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Water and the WTO: Don't kill the messenger

水与 WTO：请勿扼杀信使

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Abstract:

It is widely recognized that forecasting future climate shocks at a regional level—which regions will be flooded, which ones will be under water stress on a year by year basis—is largely out of reach. In such circumstances, trade gets back a role that has faded away during the last sixty years of relatively stable climatic, economic and political conditions. It is to be the ultimate insurer. Regions under sudden water stress will need to import food products in exceptional quantities, and trade happens to be a cheap (efficient) insurance scheme to face a sudden instability in water resources in some parts of the world.

There are thus good reasons to look at whether the world trade regime could provide a strong and sound framework to the international water regime. Not many papers have looked at this issue. They generally see the WTO as a source of problems rather than of solutions. Hence, they argue for specific international agreements on water. But, the climate community experience of the COP15 (the 2009 Copenhagen Summit on Climate Change) is a strong warning signal showing how difficult it is to build a "specific" international regime.

In contrast, this paper argues that the basic principles on which the world trade regime is built would be equally useful for the international water regime, and that the WTO rules are flexible enough to address the specific problems raised by water management in an international context. It also argues that, if current international trade mirrors domestic distortions, limiting such trade will cost a lot in terms of water use. Killing the messenger (trade) does not solve the problems (domestic markets).

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Messerlin is the author of many books, most recently Measuring the Costs of Protection in Europe: European Commercial Policy in the 2000s (Peterson Institute for International Economics 2001) and Europe after the No Votes (Institute of Economic Affairs 2006). He has also written more than a hundred of articles for professional journals.

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Introduction

There are many similarities between the trade and water nexus and the trade and climate nexus. This is because the trade, water and climate communities face the common problem of free riding associated to a "public good". Free riding is well recognized in the case of water (and climate) even if water should not be treated as a pure public good (defined by non-rivalry and non-exclusion) but only as a local and common pool resource (Perry et al., 1997). Water resources become rivalrous only once the level of water exhaustion is reached (then their consumption by one individual reduces their availability for consumption by others). And, they are often non-excludable because of the failure to implement efficient property rights, such as those illustrated by the centuries-old system of "bisses" in Valais (a Swiss region). That said, today water production and consumption are subject to free-riding largely because domestic water policies are non-existing or embryonic: pricing mechanisms are not developed, externalities (water over-use, excessive use of pesticides and fertilizers, etc.) are not taken into account, etc.

In sharp contrast, the fact that freer trade is also largely subject to free-riding is often ignored today. However, the free-riding instinct re-emerges each time when, despite robust economic analysis and history, countries believe that they would be better off if they impose tariffs on their imports while getting free access to the markets of the rest of the world. If few today realize that freer trade is a public good, it is because the existing world trade regime has been very successful in inducing countries to limit their strong free-riding instincts in trade matters. Benefits from freer trade are bigger and faster to emerge because many countries move together within a well-designed world trade regime based on GATT/WTO principles and rules (in this paper, "rules" are meant subordinate to principles).

There is another deep connection between trade, water and climate. It is widely recognized that forecasting future climate shocks at a regional level—which regions will be flooded, which ones will be under water stress on a year by year basis—is largely out of reach. In such circumstances, trade gets back a role that has faded away during the last sixty years of relatively stable climatic, economic and political conditions. It is to be the ultimate insurer. Regions under sudden water stress will need to import food products in exceptional quantities, and trade happens to be a cheap (efficient) insurance scheme to face a sudden instability in water resources in some parts of the world.

There are thus good reasons to look at whether the world trade regime could provide a strong and sound framework to the international water regime. Not many papers have looked at this issue (Yang and Zehnder 2007, Hoekstra 2010). They generally see the WTO as a source of problems rather than of solutions. Hence, they argue for specific international agreements on water. But, the climate community experience of the COP15 (the 2009 Copenhagen Summit on Climate Change) is a strong warning signal showing how difficult it is to build a "specific" international

regime.

In contrast, this paper argues that the basic principles on which the world trade regime is built would be equally useful for the international water regime, and that the WTO rules are flexible enough to address the specific problems raised by water management in an international context. It also argues that, if current international trade mirrors domestic distortions, limiting such trade will cost a lot in terms of water use. Killing the messenger (trade) does not solve the problems (domestic markets).

The paper is organized as follows. Section 2 provides a broad insight on how trade analysis shows the beneficial aspect of a more integrated international trade in water and how trade and water issues can be mutually supportive. Section 3 raises two questions. Do we need a specific international agreement for "trading water" (the various forms of such a trade are explained in section 3)? Do we need specific international agreements for producing water in sustainable quantity and quality? The paper argues that the answer to the first question is no. The World Trade Organization (WTO) rules are both sound and flexible enough to address the key issues raised by water trade. The second question has a more complex answer. The paper suggests that some WTO rules may need to be revisited, but that such revisions are unlikely to create serious problems if they are carefully handled from a water and trade perspective.

1. Water and trade economics

Before looking at water economics in an international trade setting, two crucial remarks should be made. First, trade is the mere difference between domestic consumption and production. Import is the excess of domestic consumption over domestic production, export the converse. If domestic production and/or consumption are distorted, trade is distorted. For instance, if producers in the exporting and importing countries do not take into account negative externalities (pollution), the exporting country could export too much water-intensive goods and the importing country could import not enough such goods.

The fact that trade is a mere difference has a key corollary. It is that taking measures for restricting or increasing water trade is not the adequate solution to address production and consumption externalities since it does not address the initial problems raised by imperfect domestic water markets (production and/or consumption). These problems could be satisfactorily solved only by measures targeting domestic markets—better pricing mechanisms, more appropriate subsidies and/or taxes favouring investment and delivering productivity gains.

That said, if acting on international trade is not the solution, the rules of the world trade regime, if well interpreted, have the capacity to be conducive of improved domestic market disciplines, as underscored in section 3. This has already happened. The last sixty years have witnessed increased market access (trade liberalization) in industrial products as a force pushing for reducing distortions in domestic markets in

order to reap all the benefits from trade opening.

The second crucial preliminary remark is that, contrary to the politicians' and people's views, economists underscore the fact that imports capture the gains from trade, whereas exports mirror the costs of trade. Countries export only because they have to pay for imports. Exporting too much is as bad as importing too little. This is particularly obvious in the water sector where trade does not only generate movements of goods, but also entails exchanges of the quantity of water "embedded" in commodities—hence the concept of "virtual" water (the amount of water required to produce a good is "virtually" exchanged among countries through trade flows). In short, a country saves its scarce water resources by relying on imports, while it increases its water use by exporting water-intensive goods.

1.1 Comparative advantages

Middle East's virtual water imports in the form of grains are equivalent to the flow of the river Nile in a year (Allan 2003). Explaining such trade flows requires nothing more than a direct application of comparative advantages theories (Wichelns 2010). The virtual water notion is thus a relatively new concept based on well-established ideas in international economics.

The theory of comparative advantages splits into two main tenants: the Ricardian theory and the Heckscher-Ohlin theory (hereafter HO). Both analyses show that by specializing in productions for which they enjoy a relative advantage, countries opening to trade breed a process that drives to a globally and economically more efficient use of resources than in autarky. These theories of comparative advantages tell us that all countries have an interest to trade, even if they have only a relative advantage in the production of some goods. That a country may produce all the goods more costly than its trading partner does not prevent it to have a relative (comparative) advantage in the goods it produces in a relatively less costly way than its trading partner.

The Ricardian approach perceives comparative advantages as arising from technology-driven differences in factor productivities among countries. Indeed, Ricardo used "climate differences" to express the relative productivities of two trading partners to engage into trade. The opportunity cost of using water as an input (compared across countries) is what drives Ricardian comparative advantages (for more, see below Table 1).

By contrast, the HO approach perceives countries' comparative advantage as determined by the relative abundance in production factors (capital, labour and natural resources, such as water) among countries. Shifting to HO offers an interesting perspective. International trade in goods is rooted in exchanges of factor services through which a country can "enlarge" its scarce and relatively unavailable resources. In this sense, the concept illustrates how trade in goods can be a substitute to factors' (such as water) immobility among distant countries and that trade is mutually

beneficial. So, trade may have an alleviating impact on water stress nationally, regionally, and globally if a trade policy allows for the full beneficial effect of these forces. In this context, trade can entail positive externalities by contributing to favour efficient water uses globally.

Table 1 illustrates the two approaches. It displays labour force (active population), land and water endowments as well as factor intensities for 2000 in ten countries. Compared to the situation in France, China benefits from large endowments in labour, water and land (columns 1, 2 and 3). Yet, in terms of water endowments, China is relatively more abundant in labour and less abundant in land than France (column 4 and 5). In Column (6), relative water requirements of countries are reported with respect to France. This means that a country with a ratio above unity is less efficient in producing wheat than France. For instance Canada with a high water endowment and being more water intensive than France (Canada's amount of water per worker is higher) has nonetheless lower water productivity in wheat than France. The sample used here is too narrow to draw general conclusions. It however conveys the idea that a country may well be Heckscher-Ohlinian with one country and Ricardian with another. This pledges for considering both sources of comparative advantages. It is crucial to see also that both types of comparative advantage need to be implemented if one wants to correctly capture the virtual water issue.

Table 1: Water, land and labor endowments and factors intensities (2000)

				Heckscher-Ohlin approach		Ricardian approach
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	Renewable water [a]	Uncategorized labour [b]	Arable land [b]	Water per workers	Water per Ha of arable land	Wheat productivity relative to France [c]
Brazil	8,233	77	58	106	142	1.8
Canada	2,902	16	46	183	63	1.7
China	2,830	737	133	3.8	21	0.7
Egypt	87	19	3	5	29	2
France	204	26	18	8	11	1
India	1,908	402	163	5	12	1.9
Israel	2	2	0.3	1	7	3.7
Japan	430	68	4	6	108	0.8
Mexico	457	34	25	13	18	1.2
United States	2,071	141	175	15	12	0.9

Notes: [a] International Labor Organization of the United Nations. [b] Food and Agriculture organization of the United Nations. [c] Ratio of each country water requirement for wheat production to the one of France. If the ratio is above one then the country has a lower productivity than France (and vice versa).

1.2 From trade theories to water realities

Literature has provided evidence that virtual water flows of a country is not necessarily related to the abundance and/or scarcity of renewable freshwater (Yang and Zhender 2007). Yet, one must distinguish between the water content of trade e.g. (virtual water) and trade itself. This distinction means that even if virtual water is not related to abundance in water, water availability may still play a role in shaping trade flows. And, the HO model refers to predictions concerning trade in goods and not to implicit trade in the factor services embodied in those goods (e.g. virtual water). It is thus incorrect to mobilize the HO theorem and to conclude on its poor performance when one investigates the relationship between virtual water flows and water endowments (Kumar and Singh, 2005; Verma et al. 2007). In this theoretical context we need to look at trade flows only.

Does the HO model perform well in this context? An extensive test of the HO model provides evidence that international trade is well explained by the relative uneven distribution of production factors including water resources (Le Vernoy, 2010a). In other words, trade in agricultural products is effectively shaped by the relative abundance and/or scarcity of water. And, this is sufficient to conclude that the virtual water concept is a useful tool to connect the trade and water nexus.

That said, there are very good reasons to look at the HO model as an imperfect model to capture perfectly the water situation. These imperfections are examined by increasing order of importance.

First, while water is still largely immobile among distant countries the question of contiguous nations sharing common resources should be integrated. Further research could relax the assumption of perfect immobility by acknowledging the strategic importance of the existence of upstream/downstream relationship between any two trading partners (Ambec and Ehlers 2007). Second, other determinants may be at work, such as geographical and institutional characteristics of each trading partners and distortive trade policies. Geography and climate play a major role (the issue of distortive trade policy instruments is discussed in the next section). Last but not least, the pricing mechanism in the water sector is highly distorted. Many countries do not charge a price for water, especially for by far the largest water users—farmers. Water is not priced at all in some countries, pushing the water sector into a "tragedy of the commons". Failures to ensure accurate property rights of the resource should be managed through adequate price mechanisms and regulations. An even more widespread reason is the question of subsidies. Many countries subsidized water provision to a point that the signal of scarcity is totally distorted (Boulanger, 2007).

2. Are WTO disciplines appropriate to water trade?

At the onset of this section, it is important to ask the following question. What would be the cost of rejecting the WTO-based approach that today rules virtual water? Such a refusal would open the possibility of banning imports and/or exports any time.

Estimates suggest that current virtual water trade allows saving, on average, 22 percent of the world water [Chapagain et al. 2006]. This figure represents a rough estimate of the minimal opportunity cost of rejecting a WTO-based approach. And this is despite the fact that the current trade regime is not fully developed in order to address water issues and that it operates under very distortive domestic water policies (no pricing mechanism and recognition of externalities).

	Applied tariffs (%)			Bound tariffs (%)		
	Developed countries	Developing countries and LDCs	All countries	Developed countries	Developing countries and LDCs	All countries
Fishery	2.2	15.1	14.2	2.5	34.2	31.4
Forestry	0.6	6.5	6.1	1.2	28.9	26.5
Fuels	0.5	6.2	5.8	1.5	27.5	25.3
Mining	0.8	6	5.7	1.6	30.9	28.6
All merchandise imports	5.4	10.7	10.3	[c]	[c]	[c]
Virtual water: animal [a]	2.8	10.5	6.7	22.3	58.1	40.2
water requirements [b]	6726	10066	8396	6726	10066	8396
Virtual water: crops [a]	5.6	13.8	9.7	28.6	58.9	43.8
water requirements [b]	3319	5753	4536	3319	5753	4536

Source, WTO Report 2010, pp. 114-115, WITS. [a] Virtual water associated to animals and crops. [b] Average water requirements (cubic meter per ton). [c] non available in the WTO Table 8, p.115.

Table 2. Implicit tariff rates on virtual water, 2007

In this context, examining the use of the WTO disciplines in the water sector raises three questions. Is water a tradable good? Are the two key WTO principles (national treatment and most-favored nation) appropriate pilars for a water trade regime? Do the other WTO rules accompanying the WTO principles (again, in the paper context, "rules" are subordinate to principles) offer the flexibility that may be needed by the specifics of water trade?

2.1 Is water a tradable good?

This question has received a positive answer from an economic perspective in section 1. What follows deals with the international law-related aspects of the issue. In other words, can water be seen as a tradable good in the WTO legal context? A first answer can be found in the tariff classification (the so-called "Harmonized System", or HS) which describes the whole universe of products and is used by every Customs in the world. In this context, it is useful to make a basic distinction between freshwater and waters having a saleable form (for instance, bottled waters). This latter form is clearly within the WTO scope since there are tariff lines for saleable waters (see Table 3 under the HS 2201-10 code).

Table 3. Water in the Harmonized System of classification of goods

Headings/Subheading	Article Description
22	Beverages, spirits and vinegar
2201	Unsweetened beverage waters, ice and snow
2201-10	Mineral and aerated waters not sweetened or flavoured
2201-90	Ice, snow and potable water not sweetened or flavoured
Source: UN Comtrade commodities list description. http://comtrade.un.org/ Note : Chapter 22 does not cover: (i) products of this chapter (other than those of heading 2209) prepared for culinary purposes and thereby rendered unsuitable for consumption as beverages (generally heading 2103); (ii) sea water (heading 2501); (iii) distilled or conductivity water or water of similar purity (heading 2853).	

More challenging—but much more crucial from an environmental and efficient perspective if only because of its sheer size—is the freshwater case. Freshwater could be divided into two components: bulk water traded via pipeline or ships, and "virtual" water traded as input of other products, mostly farm products.

To our knowledge, there is no exhaustive review of how bulk water is treated. There are cases of export bans (Canadian water in the NAFTA context). But, there are also cases of trade in bulk water (intra-EU trade cases or projects) and it would be interesting to know how EC Customs have treated such bulk water. However, trade in bulk water is costly with the current technologies so that it will represent only a small problem for a long time to come. Finally, the treaties on water sharing among countries having access to a large common river (Danube, Nile, etc.) amount mostly to quota systems designed in terms of production ("water use") not of trade stricto sensu (less than a third of international water treaties deal with financial or economic payments among countries (Dinar, 2008)).

The core of the water trade problem is thus the treatment of "virtual" water trade. For some commentators (WTO 2010), such a trade is still potentially covered by WTO principles and rules since the HS 2201-90 code includes ice and snow, two forms of freshwater that human beings do not drink except in extreme cases (see Table 2). For other commentators, the general heading under which waters are included (the HS 22 code) is beverages, meaning that waters under the WTO disciplines should be limited to the forms of water fit for consumption. This argument is not fully convincing because it relies on consumption defined as household consumption. But, today international trade flows are dominated by trade in intermediate goods, that is, goods "consumed" by firms for producing other goods. Virtual water fits perfectly this dimension.

2.2 Building a framework for the world water regime

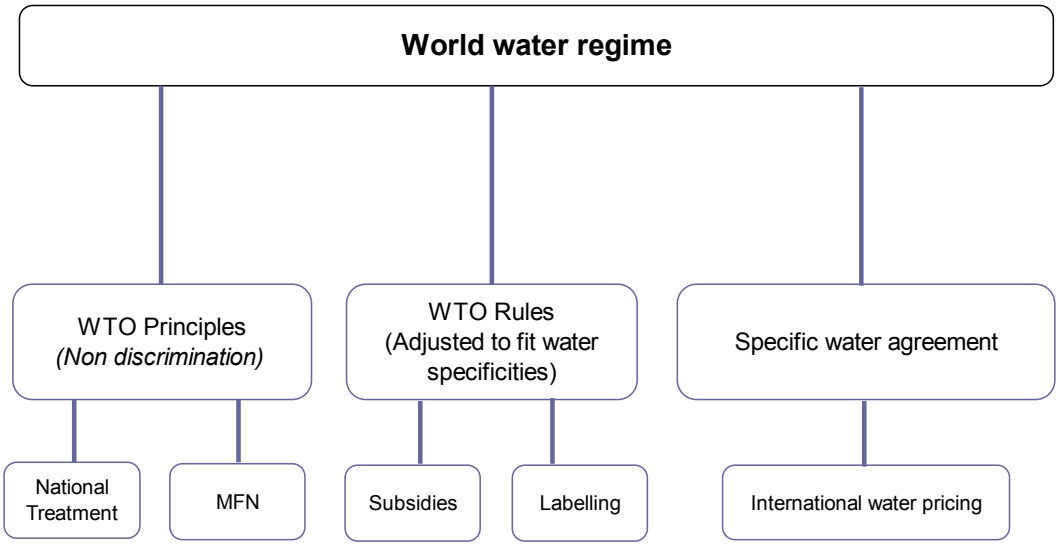
Such a context raises two questions. Which would be the principles and rules of the world trade regime that the world water regime should borrow because it will benefit from them? Which are the specific rules that the world water regime should establish? These questions suggest that the world water regime could rely on three main pillars illustrated in Figure 1:

- the WTO principles of non-discrimination (national treatment and most-favoured nation (MFN) which do not need to be adjusted in order to fit the needs of the world water regime;

- a series of WTO rules which should be adjusted in order to fit the needs of the world water management;

- and a specific water agreement which would answer questions specific to the water issue with no real equivalent in the trade regime.

Figure1. Organizing the world water regime



The following sections examine in more detail these three pillars.

2.3 The two fundamental WTO principles

There are two fundamental WTO principles—"national treatment" (NT) and "most-favoured nation" (MFN)—which, combined, define the "non-discriminatory" approach which is the basis of the modern world trade regime run under the GATT/WTO aegis.

The MFN principle (GA Article I) requires that a country imposes the same tariff on the imports of a given good independently from the country of origin. The General

Agreement on Trade and Tariffs is both a text (hereafter GA) and an institution (the GATT Secretariat, hereafter the GATT). The WTO is the heir of both the GA and the GATT. This principle is already de facto applied on virtual water since most tariffs imposed on farm products are MFN. There is an exception to the MFN principle, namely the possibility to conclude "free trade agreements" of various kinds under GA Article XXIV. Water trade benefits such preferential duties (often zero) to the extent that FTAs cover farm trade—but most FTAs do not cover farm trade. As MFN virtual water tariffs tend to be high (see Table 2), the zero-tariff FTAs are likely to generate large distortions in the virtual water trade flows—reducing the trade flows from countries outside the FTAs (for instance, non-EC countries) and increasing the trade flows from inside the FTAs (for instance, among EC Member States) independently from the water resources available inside and outside the FTA under scrutiny. This feature illustrates the importance of the benefits from the MFN principle in the water case.

The NT principle (GA Article III) requires that a country should impose the same domestic tax(es) on the goods imported and on the "like-products" produced domestically. In other words, NT intends to create a level playing field between foreign and domestic products in domestic tax matters. It is necessary to avoid that a progressive liberalization via tariff cuts would be eroded by increases of domestic taxes on foreign products alone. In the current trade regime, virtual water is covered by NT since the products in which water is included are covered.

These two non-discrimination principles often generate negative reactions because they seem to limit considerably the sovereignty of a country. This is particularly the case when precious natural resources, like water, are at stake. This impression flows from two totally different, but convergent, perspectives that are worth examining briefly.

First, the water community focuses on the (economically attractive) idea of a "world price" for water (as the climate community looks often to a world price for CO2). An unique world price of water would prevail when all the marginal costs of using water in the vast world would be equalized. Of course, this situation would probably never be reached for a couple of reasons. First is that water prices should reflect the different water qualities available in the world (as there are different quality-adjusted oil prices). Second, an unique quality-adjusted world price of water would require strict conditions to be met, such an instantaneous and pefect information on all the water markets in the world as well as instantaneous and perfect interconnections of all the water markets in the world. However, a "world price" for water is a concept useful to keep in mind in order to remember that the various world prices in the world will interact and, to some extent, may converge—in particular under the influence of trade in water. However, this purely economic approach relies on the political illusion (today) that the world is an unified entity. The COP15 has clearly revealed how much the real word is a multilateral forum where each country is unapologetic to defend its own interests at the expense of the other

countries. This does not mean that, in a distant future, there will not be one world price for water. But, it will be the result of a long process of building interconnected markets. Indeed, there is a clear parallel between the long road ensuring a progressive convergence of domestic water prices to a world water (positive) price and the long road ensuring a progressive convergence of national tariff cuts to worldwide zero tariffs.

Since its origin, the WTO has evolved in a multilateral world, where the MFN/NT principles aim at helping all the countries to converge to the economically attractive one world (meaning no trade barriers at all in the very long run) while leaving some room for the countries' strongest interests via flexible rules (described briefly below).

Second, the GATT/WTO history conveys a very realistic view of the limits of the national governments. Trade policies are the endless tale of governments captured by vested domestic interests. They show the limits of the "internal" sovereignty of governments—their inability to balance the various domestic interests in a fair way and their propensity to favour the most aggressive (even if they are very small in numbers of people) lobbies. It happens that the water sector is at the crossroads of two extremely powerful lobbies—water firms and, above all, farmers. Import-competing farmers will try to reduce virtual trade below its optimal level (i.e., a level based on sound economic concerns) while exporting farmers will try to inflate virtual trade above its optimal level. The extent to which the MFN/NT principles are an obstacle to the risks of water policies being captured by domestic vested interests makes them crucial for the water community as well as for the trade community.

2.4 Flexibility of the WTO rules

That the WTO principles offer a robust framework for an international water regime does not mean that the current WTO rules (i.e., disciplines subordinate to the non-discrimination principles) are flexible and sufficient enough to address all the specific issues raised by the water sector. Three main issues deserve attention.

2.5 Non-discrimination, "like" product and water labelling

The first question is about water "quality". Not depleting the current stock of water does not necessarily mean that water quality is kept intact or improved. It is well known that, if the agricultural policies of the rich countries have not—so far—seriously reduced global water availability, they have often been dramatically detrimental to water quality due to excessive use of fertilizers, negative externalities caused by "industrial" cowsheds or pigsties, etc.

In the WTO usual approach, non-discrimination makes sense when applied to "like-products", with "likeness" being defined by the tariff line describing a product. In short, two products pertaining to the same tariff line are assumed similar.

This crude but pragmatic approach ignores the key question of the process and production methods (PPMs) that is crucial for the water community. Is a product having used clean water similar to a good having used polluted water? In more general terms, should not one pay attention to the "water footprint" of farm products? These questions are legitimate, especially when water use is reaching the sustainability threshold in many regions in the world. The debate in the water case has not exactly the same intensity than in the climate case. Winds make "clean" air easily a worldwide public good. As stressed in the introduction, clean water is a more local good—hence much more amenable to national appropriate measures.

Defining products as different if they have different water contents/qualities (because of different production processes) is a prospect that makes the trade community very nervous for the following, very basic, reason: the sheer complexity generated by adding the dimension of production processes. Today, there are roughly 10,000 different tariff lines defining "products" in a typical tariff schedule. Taking into account the various water production processes capable to obtain each of these products would require to define tariff lines in terms of "products times production processes". Such a challenge is not new in the world trade regime. "Rules of origin" which determine the country of origin of a product are creating a similar problem. But, precisely, the trade community is aware about the costs of such a complexity. For instance, the existing rules of origin in the NAFTA context are estimated to be equivalent to a price increase of 12 percent [Cadot et al. 2005].

The water issue has the capacity to generate such problems to an extent unknown

before. Pushed to its extreme, it could easily negate the notion of similar products that is so essential in a world economy witnessing an endless expansion of varieties of products in order to better satisfy consumers. The climate literature revealing the full extent of the problems of implementing climate change policies in an international context is relatively recent [Brenton, Edward-Jones and Jensen 2009, Jensen 2010, Moore 2010]. It shows that an unrestrained PPM logic would require a gigantic database generating astronomical transaction costs (assuming that the needed data would exist). Such costs would be compounded by the huge risks of corruption that are inevitably associated to complexity in an international context. They would also divert attention from the main sources for saving water—appropriate production and consumption habits. Finally, such risks and costs would be (much) higher for the emerging and developing countries, whereas those countries should be induced—not inhibited—to participate to a world water regime.

As in the climate case, there is thus a strong need to strike a delicate balance between exhaustiveness and similarity [Messerlin 2010] if one does not want to loose the savings (gains) brought by international trade of virtual water. This balance is a question largely in the hands of the water community. It is in the interest of the water community both to ensure water quality and to favor the best use of the existing water resources by allowing freer trade among undistorted domestic water markets.

A water label has been proposed for handling this issue. Such a solution would respect the balance between exhaustiveness and similarity if it is limited to the few highly water-intensive commodities, such as rice, cotton, paper or cane sugar, as already suggested [Hoekstra 2010]. A water label is compatible with the WTO principles of non-discrimination as long as it is defined on a scientific basis, a condition likely to be met if the label is defined by an international agreement on water-labelling—the equivalent of the Codex Alimentarius for food products. Of course, WTO-compatibility does not mean that water labelling would be easy to do, hence would be desirable (Hoff et al. 2010). It simply states that such a road, if found desirable, is possible within WTO-compatible rules.

As it is allowed by the WTO Agreement on Sanitary and Phytosanitary Measures, a country could adopt a stricter definition of water quality as long as such a definition would be based on clear scientific justifications—a condition the main goal of which is to ensure that the country avoids to create "unnecessary" obstacles to water trade.

2.6 Water footprint and international water pricing control

It is argued that the limited availability of freshwater in the world implies a ceiling for human kind's water footprint. This situation has been understood as requiring that the global water stock should be "fairly" shared among countries by creating an international water-footprint permit system (that is, by issuing permits per country) (Hoekstra 2010).

The WTO legal framework per se has little to say on such a scheme. But, the

experience of the trade community suggests that such a proposal faces two problems. First is political. It is hard to imagine that water-rich countries would surrender their sovereignty on their existing domestic stocks of water. As underscored above, such a proposal relies on the view that we live in an unified world—not in a multilateral one. The second problem is the allocation process of water permits. The half century-long experience of the trade community is that quotas (permits) are the most difficult instrument to handle for allocating scarcity in an international environment, and that, as a result, they often end up as a unfair and perverse tool. Unfair because they tend to favor the most powerful countries at the time of their creation. Perverse because they create rents that give to their initial beneficiaries a massive leverage (power and money) for keeping unchanged the initial scheme while the world is changing.

Much more attractive would be efficient systems of water-pricing at the local and national level, converging progressively to a world price of water (adjusted for water quality as said above). The water community underscores that there is a huge opposition to "pay for water" [Catley-Carlson 2010]. However, this opposition at large seems declining in developed countries, and focusing on the question of whether the existing pricing system is well conceived and/or implemented (rather than on the principle to pay). However, unsurprisingly, there is one strong core exception to this evolution: the farmers who are the main users of water.

An international water pricing agreement would not be inconsistent with the WTO if it does not create discrimination among countries—and there is no reason that it does want to do so. Such an agreement may be hard to negotiate when many countries have no domestic pricing mechanism and when there is a strong opposition by farmers. One way to accelerate the creation of domestic pricing schemes would be to rely on international institutions that will be increasingly involved in the water issue. The World Bank and key regional banks (African Development Bank, Asian Development Bank, etc.) could lay down more systematically the basic components or guidelines for creating and managing domestic markets in water. Such a non-governmental initiative could then serve as a basis for an international pricing agreement that countries would join when they start to run their water markets in an efficient way.

2.7 Subsidies, taxes and domestic regulations

Water is a too multi-faceted product to believe that the introduction of pricing and markets would address all these facets. Subsidies, taxes and domestic regulations are likely to be part of a satisfactory solution to domestic efficient water regimes.

There are "bad" and "good" subsidies. Today, bad subsidies may prevail in the water sector. Too often, farmers benefit from subsidies inducing them to over-use water, to create subsidy-based droughts or water-stress, and to destroy alternative

activities (for instance, water subsidies in the French region of Poitou-Charente have hardly hit oyster-producing and fishing activities associated to local rivers) (Boulanger 2007).

The WTO strict disciplines on subsidies having an impact on trade are thus useful in the sense that they constitute an obstacle to such bad subsidies. That said, such disciplines are far to be perfect. First, they do not cover subsidies wasting water, but having no impact on trade flows. Secondly, requirements for the subsidizing country to eliminate its subsidies are missing. Rather, they open the possibility for importing countries to impose "anti-subsidy" tariffs on the subsidized products from trading partners. Such measures tend to be imposed mostly by countries having import-competing activities (for instance, in farm products) with two negative consequences: such measures are imposed because the import-competing farmers are not efficient (with respect to saving water), and they leave a lot of export markets to the products using subsidized water. A parallel could be made between freshwater and pre-harvested trees. Both are potential inputs to farm goods (water) and wood products (trees). There is an ongoing saga of trade conflicts about trees between the U.S. and Canada, with the U.S. imposing anti-subsidy measures on Canadian lumber on the basis that Canadian laws on forests grant implicit subsidies to Canadian producers of softwood products. In the first case, trade and water use are both hurt—hence the trade and water communities have common interests to improve the disciplines. In the second case, trade is not hurt, but the water community has clear interests in improving the rules (and the trade community has nothing to object).

"Good" subsidies in water may be crucial in the coming years to the extent that the sustainability threshold in water use is close to be reached in many places. Such a situation is likely to require public investments and regulations inducing public institutions and private firms to invest enough in water "production" and conservation. In other words, there is a need to make sure that such subsidies and regulations would be immune to the current WTO rules ("non-actionable" in the WTO legal jargon). Such exceptions existed (for instance, in the case of research and development) or are still existing (in the agricultural sector for developing countries). But, there is a need to review carefully all these exceptions and to craft the new rules in the best interest of worldwide water management.

A last instrument deserves a quick comment. The WTO rules ban export quantitative restrictions, but allow generally export taxes (an awkward situation). The ban of export quotas makes sense from a water perspective to the extent that such quotas are implicit subsidies to the domestic consumers of water—hence running the risks of wasting water (a departure from the world water price). Allowing export taxes introduces distortions in the world economy which were very visible during the 2007-2008 food crises, caused in part by some exporting countries' ban of exports (Argentina, Vietnam, among others). Exporting countries of farm products were using export taxes to raise the world farm and food prices with adverse effects on the importing countries, but also ultimately on their exporters. Here again, better WTO

rules are needed.

3. Concluding remarks

The paper argues that the two WTO principles of "non-discrimination" are necessary for a economically sound water trade. But they are not sufficient. Other international disciplines will be needed—on labelling, subsidies, taxes and regulations. In this respect, the existing WTO rules are roughly what is needed. But they require to be improved in order to better contribute to a more efficient water management from the world point of view. Improving these WTO rules would allow more open virtual water markets, and increase the pressures for improving the functioning of domestic markets, too much distorted today by the absence of domestic pricing mechanisms or by unsound economic policies.

The flexibility of the WTO rules seems wide enough not to bother too much with the GA Article XX on "General Exceptions". Some of these GA Article XX exceptions could easily fit water issues: for instance, paragraph (g) on conservation of exhaustible resources or paragraph (b) for protecting health. The key conditions for using GA Article XX (not constituting an arbitrary or unjustifiable discrimination between countries and a disguised restriction on international trade) are consistent with the desire to create progressively a worldwide water pricing regime. But the GA Article XX stops short of suggesting adequate measures for really solving the problems. For instance, the true way to conserve exhaustible resources is to make adequate investments, hence the need of appropriate rules on subsidies and domestic regulations. The better these rules will be, the lower the need for using the GA Article XX will be.

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