up with rapidly evolving EU norms. The uncertainty is rooted in a number of factors.

Two of the main deficiencies that triggered the ban have not been fully addressed. First, as transfer platforms and control units have been constructed only at the smallest of the three lakes, the risk of non-compliance remains. Second, up to the present (November 2013), the laboratories used by the Beninese Competent Authority have yet to meet the EU ISO/IEC-17025 norm, which grants the right to check for chemical substances and water quality. Without this accreditation the risk of refusal to entering the EU markets is high. Another deficiency remained unresolved for several years. Until late 2009, the exporting firms were still under the EU regulation 2076/2005/CE, according to which they could export fishery products only by means of bilateral agreements with a few EU countries: Belgium, Spain, The Netherlands and France. This kept the firms from exporting to potential clients in the UK and Germany.

[15] See the Commission Decision 2009/951/UE of December 14, 2009. Each of the three exporting firms (CRUSTAMER, FSG and DIAX) also obtained DG SANCO's approval to export fishery products to the EU on December 18, 2009 (SFP, 2010). Prior to Decision 2009/951/UE, Benin was operating under Decision 2076/2005/CE, such that the country could export fishery products under bilateral agreements with four EU countries: Belgium, France, The Netherlands and Spain.

Why did these issues remain unresolved or took many years? A lack of financial resources and poorly coordinated donor efforts certainly played a role. The Beninese government may also have been hesitant to transfer scare resources to the shrimp sector, given other development needs. For instance, while the government had committed to contributing about 12% of the total cost of the infrastructure works at Lake Ahémé (euro 3,033,055), it only disbursed 8% of its committed contribution (BTC, 2011).

Besides its limited financial capacity and other pressing needs, the local institutional environment may not have the technical capacity to manage a high-quality high-risk supply chain. The recent reduction in the compliance gap was heavily supported by donors instead of being a homegrown success of the local institutions. For instance, while donors financed most of the new infrastructure in place, it is not clear whether local institutions can effectively maintain and operate it. A project manager from one of the donor institutions involved noted that the local actors do not possess enough expertise or financial resources for the management of the transfer platforms, that the control units at some of the transfer platforms lack the high-power energy needed to function, and that the control units as well as the newly established laboratory lack qualified technicians (see also BTC, 2011).

Hence, the concern that, as long as the sector remains dependent on the EU market for its exports, it may face a new export ban in the future. The increased perceived riskiness of the sector affects the willingness of firms to invest, the more so because the profitability of the exporting activity decreased following the ban, because of two main reasons.

First, firms needed to finance the additional physical and human capital required to meet the higher food safety standards. The costs were further inflated by the pending non-compliance issues and doubtful local capacity, increasing the perceived riskiness of the export activity, and therefore urging banks to charge the firms a higher interest rate on new loans from the banking sector. Moreover, from a number of interviews with credit managers we learned that banks are even reluctant to provide credit to the exporting firms because of high firm debt, resulting from losses due to the ban.[16] If they resumed activities (instead of filing for bankruptcy), the firms would have to repay their high debt to the banking sector.[17]

These additional costs would greatly inflate compliance costs per unit of output in the sector, of which the size is limited by the stock of shrimp in the lakes. That infrastructure works were only completed at lake Ahémé, which supplied less than one sixth of the total shrimp supply, further raised concerns about an insufficient supply of shrimp to cover operation costs. The importance of size is also underlined by Athukorala and Jayasuriya (2003, p.1408) who observe that "Relatively large companies are naturally better placed to undertake additional investments needed to meet international SPS standards". Among others, they refer to evidence presented by Cato and Santos (2000) that the export ban in Bangladesh strengthened the relative position of larger firms, but pushed many small- and medium-scale firms into bankruptcy.

[16] The amount of the firms' debt with banks and other financial institutions was estimated at 1,271 million XOF for CRUSTAMER in 2006, 1,070 million XOF for FSG in 2005 and 462 million XOF for SOBEB in 2003 (PASP, 2007). These numbers are very high compared to the values of the firms' capital stock: 170 million XOF, 110 million XOF, and 100 million XOF for CRUSTAMER, SOBEP, FSG, respectively.

[17] A wait-and-see strategic behavior on the part of the firms may also play a role. The firms were waiting for the government to finance part of the new costs associated with compliance, to intervene in settling the outstanding debt with the banking sector, and to act as guarantor for new loans (and so to obtain lower interest rates). In July 2008, the government announced at the Council of Ministers the decision to guarantee bank loans to the exporting firms of shrimp. It is not clear why this decision has not become effective (Allegre and Dupret, 2010). One pending issue is that exporting firms failed to justify the use of a soft government loan of 500 million XOF (≈763,000 €) they received in 2007-2008 in order to make the investments required for compliance with the EU standards.

Another aspect that drove down profit expectations relates to the changes in the local and international market for high quality frozen shrimp. A few years after the ban local intermediate traders started supplying more and more shrimp to neighboring countries. This competition in the market of shrimp led to a rise in the *domestic* price of shrimp, driving up firms' operating costs. On the demand side, several European clients had turned to other suppliers and particularly to the Asian market.

All these issues imply that the prospects of a swift recommencement of activities were low. The Appendix presents an open-economy supply-demand framework that illustrates in detail how the combination of these factors blocks the export market activity in Benin's shrimp sector.

4. Evidence from a survey among fishermen and fishmongers

The ban implies the loss of the European export market, where shrimp fishers could receive a higher price. In the short-run this leads to a decline in the producer surplus of shrimp fishers, as is shown in the open-economy supply-demand framework presented in the Appendix.

While the ban implies an income loss in the short run, in the longer run, a number of fishermen may compensate their income loss with income from other activities. To assess whether fishermen face persistent income losses, we study their income and activity portfolio changes on the basis of data from a survey that was undertaken in 2009, six years after the imposition of the ban and four years after the ban was lifted.

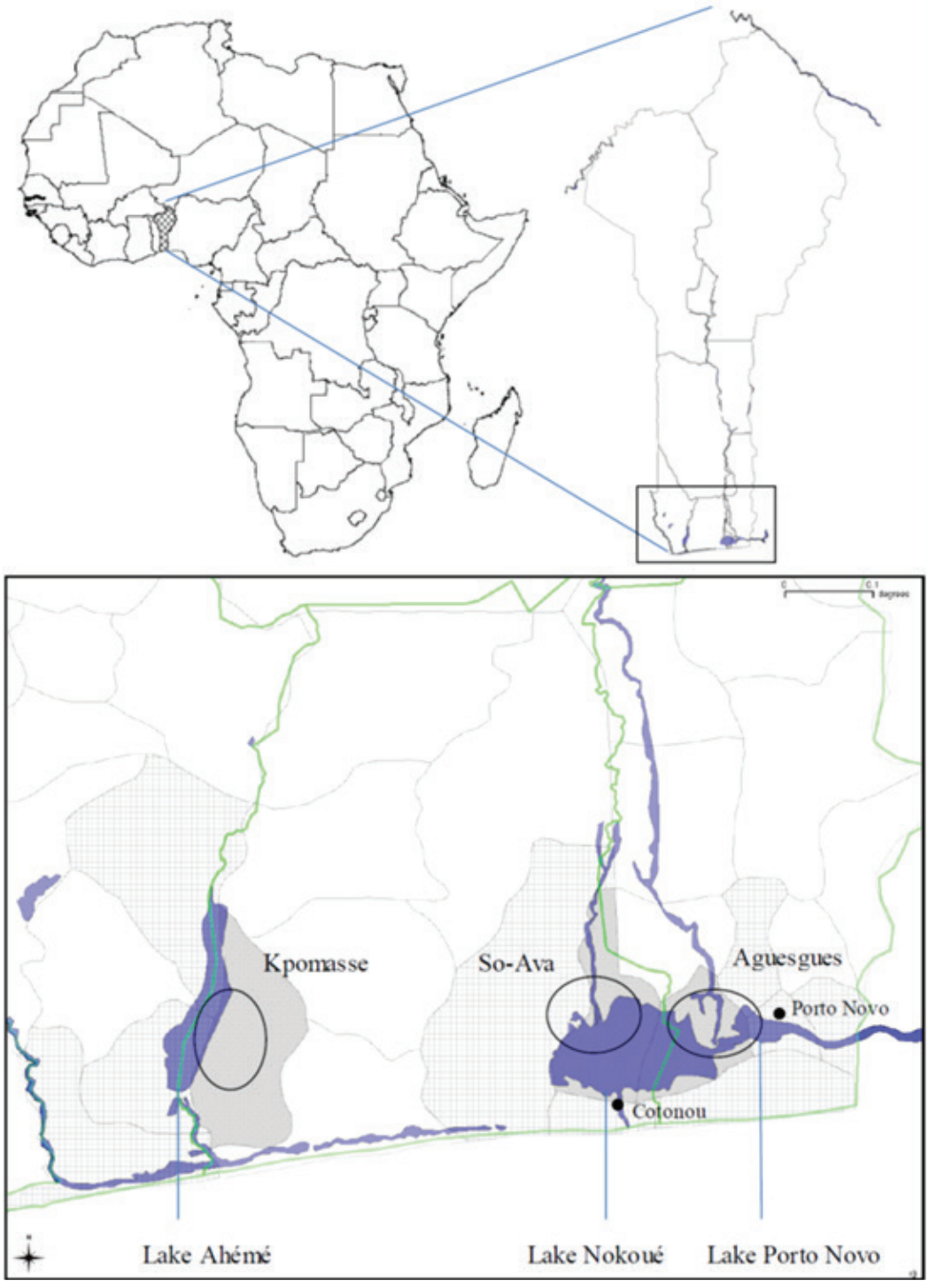
Besides focusing on the income effect, we also study to what extent fishermen and fishmongers are aware of the ban and its cause. This is important, not only because informed actors can engage in agency, urging policymakers to defend their interest, but also because small-scale actors need to be reliable partners in assuring the compliance to standards. Because of this, donor and government institutions have organized training sessions to raise awareness of small-scale actors about the ban and about what is expected from them in order to comply with standards. Our survey allows to assess whether such efforts were successful.

4.1. Data used

The households that are part of our survey were selected from the 2006 fishery census, which recorded information on 27,568 small-scale actors, mostly fishermen and fishmongers, operating in the fishery sector of southern Benin. We took a random sample of 540 households, stratified geographically across 18 villages that are part of three administrative communes located on the three lakes: Lake Nokoué (So-Ava Commune); Lake Ahémé (Kpomasse Commune); and Lagune de Porto-Novo (Aguégués Commune). Within these households, we selected 516 fishermen and 394 fishmongers (mainly the fishermen's wives) for individual interviews.

The location of the three communes and lakes is shown in Figure 4. The communes differ in a number of aspects that are likely to play a role in the heterogeneous impact of the ban across the lakes. So-Ava, located on the largest lake, is the most remote commune. Its many traditional fishing villages, built on the water, result in pollution from human waste and therefore lower quality of shrimp with respect to the EU standard. Aguegues, located at the medium-size lake, is the least remote commune and provides shrimp of intermediate quality. Kpomasse is located furthest from the exporting firms at the smallest lake, but it can easily be reached across land. It was the preferred supplier of the exporting firms because of its highly appreciated quality of shrimp (reflected in a larger size and more reddish color of the shrimp). Because of this reason, we expect fishermen at Kpomasse to be most affected by the ban.

Figure 4: Map of survey area



Note: Kpomasse lays at Lake Ahémé, So-Ava at Lake Nokoué and Aguegues at the intersection of Lake Nokoué and Lagune de Porto-Novo

The household members were interviewed in the period March-July 2009, during the 2009 shrimp season, by the authors of this paper and a team of 30 enumerators and 4 supervisors. In order to collect accurate information on income and consumption, the households were visited every two weeks. During each of these visits, income and consumption data were recorded. In addition, a standard household module was implemented covering different topics at each visit, such as social capital, credit, annual income and economic activities, shocks and coping strategies, health and education. From the data, we found that household income in 2009 stemmed for more than 80% from the fishery sector of which 30% was accounted for by the shrimp subsector.

During the first survey visit, the fishermen and fishmongers were asked to share their experiences regarding the ban. The following open questions were asked[18]:

- Did you receive a training on activities in the shrimp sector in the past five years?
- Are you aware that there has been a ban? (If no: go to the next section)
- In your opinion, what was the cause of the ban?
- What impact did the ban have on your income immediately after the ban (in 2003) and today (in 2009)?
- What explains this impact?
- If the impact was negative, how did the household react to cope with it, immediately after the ban (in 2003) and today (in 2009)?

4.2. Awareness about the ban and its cause

The survey reveals that 20% of fishermen and 24% of fishmongers in our sample had received a training on good practices in the shrimp sector (see Table 1). This is a non-negligible proportion, certainly given the fact that after the training, these individuals may share whatever they have learnt with their fellow villagers.

The answers to the second question, also summarized in Table 1, show that 82% of both the fishermen and fishwives knew about the ban at the time of the survey.[19] This proportion varied across the communes. In So-Ava, the commune that is most isolated and was supplying the lowest quality of shrimp, only 68% of the fishermen and fishmongers were aware of the ban. In Kpomasse and Aguegues, 81% and 97% of the fishermen and fishmongers knew about the ban.

Regarding question (iii), about the cause of the ban (asked to those who knew about the ban), only 40% of the fishermen and 45% of fishmongers report as a cause that "the food safety norms were not sufficiently respected"; while 20% said they had no idea why. In the remaining 30% to 40%, the answers varied widely, including "the Europeans no longer had money", "the firms went bankrupt", "the local authorities were arguing", "the European who bought the shrimp is on a holiday", "we need to provide food to Beninese markets (instead of European markets)", "it is because of the use of prohibited fishing gears" and "the Houedah are behind it".[20]

[18] The question were "open" in the sense that we did not present answer categories to the respondents. We did however ask the enumerators to code the answers, making use of a set of codes and potential answers that were listed on the questionnaire. These codes included a code for "other". The answers in this miscellaneous category were coded after data-entry.

[19] Among the fifth that was not aware of the ban, a number of actors did not catch or trade shrimp (or did so prior to the ban) but specialize in other species (fish, oyster, crab). When excluding those actors, the proportion of informed actors increases only slightly from 82% to 84% among fishermen and 88% among fishwives.

[20] The Houedah is a group which is competing for the fishery resources with the Goun and the Tofin, which are

Table 1: What fishermen and fishwives know about the export ban

	Total	Fishermen	Fishmongers	Kpomasse	So-Ava	Aguesgues
"Did you follow a training on activities in the shrimp sector in the past five years?"						
Yes (%)	22	20	24	21	19	24
"Are you aware that there has been a ban?"						
Yes (%)	82	82	82	81	68	97
Obs	910	516	394	299	306	291
"What is the cause of the ban?" (correct answer: "The food safety norms were not respected")						
Correct answer (%)	42	40	45	61	26	38
Obs	744	422	322	241	209	291

Source: household survey conducted in 2009 by the authors of this paper.

We turn to a multivariate regression analysis to assess to what extent the training sessions contributed to the awareness of the ban and its cause. As dependent variables, we construct two indicator variables: (1) *Know about ban* takes one if the small actor knows about the ban, and zero otherwise, (2) *Know cause ban* takes one if the small actor reported the correct reason ("the food safety norms were not sufficiently respected"), and zero otherwise. Given the binary nature of the dependent variables, we estimate a probit model. Our explanatory variable of interest, *Training on good practices in shrimp sector,* takes one if the small actor received a training session on good practices in the shrimp sector. We compare the impact of the training session with the effect of formal schooling, measured by the *Years of schooling* of the small actor, and with his or her *Involvement in the shrimp sector*, measured by an indicator variable that takes one if the small actor was engaged in the shrimp sector at the time of the ban. To control for the differences in accessibility and shrimp quality across lakes, we include lake fixed effects.

Table 2: Determinants of knowledge about the ban and its cause

	Know about ban		Know cause ban	
	Fishermen	Fishmongers	Fishermen	Fishmongers
Training on good practices in shrimp sector	0.650*** (0.243)	0.591** (0.235)	0.555*** (0.160)	0.669*** (0.177)
Years of schooling	-0.008 (0.026)	0.025 (0.045)	0.019 (0.024)	-0.004 (0.033)
Involved in shrimp sector in 2003	0.693*** (0.193)	0.356* (0.192)	0.134 (0.210)	0.061 (0.277)
Lake fixed effects	Yes	Yes	Yes	Yes
Obs	516	394	422	322

*Probit model estimation. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

different but related groups speaking different dialects belonging to the same family of Gbe languages (Hounkpati, 1991).

The results, shown in Table 2, indicate that the training sessions had a significant impact on knowing about the ban and its cause, raising awareness among fishermen as well as fishmongers. In sharp contrast, formal schooling has no significant effect. Those who were shrimp fishers or traders at the time of the ban, were more aware about the ban but not significantly better informed about its cause.

In sum, while the small-scale actors in general knew about the ban, the awareness about the actual cause of the ban was relatively low. Even though the training session reached about one in five small actors and increased the knowledge about the ban and its cause, a fairly large proportion among fishermen and fishmongers trained (48% and 37% compared to 60% and 55% overall) failed to report the actual reason for the ban. This result indicates that raising awareness about food safety standards among small-scale actors poses a huge challenge that cannot be fully addressed in a few training session.

4.3. The self-reported income effect of the ban

Table 3, Panel A summarizes the responses to question (iv) on the self-reported income effect of the ban in 2003. Close to 59% of the respondents reported a *very* negative impact in the short run, and 26% report a *rather* negative impact. Approximately 9% reported no impact, and about 5% mentioned a positive impact. Corresponding well with its status as preferred supplier to the exporting firms, Kpomasse had the highest proportion of actors mentioning a strongly negative impact (84%), followed by Aguegues (56%) and So-Ava (33%). When asked about the reason for the negative short-run impact of the ban (question v), more than 70% of those who reported a negative impact attributed it to "a low price because of lack of purchasers". This is consistent with the price decrease that features in the model presented in the Appendix. Other reported reasons are diverse and include "the market is far", "it is complicated now that we have to sell to Togolese, Gabonese and Nigerian markets", or "we have to throw away the shrimp or smoke them for lack of buyers of fresh shrimp".[21]

Table 3: Self-reported assessment of the impact of the export suspension

Panel A: short-term (impact in in 2003) (%)

	Total	Fishermen	Fishmongers	Kpomasse	So-Ava	Aguesgues
Strongly negative	59	57	60	84	33	55
Rather negative	26	26	26	10	56	18
No impact	9	11	6	2	8	15
Rather positive	4	4	5	1	0	10
Strongly positive	1	0	2	2	0	1
I don't know	1	1	1	1	3	0

[21] Among the 5% who reported a positive impact, the reason mentioned is "new market opportunities", suggesting that a minority of the respondents could take advantage of the export market failure. From our interviews, we learned this was the case for larger intermediate traders who increased their interactions with markets in neighboring countries.

Panel B: medium-term (impact in 2009) (%)

	Total	Fishermen	Fishmongers	Kpomasse	So-Ava	Aguesgues
Strongly negative	52	51	53	66	36	51
Rather negative	30	29	31	22	40	29
No impact	11	13	9	8	9	16
Rather positive	4	5	4	2	10	2
Strongly positive	1	1	1	1	1	0
I don't know	2	2	2	0	4	1
Obs	744	422	322	241	209	291

Source: household survey conducted in 2009 by the authors of this paper.

Panel B of Table 3 summarizes the self-reported assessment by the local actors on the ban's medium-term impact (6 years after the ban). When asked about the ban's income effect in 2009, up to 52% of the households still reported a very negative impact, and 30% reported a rather negative impact. The most frequently cited reasons for the persistent negative effect were the persistently low price and the difficulty of selling in distant markets.

We expect the ban's income effect to be more negative for small-scale actors that were involved in the shrimp sector at the time of the ban. To verify this, we turn to a multivariate regression analysis. Our dependent variable is an indicator variable taking one if the self-reported impact of the ban was very negative (and zero otherwise). We construct this variable both for the immediate effect in 2003, and for the medium-run effect in 2009. As our explanatory variable of interest, we include the indicator variable on the actor's involvement in the shrimp sector in 2003; and we control for years of schooling and lake fixed effects. The results in Table 4 show that, in the short run, the impact of the ban was more negative for shrimp fishers. Interestingly, this no longer is the case for the medium-run effect.[22] A study of coping strategies can shed light on this result.

Table 4: Determinants of the ban's income effect, short-run and medium-run

Dependent variable: very negative impact	Short run (2003)		Medium run (2009)	
	Fishermen	Fishmongers	Fishermen	Fishmongers
Years of schooling	-0.027	0.014	0.004	-0.070**
	(0.023)	(0.040)	(0.023)	(0.035)
Involved in shrimp sector in 2003	0.554***	0.285	0.226	0.299
	(0.211)	(0.283)	(0.204)	(0.275)
Lake fixed effects	Yes	Yes	Yes	Yes
Obs	422	322	422	322

*Probit model estimation. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

[22] Fishmongers involved in the shrimp sector at the time of the ban also faced a larger negative income effect, but not significantly so. This may indicate that fishmongers find it relatively easy to switch across species, e.g. by replacing shrimp trading by fish trading. In contrast, fishermen may find this more difficult as the fishing gear they possess may not be readily used across all species. For instance, while the medokpokonou is used for shrimp fishing, it is less suited for fish fishing.

4.4. Coping strategies

It is well documented that, when faced with a non-negligible adverse income shock, households in developing countries resort to a wide range of coping strategies in order to smooth consumption, including self-insurance through dissaving, increased labor effort, migration and mutual insurance. The choice of strategy depends on the size and the type of the shock (Dercon, 2004). The export ban can be characterized as a covariant and highly persistent shock, i.e., many households within the same community were negatively affected at the same time and the shock was not limited to one point in time (since exports were suspended for several months).

To understand how the small-scale producers in our sample reacted to this shock, we study their answers to question (vi): "If the impact was negative, how did the household react to cope with it immediately after the ban (in 2003) and today (in 2009)?". The answers are summarized in Table 5. Given that the shock was covariant and persistent, it is not surprising that the households in our sample rarely reported mutual insurance ("asking for help from friends and family") as a coping strategy, while "developing another activity" was frequently reported. Other coping strategies that were frequently reported were "no reaction", "consume less", "selling asssets", "take consumption credit", "work more hours", and – to a lesser extent - "take child(ren) out of school". Much less frequently reported coping strategies are pooled in the category "other", and include among others "reduce the number of children" and "migrate to Nigeria".

Table 5: Self-reported coping strategies upon the ban

	Fishermen				Fishmongers			
	2003		2009		2003		2009	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%
No reaction	70	20	73	21	53	19	61	22
Asset sale	44	13	18	5	20	7	11	4
Consume less	61	18	56	16	61	22	43	15
Take consumption credit	31	9	24	7	24	9	30	11
Engage in other ec. act.	62	18	63	18	51	18	57	21
Work more hours	31	9	66	19	25	9	41	15
Take child out of school	23	7	10	3	6	2	8	3
Help from family or friends	12	3	14	4	23	8	14	5
Help from government or NGO	1	0	8	2	7	3	7	3
Other	13	4	16	5	8	3	6	2
Total	348	100	348	100	278	100	278	100

Source: household survey conducted in 2009 by the authors of this paper.

A number of these coping strategies reduce the household's capital, be it physical or human. While contributing to consumption smoothing in the short run, such strategies may negatively affect income in the longer run. The most viable coping strategy when faced with a prolonged negative demand shock for shrimp would be to switch to another activity. This conjecture finds support in the data. Among the 63 fishermen who reported having switched activi-

ties following the ban, 39% reported a very negative impact of the ban in 2009 compared to 60% of all fishermen, and to 73% of fishermen reporting the coping strategies "no reaction", "asset sale", and "consume less".[23]

To investigate the effectiveness of an activity-portfolio change further, we analyze the data from a module on economic activities asking fishermen about their economic activities in 2002 and in 2009. Among the 63 fishermen who self-reported having switched activities following the ban, the large majority (77%) remained in the fishery sector, switching to fishing fish (instead of shrimp). Thus, they ended up competing with other fishermen for the scarce fishery stock. Only 14 fishermen who changed activities between 2002 and 2009 (23%) switched to activities outside the fishery sector. These fishermen reported a very negative income effect of the ban only in 29% of cases compared to 42% for those who switched activities within the fishery sector, which suggests that switching to the non-fishery sector was the most effective coping strategy.[24]

We verify this result in a regression analysis in which we regress an indicator variable taking one if the self-reported medium-run impact of the ban was very negative on indicator variables of income diversification, inside and outside the fishery sector (taking from the survey module on economic activities). We control for years of schooling and being a shrimp fisher or trader at the time of the ban, as well as lake fixed effects. The results, given in columns 1-2 of Table 6, confirm that diversification outside the fishery sector strongly decreases the probability of a very negative income effect of the ban in 2009.

One could object that this result does not per se reflect the successfulness of this diversification strategy, but rather an unobserved characteristic of the small-scale actor that correlates both with diversification and the impact of the ban. If such spurious correlation is driving our result, we would expect diversification to be also related to the immediate impact of the ban (in 2003). In a falsification test, reported in columns 5 and 6 of Table 6, we find that this is not the case.

[23] For fishwives, we find similar results. The 51 fishwives who changed activities reporting a very negative impact in 33% of cases compared to an average of 53%.

[24] That this strategy was used by only a handful of fishermen indicates that access to the non-fishing sector was constrained. In a study on income diversification in the fishing communities in our sample, we explain the extremely low degree of income diversification among fishermen in terms of the remoteness of their communities, the difficulty of access to agricultural land, and especially the lack of schooling with close to 70% of active adults being illiterate (Stoop et al., 2013).

Table 6: Income diversification, migration and the ban's income effect

Dependent variable: very negative impact	Medium run (2009)				Short run (2003)	
	Fishermen	Fishmongers	Fishermen	Fishmongers	Fishermen	Fishmongers
Years of schooling	0.009	-0.063*	0.009	-0.063*	-0.029	0.015
	(0.023)	(0.035)	(0.023)	(0.035)	(0.023)	(0.041)
Involved in shrimp sector in 2003	0.249	0.232	0.186	0.229	0.503**	0.263
	(0.206)	(0.273)	(0.211)	(0.274)	(0.216)	(0.283)
Coping strategies 2009:						
Diversify into fish fishing or trading	0.001	-0.363	0.068	-0.357	0.286	-0.340
	(0.216)	(0.256)	(0.222)	(0.256)	(0.226)	(0.265)
Diversify out of fishery sector	-0.940***	-1.146***	-0.942***	-1.135***	0.260	-0.249
	(0.331)	(0.311)	(0.332)	(0.311)	(0.364)	(0.301)
Household members migrated for work			-0.252*	0.013	-0.034	-0.021
			(0.133)	(0.142)	(0.101)	(0.142)
Lake fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	422	322	422	322	422	322

*Probit model estimation. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

In sum, the persistence of the self-reported negative welfare impact suggests that the domestic and regional demand did not succeed in substituting for EU demand even after considerable time. It also indicates that the small-scale actors were unable to fully cope with the drop in shrimp demand by substituting shrimp fishing and trading with another activity, which would be the coping strategy *par excellence* for dealing with a persistent covariant shock. Among those who diversified, most diversified within the fishery sector, ending up competing with fish fishers and fish traders who were not engaged in the shrimp sector at the time of the ban. This competition may explain why, in the medium-run, the negative effect of the ban is no longer significantly stronger for those with experience in the shrimp sector (as was shown in Column 3 of Table 4).

4.5. Migration

The fact that migration was not often mentioned as a coping strategy by our respondents is likely to stem from selection bias; those who migrated had lower chances ending up in our sample. This selection bias may not only bias the coping strategies that we recorded, but also the reported income effect, with the direction of the bias depending on whether migrants were more or less successful than non-migrants in coping with the ban.

Our fieldwork revealed that, while the emigration of entire households is uncommon, the emigration of household members is rather common. Even prior to the ban, fishermen would temporarily migrate, especially to other fishermen villages in Nigeria that very closely resemble their own. The extent of migration of household members can be derived from the household roster, which was made up when visiting the households in 2009. Of the 1871 household members aged 15 to 65, 131 or 7% were reported to be temporarily absent. Among the ab-

sent members, 72 left for work purposes. Among those, 41 were reported to be working in the fishery sector in Nigeria.

We did not have the means to track these migrants and find out whether they suffered less from the ban. In case they did suffer less, some of their relative success may have spilled over to other members of their household. To verify this, we add the number of temporary work-related migrants to our regression model. The estimated coefficient on this variable is found to be significant (at the 10% level), suggesting that temporary migration reduced the ban's negative income effect in the medium-run. In a falsification test, we show that the number of temporary migrants is unrelated to the immediate effect of the ban in 2003, reducing the concern that we pick up a spurious correlation between the effect of the ban and migration.

In sum, these findings indicate that migration may be a relatively successful coping strategy, and that, since migrants are largely excluded from our sample, we may be overestimating the negative impact of the ban. Nevertheless, even in the subsample of households with temporary migrants, 42% reported a very negative medium-run income effect of the ban, and 38% reported a negative effect. Hence, we are rather confident that the effect of migration would not entirely cancel out our result of a negative income effect of the ban.

5. Discussion and concluding remarks

Benin's shrimp sector collapsed upon the 2003 export ban. Strikingly, the sector did not revive, despite the lift of the ban in 2005 and considerable Aid for Trade flows. We argue that the sector's dependency on the EU, its smallness, Benin's poor institutional environment, and inadequate Aid for Trade played critical roles.

Putting all of one's eggs in one basket is risky. Because of its reliance solely on the EU market, the ban on shrimp exports from Benin to the EU basically put the exporting firms out of business, which led to the current situation of unsettled debt. In its turn, this dependency on the EU market is explained by the underdevelopment of the regional market (regarding its purchasing power and infrastructure) as well as the size of the sector, which is limited by the capacity of the lakes and poor regional infrastructure (which prevents the firms from cost-effectively sourcing from other lakes in the region).

Smallness also played a role in a more direct way. Complying with standards involves fixed costs (upgrading laboratories, building landing sites and control units, training fishery experts and fishermen, etc.) which, in the case of a small sector, are shared by few actors. The potential total pay-off from upgrading a small sector is therefore low in terms of firm and tax revenue. This may greatly reduce the incentives for both firms and governments to invest in a small export sector. In the case of Benin, donors incurred huge sunk costs in infrastructure for controlling, treating and transporting the shrimp from the lakes to the firms, but the firms and the government (e.g., as a potential guarantee for credit to the sector) were hesitant to take the further steps necessary to revive exports.

The institutional environment also plays a crucial role. It is undisputed that, in addition to investments in "hard" transportation and communication infrastructure, the development of a "soft" infrastructure is at least as important for the integration of countries into value chains (Grossman and Helpman, 2005). These may include well-functioning contractual institutions, but also informal 'rules of the game' which are crucially important for the functioning of a supply chain (Martinez and Poole, 2004). After all, all the actors of a supply chain are inter-dependent managers of the quality of the same final product and the success of their combined management depends on the extent of the co-operation, information exchange and trust between them.

These attributes are in short supply in Benin's shrimp sector as we could conclude from interviews with the firms, three credit managers, the competent authority (civil servants in the ministry of fisheries), and the fishermen from the different communities. For example, only 33% of fishermen in our sample knew about the cause of the ban. In addition, the fishing community is fractionalized between different ethnic groups and inter-group trust is very low (some fishermen blamed other ethnic groups for the ban).[25] Also further down in the supply chain, mistrust plays a role: following allegations of misuse of a soft government loan by the firms, the Beninese government was hesitant to continue to support the firms and was waiting for the results of the investigation by the national debt committee. The government, in its turn, did not fully respect its commitment to finance even a small part of the infrastructure at Ahémé. Finally, lacking confidence in the capacity of the firms and governments to face up to the future financial and market challenges (without further extensive donor support), the banks were reluctant to provide credit to the sector.

[25] Mistrust in Benin, as measures in the Afrobarometer survey, is high, even compared to the Sub-Saharan African average. It is argued to be rooted in the slave trade (Nunn and Wantchekon, 2011; Deconinck and Verpoorten, 2013)

Is there a future for Benin's shrimp sector? Provided that the cold chain is respected by all the actors, the control units and transfer platforms operate, and the firms' financial situation is sorted out, Benin possesses a very well-appreciated product that satisfies the highest food and safety norms. However, the question remains whether, given its institutional environment, Benin will be able to keep up with rapidly evolving EU norms and be able to (re)conquer the market and compete with the expanding Asian shrimp export with a small-size shrimp of standard quality but for a very low price. Benin could seek a niche in the market and stress the flavor and size of Benin's shrimp. Aiming at a high-value product would also fit well with the small size of the sector as the price premium received would justify the higher unit costs of operation and compliance. Similarly, the sector could seek added value by aiming at labels for artisanal and/or environmentally sustainable fishing. However, the demanding administrative requirements and procedures to obtain special labels require skill and expertise that are far beyond the current capacity of actors in the sector.[26] Until the local capacity and coordination issues are resolved, the situation will remain frozen.

Can Aid for Trade resolve these constraints? Whereas more resource mobilization would be needed to effectively address the deficiencies that triggered the ban, international initiatives can by no means be a substitute for appropriate national actions. A firm political commitment at a high level is crucial to coordinate donor efforts but also to obtain trust of private investors. But, what then is the role of Aid for Trade? While the Aid for Trade flows in the aftermath of the ban helped reducing the compliance gap, they failed to credibly upgrade the sector. Aid could have been more effective if (1) it had been more focused on capacity building of the local institutions involved so to assure the maintenance and operation of the donor-funded infrastructure, and (2) if aid had been less fragmented (coordinating, for instance, the construction of infrastructure across all lakes). A central coordinator, appointed by the receiving country and possibly financed by a common Aid for Trade donor fund could bring private and public actors and the various interested donors around the table and discuss the actions required and their interdependencies. This central coordinator should take as a metric for success the export performance as well as the welfare of the small-scale actors involved in the supply chain, certainly if these actors are fragmented, ill-organized and ill-informed, and therefore lack agency.[27]

What are the welfare implications of a ban at the level of small-scale producers? The last part of this paper points out that the stringent EU standards had a large and persistent negative impact on the income of fishermen and fishmongers. The access to world markets, which translated into a perfectly elastic demand of exporting firms, assured daily market clearance for the fishermen. Being small, much poorer, and plagued by high transport and transaction costs and with limited access to inexpensive preservation technology, the domestic and regional markets could not take over this role. In addition, fishermen were constrained in their access to the non-fishery sector. As such, switching activities proved an effective coping strategy for only

[26] For instance, Fair Trade Organizations require keeping records for all marketed shrimp in order to trace their origin to members of cooperatives.

[27] The central coordinator should also take into account the environmental impact of changes in trade regimes. If not, Aid for Trade may not align well with donors efforts in this field. In this respect, it is worthwhile pointing out another fundamental problem in Benin's artisanal fishery sector, i.e. overfishing. There is an urgent need for effective institutions to regulate Benin's fisheries and preserve the fishery stock for future generations. At present, such institutions are lacking and the pressure on the lake is mounting. Partly as a response to the ban, partly as a reaction to the degradation of the lakes' resources, fishers increased their fishing effort, by fishing during more hours a day but mostly by using more damaging fishing gears. If continued unregulated, the ecosystem will be affected, and the available shrimp stock may permanently decrease. Studying these issues is out of the scope of this paper but are addressed in, among others, Stoop et al. (2013) and Briones Alonso et al. (mimeo).

a handful of fishers and was insufficient to compensate for the loss in producer surplus. Instead, shrimp fishers engaged in competition with fish fishers or intensified their shrimp fishing activity, thereby compromising the future fishery stock.

The more general lesson one can draw from these findings is that, in the face of a ban or another export market shock, policymakers and donor agencies should support those household coping strategies that are viable in the longer run and do not inflict negative externalities on other households in the same community. In the case of the fishing communities, this means supporting income diversification outside the fishery sector, e.g. through micro-credit schemes and training programs. A policy of fostering market integration though better transport facilities would also increase the range of profitable activities that households can engage in.

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Appendix: The ban's impact in a supply-demand framework

We model the market for shrimp in Benin, focusing on the involvement of three main actors: (i) fishermen; (ii) local consumers in Benin and in neighboring countries; and (iii) the exporting firms. We do not present the welfare analysis for fishmongers, but the effects go in the same directions as those of the fishermen.

Fishermen supply two qualities of shrimp: high and low. The high quality shrimp is characterized by its larger size, pink color and freshness. Exporting firms buy only the high quality, whereas local consumers may buy both high and low quality shrimp.

We integrate these features into the standard open-economy, supply-demand framework (e.g., Baldwin and Wyplosz, 2009 and Krugman et al., 2011) and demonstrate the impact of the export ban on firms and fishermen. Section a models the main features of Benin's market for fresh shrimp before the ban, i.e., when the exporting firms were operating. Sections b and c illustrate the short-term and medium-term impacts of the ban, respectively. Our time frame for the short-run is the period under which the ban was in force, i.e., from July 2003 till February 2005; while the medium-run time frame stretches from February 2005 - when the ban was lifted – to 2009, when we conducted our fieldwork.

a) The Model and the situation prior to the ban

We make the following four assumptions. First, fishermen supply shrimp every day; q_b^d low-quality shrimp to local consumers and q_g^d and q_g^X high-quality shrimp to local consumers and exporting firms, respectively. The prices related to these quantities (q_b^d, q_g^d and q_g^X) are denoted by p_b^d, p_g^d and p_g^X where $p_b^d < p_g^d \leq p_g^X$. Second, the supply curves of the two qualities of shrimp, denoted by S_g and S_b , are assumed to be identical.[1] Each supply curve is a positive function of the shrimp price. Third, the supply is bounded by the available stock of shrimp in the lakes (which depends on weather and environmental

[1] The good and bad quality shrimp are caught with the same fishing gear.

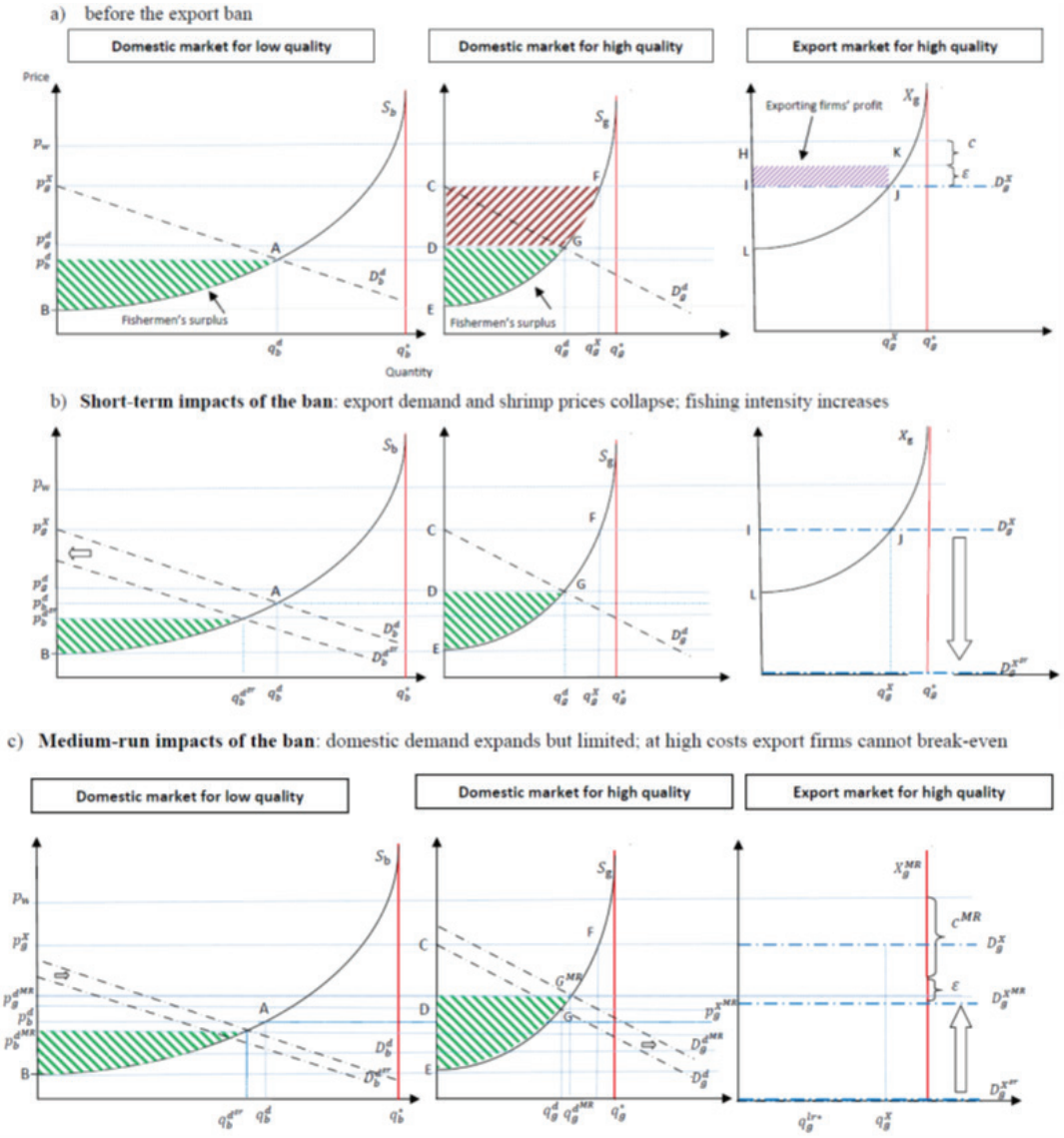
conditions as well as on past fishing intensity). We denote the stock of each quality of shrimp by $q_b{}^*$ and $q_g{}^*$, respectively.

The fourth assumption we make is that local consumers and fishermen are price takers, i.e., they cannot determine the *local market* price for shrimp. The exporting firms are price takers on the *world market* as they cannot determine their export price p_w. In the *local market*, however, the handful of exporting firms set the price p_g^X at which they acquire shrimp from fishermen and buy at this price as long as they earn a markup ε equal to $p_w - p_g^X - c$, where c represents the expected marginal cost (including the costs of transporting, treating, freezing and packaging the shrimp as well as the cost of external financing from banks).[2] Thus, the demand curve of the exporting firms, D_g^X, is assumed to be perfectly elastic.

Figure A (a)-(c), summarizes our open-economy, supply-demand model for the market of fresh shrimp in Benin. Panel (a) presents the situation before the ban, i.e., at the moment when the exporting firms were operating. Panels (b) and (c) show the short-run and medium-run impacts of the ban, respectively. Each panel has three diagrams: the left and middle diagrams represent the domestic market for low and high quality shrimp, respectively, while the diagram on the right gives the export market for high quality shrimp.

[2] From our interviews with the exporting firms' managers, we learned that the largest of the four firms is the market leader and sets the price when the shrimp season starts. The other firms follow. Data reported by PASP (2007) and information derived from our fieldwork indicate that, prior to the ban p_g^X was set at about 2 euro per kg, while the exporting firms received a price p_w of about 6.5 euro per kg. Thus, $p_w - p_g^X$, was 4.5 euro per kg and we can hypothesize that $c + \varepsilon \leq 4.5$ euro.

Figure A: Open-economy, demand-supply framework for the market for fresh shrimp in Benin



In the right-hand diagram of Panel (a), exporting firms break even at the quantity q_g^X for which they pay a unit price p_g^X to the fishermen. For the same quality of shrimp, local consumers are willing to pay only p_g^d, $p_g^d < p_g^X$, (middle diagram of Panel (a)). As a result, fishermen sell all of their good quality shrimp to the exporting firms.[3] Under these assumptions and given the world price of shrimp p_w and operating costs c, exporting firms derive a profit represented by the purple area HIJK in the right diagram.

The producer surplus of fishermen has two parts: one related to their supply of the low quality to domestic consumers, which is represented by the green area ABp_b^d in the left diagram; and the other is derived from the supply of high quality shrimp to the exporting firms given by the domain CEF in the middle diagram. The latter can be further split into two parts: the green area DEG represents what the fishermen would obtain if they sold all high-quality shrimp to local consumers, and the dark red area $CDGF$ represents the additional welfare fishermen obtain by selling a larger quantity at a higher price to exporting firms. The export regime is clearly beneficial for shrimp fishers.

The export regime represented in Panel (a) is not beneficial for local consumers as it deprives them of high quality shrimp. Their loss is represented by the area CDG in the middle diagram. Note, however, that the welfare gain of the fishermen under the export regime is much greater than the welfare loss of the local consumers. The area CFG represents this positive net welfare gain. Besides, the exporting firms also create employment and contribute to the foreign reserves of the central bank, adding to the overall positive welfare impacts of the export regime.

[3] It is possible that some fishermen sell the high quality shrimp to local consumers, but this amount would be very small compared to the quantity supplied to exporting firms. Therefore, the model normalizes the amount of the high quality of shrimp sold to local consumers to zero.

b) Short-run impacts of the export ban

Panel (b) illustrates the short-term impacts of the export ban. As shown in the right diagram, it causes the demand D_g^X from the exporting firms to shift down to zero. As a result, the profit of exporting firms disappears completely. In addition, but not shown in the figure, the firms have to suffer the loss due to the destruction of their stock and also have to lay off employees.

The ban also generates a loss to fishermen corresponding to the area $CDGF$ in the middle diagram. However, local consumers derive a welfare gain from the ban as they are now able to buy high quality shrimp. This gain, given by the area CDG, is less than the loss of the fishermen's producer surplus. This is not, however, the end of the story. As good quality shrimp are now supplied to the local markets, the demand for its substitute (bad quality shrimp) D_b^d shifts to the left, leading to a further reduction of the welfare of the fishermen.

In sum: the ban is bad news, both for the exporting firms and the fishermen.

c) Medium-run impacts of the ban

In 2005 the export ban was lifted, but the firms did not resume activities. The reasons for this failure were discussed in Section 3.3 and are illustrated in Panel (c). The diagram on the right shows that, in the medium-run (MR) after the ban, the exporting firms faced costs c^{MR}, which were significantly higher than the pre-ban cost c.

Keeping the export price p_w and the markup ε fixed, these additional costs imply that the firms will only operate when they can purchase shrimp at a lower price $p_g^{X^{MR}}$. However, if $p_g^{X^{MR}}$ is less than the local market price $p_g^{d^{MR}}$, then all the good-quality shrimp will be sold locally. This scenario, depicted in the middle and right diagrams of Panel (c), corresponds to the information received during our field trip.

Our interviews with intermediate traders revealed that the local market for good-quality shrimp expanded since the ban, with increased sales to neighboring countries (Nigeria, Togo, Gabon and Ghana). This expansion led to a price increase in the local markets, such that $p_g^{d^{MR}} > p_g^{x^{MR}}$ (see the middle diagram). However, the traders also noted that this increase could not compensate for their loss of the European export market; partly because of the high transaction costs in the forms of border taxes and the poor transport infrastructure to the local markets. They also complained about price fluctuations in the local markets and the lack of timely payment (for the latter point, see also Allegre and Dupret, 2010).

In sum: increased costs and evolving competition in the local (and international) market in the aftermath of the ban, led to a reduction of the profitability of exporting firms, and therefore to a failure to restart export activities.

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