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The Role of Financial Instruments in Solving the Global Climate Crisis

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Abstract

Despite the accumulation of scientific evidence for an anthropogenic role in global warming, the response in terms of international action remains rather disappointing. The Kyoto Protocol failed to create an international coalition in favour of a carbon price in relation to its social cost and served to illustrate the intrinsic instability of any international effort which does not take the "free-rider" problem seriously. Any international agreement must meet three criteria: economic efficiency, incentives to meet commitments and equity. Efficiency is only possible if all countries apply the same carbon price. An incentive may entail offering some flexibility regarding "free riding." Equity, a concept whose definition differs depending on the stakeholders involved, can be achieved through flat-rate transfers. The strategy of a voluntary reduction of carbon emissions, such as that adopted by key countries, is a further example of choosing to postpone clear commitment, while, in the meantime, paying insufficient attention to the financial instruments available.

Keywords: global climate crisis; free-rider problem; financial instruments; risk management.

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Роль финансовых инструментов в решении глобального климатического кризиса

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Аннотация
Несмотря на накопление научных данных об антропогенной роли в глобальном потеплении, реакция в плане международных действий остается довольно разочаровывающей. Киотский протокол не смог скоординировать международные усилия, направленные на снижение социальных издержек в связи с ограничениями по выбросам углекислого газа и продемонстрировал внутреннюю нестабильность любых международных усилий, которые не воспринимают всерьез проблему «свободного гонщика». Любое международное соглашение должно отвечать трем критериям: экономическая эффективность, стимулы для выполнения обязательств и справедливость. Эффективность возможна только в том случае, если все страны применяют одинаковую цену на углерод. Поощрение может повлечь за собой некоторую гибкость в отношении «бесплатной езды». Справедливость — концепция, определение которой различается в зависимости от заинтересованных сторон, может быть достигнута за счет переноса фиксированных ставок. Стратегия добровольного сокращения выбросов углерода, как, например, стратегия, принятая ключевыми странами, является еще одним примером решения отложить принятие четких обязательств, в то же время уделяя недостаточное внимание имеющимся финансовым инструментам.

Ключевые слова: глобальный климатический кризис; проблема «свободного гонщика»; финансовые инструменты; управление рисками.

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Introduction

Climatologists have found that we now have a low-carbon budget, in other words the expenditure of greenhouse gas (GHG) emissions permissible before the maximum threshold is reached of a global increase of 1.5 or 2 degrees Celsius. In this the consensus of climate scientists must be relied on. The challenge for the economist is then to describe the policies that will, at a reasonable cost, prevent this threshold from being crossed. For this to be done, it is necessary to model the behavior of actors producing GHG: businesses, administrations and households. To make a preliminary analysis it is hypothesized that these actors will make the following rational choice: they will pollute if the cost of avoiding the pollution remains higher than the amount levied on the pollution by the public authorities. In short, they will act in their own best material interests as homo economicus.

The next step in modeling behavior is the normative analysis of regulation, by means of which economists consider how the result envisaged by the public authorities might best be achieved. Again, a simple assumption can help in the initial approach to the problem, namely the imperative is for the cost of the policy followed in achieving the given environmental objective to be limited, not only because an expensive policy will strain the purchasing power of consumers and restrict the competitiveness of businesses and employment, but also because it will otherwise goad the lobbies opposed to sustainable environmental policies and increase their powers of persuasion. If the regulator knows the characteristics of each company, it could adopt an "administrative approach" and simply impose measures to avoid pollution whenever the cost of doing so is below a given level. The level would be calibrated so that, if the limits are accepted, it will enable temperature increases to remain below the global threshold. If, however, as is more likely, he does not have this information, analysis shows that it is preferable for the company to be entrusted by the state with the decision-making, so that it becomes responsible when it pollutes, for either paying a carbon tax, or by acquiring tradable emission rights.

This analysis, which dates back to the work of the famous English economist Arthur Cecil Pigou[1] leads, therefore, to simple economic policy recommendations which have greatly contributed to the success of environmental policies over the past century. The actors do not always behave exactly as expected. They often lack the information needed to allow them to make a wise economic choice (for example, the price that a polluting enterprise will be required to pay for carbon emissions in twenty years). Indeed, their behavior may not be dictated exactly by the desire to maximize their material benefits. They may have true environmental awareness or, at least, wish to embellish their image in the eyes of their neighbors or colleagues. A company may thus take its environmental responsibilities seriously.

1. The institutions of the financial approach

A further step in the analytical process is therefore to incorporate into it the incomplete information of economic agents and their pro-social behavior. Many other aspects of the problem then become relevant, such as the credibility of state commitments, uncertainties surrounding the science on climate, innovation, international negotiations and geopolitics. The analysis then must be designed to test different hypotheses. For example, the recommendation to use "economic instruments," such as carbon tax and tradable emission rights, rather than a case-by-case administrative approach assumes that the regulator lacks information. However, a case-by-case approach could lead to a less than honest regulator granting rights to personal friends or to powerful pressure groups. If a hypothesis seems justified on the grounds of anecdotal observation, it is only a hypothesis. It can then either be studied directly or validated indirectly by examining the consequences. Economists have conducted empirical studies showing that the use of an administrative approach could, depending on the type of pollutant, increase the cost of environmental policy from 50% to 200%, thus confirming the effect on the best pollution reduction solutions of the intuitive hypothesis concerning the incomplete information of the regulator.

The drive for interventionist approaches is a result of the desire of governments to score political points by appearing involved in the fight against global warming. Sporadic actions may be expensive, but the cost is partially concealed by share prices or in the cost of goods

[1] A.C. Pigou. *The Economics of Welfare*. Macmillan, London, 1934, p. 25.

and services. In political terms the cost is then less than that of a carbon tax, grants being always more popular than taxation, even if the taxpayer ultimately has to foot the bill. The literature supplies empirical evidence that interventionist policies significantly increase the cost of environmental policies, while experience shows that a single price system usually decreases the cost of depollution by half or more in comparison with administrative approaches, also reducing the tendency towards discrimination between sectors or actors[2].

Western countries have made some attempts to reduce GHG emissions, in particular by directly subsidizing green technologies. These include feed-in tariffs by the electricity grid to favor of solar and wind power, bonus-malus systems in favor of low car emissions, and subsidies to the biofuel industry. For each program implemented, we can estimate an implicit price for carbon: the social cost of the program per ton of CO_2 saved. In the electricity sector, OECD estimates range from $0 (or even less[3]) to $800. In the area of road transport, the implicit price of carbon can reach €1,000, particularly for biofuels.

The great degree of heterogeneity in the implicit carbon prices used in public policy offers further demonstration of the ineffectiveness of the interventionist approach. Nor would any international climate agreement which would not apply to all regions of the world be any more efficient, because the carbon price in the countries which were not signatories to the agreement would be zero, while in countries which signed up to the agreement and it would ultimately be extremely high.

The equitable treatment of actors is, as shown, crucial in mitigating the impact of the fight against global warming on purchasing power and in giving the fight credibility, any excessively costly agreement being doomed to be abandoned under pressure from the electorate or lobbies. The ecological imperative can only be respected if it is also the economic imperative. Both require a holistic approach and a price mechanism. Price mechanisms (tax or market) are therefore not the enemies of an environmentally friendly policy, but, on the contrary, a necessary condition for achieving further goals of an environmentally far-reaching policy.

Most economists recommend imposing tariffs on CO_2 globally. Divisions over the technical methods adopted to achieve this are of a secondary order in relation to this principle. Likewise, many leading figures and decision-makers are united on this point. For example, Christine Lagarde, former Managing Director of the International Monetary Fund and Jim Yong Kim, President of the World Bank, jointly declared in Lima, October 8, 2015: "The transition to a cleaner future will require both government action and the right incentives for the private sector. At its center should be a strong public policy that puts a price on carbon emissions. Putting a higher price on fuels, electricity, and industrial activities emitting carbon will create incentives for the use of cleaner fuels for energy saving, and for a transition to green investments. Policies such as a carbon tax, a tradable emissions rights market and other pricing mechanisms, and the removal of inefficient subsidies can give businesses and households the predictability they need to make investments long-term measures in the intelligent fight against global warming." The recommendation was to charge the same price for CO_2 emissions worldwide, whatever the economic sector or economic participant. It is obvious that, so far, a more complex course of action has been preferred.

Two economic instruments allow coherent carbon pricing: carbon tariffs and a mechanism of negotiable rights. Both strategies allow subsidiarity climate policies at the level of each country. We can want to leave some freedom for national policies even though it is known that these policies risk deviating from lower cost mitigation mechanisms. Take the example countries with limited capacity to collect and redistribute through the tax. Imagine that some of these countries are in favor of a low carbon price on cement to promote construction housing for the poorest; one of these countries could then deviate from the uniform price rule for this sector. The argument in favor of subsidiarity is twofold. First, it leaves governments a margin of freedom to convince the public opinion (or to convince themselves); second, the other countries are only interested in the amount of CO_2 emitted by the country in question and not how that country reached it.

[2] T. Tietenberg. *Emissions Trading.* Principles and Practice, Routledge London, 2006, p. 65.

[3] It may seem surprising that some investments are not made that would pay off for those who make them. In some cases, the actor concerned may not have had the information, while in other cases, he may not have enough money available to invest (as with the liquidity constraint of a modest household which prevents investment in insulation work).

To achieve their ends, both strategies depend on an international agreement with sufficient coverage of global emissions, and therefore an "I will if you will" approach. Both require policies of implementation, control and verification (more generally, the prerequisite for any effective mitigation action is the establishment of credible and transparent mechanisms for emission measurement). Not all economists agree as to the choice to be made between carbon tax and issue of negotiable rights, but as for the vast majority of economists, one or the other of these two approaches is significantly more efficient than the current system of voluntary promises.

In the first strategy, that of carbon pricing, all countries would agree on a minimum price for their GHG emissions, for example € 60 per ton of carbon, and each country would collect the corresponding sums on its territory. All countries would therefore have the same price for GHG emissions[4].

For example, countries could agree on a tax universal minimum carbon, leaving no room for the subsidiarity in the field of possible actions (except to impose an even higher tax). A more sophisticated mechanism, where the countries would agree on an average carbon price, would allow subsidiarity. The carbon price would then be the ratio of revenues of this collection divided by the volume of issues in the country; the price would correspond to the carbon tax in the specific case of an approach through taxation; but more generally, the price could emerge from a range of policies: carbon tax, negotiated emission rights cables or any other type of mechanism based on a price (system bonus-malus on cars for example).

The carbon tax approach and its variants pose problems of compliance verification with the international agreement for several reasons, which can be named.

Because the majority of climate impacts positively on the carbon tax policy benefit of third countries, today nothing encourages countries to charge for emissions to their citizens, businesses and administrations, even if from such taxation there would be a benefit for public finances; and overall, with the exception of Sweden, they do not. Whatever the international deal sealed, it could not be otherwise. So, even if the emission verification measurements did not generate any cost in themselves, the authorities could nevertheless turn a blind eye to certain polluters or underestimate their pollution, thus saving the country the economic and social cost of green actions. Such opportunistic behavior of certain states is hard to avoid. To better visualize the difficulties inherent in any monitoring and control of compliance, we can relate to the debate on inefficient tax collection in Greece[5]. To sum up: the institution of a uniform price of carbon faces the classic free rider problem, with local costs and global benefits. To work correctly for it, it will have to be accompanied by an international strict control.

2. Compensatory transfers and the risks they entail

Another form of bypassing an agreement on an international carbon tax is to make lapses of a carbon tax through compensatory transfers; for example, when a tax carbon is introduced on fossil fuels, a country can reduce as many other taxes (or increase subsidies) on these energies, thus denying the impact of the carbon tax. Indeed, the other taxes or subsidies already exist for these energies which were not motivated by other considerations of warming climate but by another considerations: for example, negative local externalities such as the emission of nanoparticles (responsible for the development of cardiovascular diseases, asthma ...) and, in the case of gasoline, automobile congestion and the deterioration of road infrastructure. Countries are benefited by the relative inelasticity of demand for these products to increase their tax revenues.

The pricing approach to tariffs requires finding conversion rates for revaluating the various policies that have an impact on climate change but which do not have their own explicit price, such as R&D of public green, residential construction standards or roads, certain agricultural methods or programs of afforestation and reforestation. It might also be necessary to determine conversion rates specific to each country and a construction

[4] On the other hand this solution would be ineffective and unfair for a country like Sweden which has been virtuous even before the international agreement and for whom the effect would be to make the surplus sustainable of past contribution.

[5] In recent years, despite the existence of a binding program and the involvement of the Troika representing the creditors, Greece has made little progress in its fight against tax evasion. This shows how difficult it is for countries third party to impose tax collection if the national government is reluctant to apply it. And in the context of climate change, there is no institution in each country to monitor what is happening there.

standard will have a different impact on GHG emissions according to the country's climate; similarly, afforestation can increase rather than reduce GHG emissions in high latitude areas where trees can cover snow (high albedo[6]).

The classic alternative way to subject actors to the same treatment is to introduce a negotiable emission rights mechanism. A global emission control target is defined and a corresponding volume of permits is allocated, either free of charge, or through an auction. Actors who pollute more than they do, not having a license, must buy the difference in the market; those, more virtuous, who do better than the quota allocated to them, resell the excess. For all, the cost of pollution is the price market, whether the initial allocation was free or paid: an additional emission deprives the virtuous company of the sale of a permit and penalizes the polluting company by an amount equal to the purchase price of a permit. In the case of GHG emissions, the international agreement would cap future CO_2 emissions and therefore define a fixed number (the cap) of emission rights that can be traded globally. The tradability of rights would guarantee all countries a uniform carbon price, generated by mutually beneficial trading on the carbon exchange; the price of the cession of emission permits between states would not be determined by an agreement on a carbon price, but rather by the law of supply and demand in this market. To ensure compensation, we would start by allocating carbon permits to countries, with the twin objective of equity and of encouraging all countries to participate.

And what about the situation of households in all of this? They are indirectly affected through the impact of measures on the price of goods and services. For this which is their energy consumption, we can choose the option of carbon tax, provided that its level is established in such a way as to remain consistent with the price paid on the permit market by electricians, cement manufacturers and other companies subject to the system negotiable rights (or follow the proposal of former President Barack Obama by submitting refineries or producers/importers upstream gas to the tradable rights system, these companies transmit much the "carbon price signal" to consumers).

The most successful example of pollution control, in the occurrence of sulfur oxides (SO_2) and nitrogen (NOx), responsible for acid rain, originates from a bipartisan law passed in the United States in 1990. It was then decided to reduce emissions of 20 million ton to around 10 million as of 1995, and therefore to issue a corresponding quantity on a recurring basis negotiable rights over a thirty-year horizon. An eco-friendly ambitious logic was therefore achieved thanks to a market of negotiable rights[7] and strict compliance with the commitments made by law.

Several lessons can be learned from this experience, such as that a single carbon price scheme can work even when, moreover, it is not possible to perfectly deal identical way with all the actors — as we said previously the Midwestern states, big polluters with their coal plants, stood up against the 1990 law and finally saw themselves allocating free permits, while remaining incentivized by the price of market to greatly reduce their pollution, which they did effectively. Moreover, the time horizon is decisive. Economic players (like companies, households, administrations, states) do not choose will require non-GHG emitting equipment than if they anticipate a sufficiently high carbon price in the future. Likewise, the companies will not make the necessary efforts to promote new generations of non-polluting technologies only if they see an economic interest. In short, it is about reducing the uncertainty study on the carbon price of tomorrow.

Should we be worried about the development and possible drifts of carbon finance? Will it lead to speculative phenomena and could it harm society? First, we have to notice that a speculation does not matter as long as market participants bet on the rise or fall of the carbon price with their own money. On the other hand, if a bank or a company of the energy sector uses financial markets to take very risky positions in these markets instead of using them to cover their risks (i.e. protect themselves against changing prices), there is a problem

[6] The albedo is the ratio of solar energy reflected from a surface to the energy incident solar; it cools the planet by reflecting solar radiation, and therefore reduces GHG emissions. Trees on snow-covered ground can limit this beneficial effect for the planet.

[7] The price in the market today is quite low for several reasons. First of all, the recession which, until recently, raged in the United States slowed down emissions. Second, the discovery of shale gas and the threat (still not realized) of significant pricing of GHGs discouraged investment and consumption of coal. This low price therefore also corresponds to less local environmental damage.

insofar as possible losses would harm the bank's depositors or consumers of electricity suppliers, or more likely to the taxpayers when the state bailed out the bank or the power company. We are here within the framework of classical regulation. The power public sector must monitor the positions taken on these markets by regulated companies and ensure that these positions serve well to cover, not to take risk. It is also necessary that companies are forced to exchange these negotiable rights, as well as their derivatives, on organized markets with clearing house, to be better supervised by their regulators. Much more than voluntary arrangements over the counter, which proved so harmful during the financial crisis of 2008 and 2017, these transparent markets allow better readability positions.

3. Examples of approaches to climate control and associated uncertainties

Whatever solution is chosen to combat the heating climate change, it is clear that we will not avoid mistakes in the design of the policy: there is still a lot of uncertainty from climate science, technology, the economy (on the cost of decarbonization) and political science (on the will of countries to find a real agreement and to respect it).

Faced with the uncertainty associated with future price trends, many additional policies are needed. The first consists of adjusting the number of permits or the carbon tax to keep account of new developments (climatic degradation faster than expected, global recession, etc.). Of course, these revisions can limit the long-term commitment of states in favor of reducing GHGs, but solutions exist. In Europe there will finally be put in place from 2021 onwards a price stability in the tradable emission rights market.

In addition, the possibility for participants to use the permits at later dates reduces price fluctuations: if the price is expected to increase in the next few years it is in the interests of participants to keep permits in reserve which makes the price go up today and go down tomorrow[8].

Applying an emissions permit mechanism is relatively simple when they are countries and not economic actors who are responsible for national GHG emissions. We can effectively calculate the anthropogenic CO_2 emissions of a nation through carbon accounting by taking production and imports from which we subtract exports and the variation of stocks. The carbon sinks linked to forests and agriculture can already be observed by satellite. The programs experimentally undertaken by NASA and ESA to measure overall CO_2 emissions at the level of each country are promising in the long term[9]. It is easier for the international community to grow CO_2 emissions by country rather than measuring them at the point sources; and, as the case is with current *cap and trade* mechanisms, economic actors (here the countries) which have a permit deficit at the end of the year will have to acquire additional permits while countries with a surplus of permits could either transfer them or keep them for a future use.

The question of inequalities arises at two levels: within a country, and in a much more significant way now, at the international level. At the national level, it is sometimes objected that a carbon tax will cost the most disadvantaged. Carbon pricing leads to reduction in the purchasing power of households, including that of more modest ones, which can be seen as an obstacle to its implementation work (even if this consideration in the past did not prevent the implementation of other ecological taxes). Which is true, but must not prevent the achievement of the ecological goal. In a matter of public intervention, it is important to associate with each objective a suitable tool, and if possible not to try to manipulate a tool, such as carbon pricing, to reach a multitude of goals. Regarding inequalities, the state should rather use income tax as much as possible to redistribute revenues transparently, while independently leading an appropriate environmental policy. This should not be diverted from its primary objective to respond to legitimate concerns about inequality. Such arguments could indeed more generally lead to the adoption of policies that we consider unwanted, like pricing electricity at a tenth of its own cost (open windows with hot radiators or, for the better-off, the outdoor pools heated all year round; farewell to building insulation and other ecological behaviour) or encourage smoking by getting rid

[8] Some tradable emission rights systems specified a horizon of short time to use given permits, thus generating very high volatility: at the end of the fixed horizon, say the end of the year, the price is either equal to 0 if there is excess permit, or very high (equal to the penalty for lack of permit) if there is an excess of request. Therefore, any development that takes place before the end of the year has substantial effects on the market price. In general, however, the possibility of saving permits (called banking), which exist in many countries, reduce the volatility.

[9] NASA Orbiting Carbon Observatory-2, or OCO_{-2}, is already in orbit of the Earth.

of high taxes on tobacco as the pretext that the poorest smoke a lot. Yet, whatever the reason, this is what we do with carbon today.

The same principle applies at the international level, where it is preferable to organize flat-rate transfers in favor of poor countries rather than trying to adopt ineffective policies and therefore not very credible ones.

Poor and emerging countries rightly point out that rich countries have financed their industrialization by polluting the planet and that they too would like to access a comparable standard of living.

The answer is that emerging countries need to subject their citizens and businesses to substantial pricing of carbon (ideally the same price as everywhere else in the world) and that the issue of equality be managed by financial transfers from rich countries to poor countries. The Copenhagen Protocol had also decided on such aid, a principle reaffirmed by COP 21 in Paris.

4. International inequalities as a factor in making the case

In summary, the reality of international inequalities leads us to ask the question of sharing the climate burden. The principle of common but differentiated responsibility reflects the idea that wealthy countries are generally those which have historically contributed the most to the accumulation of GHGs in the atmosphere. This finding, however, should certainly not lead us to seek the solution by abandoning the principle of the single price as we did so during the Kyoto Protocol in 1997: the parties of the Kyoto Protocol called "Over-Annex I" had no obligation under the terms of the protocol and should not be subject to any carbon pricing; which derailed the process when the time came for the protocol to be ratified by the Senate of United States. The countries should not repeat Kyoto's mistakes in the future.

Finally, we can ask ourselves whether it is right that the pollution entailed born, for example, in China, by the production of exported goods to the United States and Europe, is counted as Chinese pollution and therefore be covered by the permit system to which all countries, including China, would be the subject? The answer is that Chinese companies that emit GHGs during the production of exported goods will pass the carbon price through their prices and that it will therefore be American consumers and Europeans who will pay for the pollution, not China. The international exchanges do not therefore call into question the principle of collection where the emissions are produced.

Negotiations to settle the issue of offsets to offer to poor countries for their participation in the collective effort have so far failed. The most recent attempt dates from the summit of Copenhagen in 2009 and consists of the promise of a transfer of $ 100 billion annually to the poorest countries.

In October 2015, the OECD announced that commitments had been taken at the level of 62 billion, a level well in excess of all expectations. Looking more closely, NGOs and poor countries expressed serious reservations. Some of the commitments are loans, not grants. In addition, many funds come from multilateral aid agencies (World Bank, Asian Bank Development, European Bank for Reconstruction and Development ...) or bilateral; like the budget of these agencies has not been increased accordingly, the question then arises whether these aids are additional, that is to say if this is really new aid for benefiting countries of the South and not existing aid which is re-labeled "green".

As is the case in other areas (humanitarian aid after a natural disaster or health actions in favor of least developed countries), national parliaments are known for their reluctance to vote large credits for causes which benefit third countries[10]. Even a program performing as the Global Alliance for Vaccines and Immunization (GAVI) — whose budget is much smaller — only took off thanks to the significant financial commitment of Bill & Melinda Gates Foundation. At international conferences, politicians are used to pledging financial contributions costs, but once the conference is over, they reduce those costs masses or come back to it. It is unfortunately likely that free rider behavior predominates in the problem of financing the Green Fund and is endangering its development.

[10] The issue of transparency is one of the reasons why many pollution control programs around the world have adopted a cap and trade scheme and have addressed the issue of financial transfers through a tradable quota solution (often a system of "grandfather's rights"), less politically sensitive. The large transfers to Midwestern states generated by the Clean Air Act Amendment of 1990 never really made headlines. Of course, transfers made under national cap and trade programs differ by nature from international payments under an international cap and trade system. However, under the EU ETS scheme, billions of euros could potentially have been transferred to the countries of the East and to the countries (this was the spirit of the so-called "Hot Air" program.) through the allocation of quotas to convince them to sign the Kyoto Protocol.

It is of course difficult to agree on the identity of the beneficiaries and payers in a negotiation with 195 countries. Each country wants to put its two cents in and delay the negotiation by demanding to pay a little less or to receive a little more. It is necessary without doubt to negotiate crude formulas, based on a few parameters (the population, current and foreseeable pollution, sensitivity to global warming ...etc.) rather than trying to determine the country-by-country contribution. An exercise that remains difficult, but more realistic than open-ended negotiations.

An effective international agreement will need to create a coalition within which all countries and regions will be brought to apply the uniform carbon price to their respective territories. According to the principle of subsidiarity, each country or region will then be free to develop their own carbon policy, for example by creating a carbon tax, a negotiable emission rights mechanism or a hybrid system. The free rider problem poses a challenge to the stability of this grand coalition: can we count on compliance with agreements?

Naming and shaming is a good tactic to which one must resort; but as we have seen in the case of Kyoto "commitments", it remains ineffective. The countries will always find a multitude of good excuses not to respect their commitments: arbitration in favor of other actions such as green R&D, a recession, insufficient efforts by other signatories, the change of government, the defense of employment, etc. There is no foolproof solution to the problem application of an international agreement, but we have at least two tools.

First, countries want trade free; the WTO might consider that failure to comply with an international agreement on the climate is equivalent to environmental dumping and should because of this title impose penalties. In the same spirit, we could use punitive import taxes to penalize countries that are non-participants in the agreement. Such a policy would encourage countries hesitant to join the agreement and would promote the development of a global stable coalition for the climate. It goes without saying that the nature of sanctions cannot be decided by individual countries, because they would happily seize this opportunity to put in place of protectionist measures without necessarily a large relationship with an environmental reality.

Secondly, failure to comply with a climate agreement should be considered as engaging the responsibility of future governments of a country and assimilated to sovereign debt. The IMF would be a stakeholder in this policy. For example, in the case of a negotiable issue rights mechanism, a deficit permits at the end of the year to increase public debt; the rate would be the current market price.

Of course, we are aware of the risk of collateral damage that may result from the choice to link a climate policy to the international institutions which function as best as they can. But the real question is: what is the alternative? Supporters of non-binding agreements hope that the goodwill of signatories will suffice to limit GHG emissions. If they are right, then the incentive measures through collaborations with other international institutions will suffice *a fortiori*, without any collateral damage for these institutions.

Despite the accumulation of scientific evidence for the anthropogenic role contributing to the global warming, international mobilization in practice on this subject remains disappointing. The Kyoto protocol failed to create an international coalition in favor of a carbon price in relation to its social cost; it is also a perfect illustration of the intrinsic instability of any international which does not take the free riding problem seriously. Any international agreement must meet three criteria: economic efficiency, incentives to meet commitments and equity. Effectiveness is only possible if all countries apply the same carbon price. Incentives require sanctioning the free riding. Equity, a concept whose definition differs according to the stakeholders, can be achieved through a flat rate transfer. However, the commitment of strategy emission reduction voluntarily is another example of the wait-and-see attitude on the part of key countries, that is to say a strategy of postponing to a later date a concrete commitment to reduce their emissions.

But still there are some reasons for optimism. First of all, awareness in public opinions policies have progressed in recent years, even though the economic considerations have been somewhat relegated to the background of ecological considerations. In addition, more than forty countries, and not lesser (United States, China, Europe ...) have established issue of negotiable market rights, admittedly with far too generous caps and therefore very low carbon prices but demonstrating their willingness to use a rational policy of fight against global warming. These carbon exchanges can one day be linked

together to form a market more coherent and globally efficient and "Exchange rate" will be thorny[11]. Finally, the substantial drop in cost of solar energy suggests economical solutions to the issue of emissions from Africa and other developing and emerging countries. But all this will be *a priori* very insufficient for achieving our goals.

While it is important to maintain a dialogue at the global level, the United Nations process has shown its very predictable limits. The negotiation between 195 nations is incredibly complex. We should succeed in creating a "climate coalition" which would bring together from the outset the major current and future polluters. We do not know if it has to be the G20 or a smaller circle: for example, in 2012, the five biggest polluters, Europe, the United States, China, Russia and India accounted for 65% of global emissions (including 28% for China and 15% for the United States). Members of the coalition would undertake to pay for every ton of carbon emitted. First, we would not necessarily try to involve the 195 countries involved in the negotiation, but they would be encouraged to do so. Members of the coalition, in effect, would weigh on the WTO and impose tax at the borders on countries refusing to join the climate coalition. To avoid undue protectionism, the WTO would be involved in this system on the basis of dumping the environment by non-participants. To the question "what to do?", the answer would therefore be quite simply:" to find the path of common sense".

The number one priority of the current negotiations should be an agreement in principle on the establishment of a universal carbon price compatible with the objective of 1.5 to 2° C. Proposals aiming at differentiated prices according to countries not only open a Pandora's box but especially are not ecological. Emissions growth will come from emerging and poor countries and underpricing the carbon in these countries will not allow us to achieve the target of 1.5 to 2° C; especially since the high prices of carbon in developed countries will encourage development of GHG-emitting productions in countries with low carbon price, thus negating the efforts made in rich countries.

We must also agree on the need for an independent monitoring infrastructure to measure and control the national pollution of the signatory countries, as well as on a governance mechanism.

Finally, and always in the spirit of going back to basics, let us tackle the thorny issue of fairness head-on. The question is important, but any negotiation must come to terms with it whatever happens, and the thorny question of dealing with it, and drowning it in the midst of discussions devoted to many, many other subjects, does not facilitate the task. A negotiation mechanism must be put in place which, freed from side debates after the acceptance of the single carbon price, focuses on this central issue. Today, it is futile to seek to obtain ambitious pledges from the developed countries on the green fund without this leading in return to a mechanism capable of achieving our objectives to receive support; that extra-ordinary business franchises like Citigroup, Royal Bank of Scotland and Union of Swiss Banks would capsize after taking insane risks; that an insurance company and two mortgage guarantee institutions would mobilize approximately $350 billion from the US state; that the latter would have committed 50% of US GDP just over a year later; that the American and European governments would lend large sums of money directly to the industry; and that central banks would use unconventional monetary policies and go far beyond their mandate, dragging us into a period of extremely low interest rates and supporting states and the financial system.

Conclusion

The choices facing governments involve prioritizing efficiency and speed of change if a reduction in the emission of greenhouse gases is to be achieved on the scale now required to avert an irreversible change in the planet's climate. Economic reality, however, requires that enterprises prioritize their own survival and need encouragement to act. This tends to result, as has been shown, in tentative actions that are inadequate to meet the accelerating global crisis.

When analyzing the financial instruments available to governments and their application in recent years it is noticeable that their role is diminishing in practice. Instead, "soft" institutions, including those operating on a local level, are initiating action to speed up the reduction of carbon emissions. Increasingly ordinary citizens are becoming frustrated by this and are attempting to

[11] It will be necessary to know whether a right to emit one ton in a system is equivalent to the same right in another system. The most virtuous countries, having issued less than rights, would then risk feeling aggrieved.

take direct practical action, although it is clear that their freedom to do this varies widely from one country to another.

Whereas there has been a tendency to procrastination in the response to international initiatives, analyzed earlier, valuable practical decisions have been taken by some large and multinational companies. IKEA's move in choosing to base 17 new stores in the Russian Federation using solar energy is a good example of this.

It seems, therefore, that time is running out for high level discussion. Digital technology has taken over from governments much of the task of persuasion and the activity of individuals and social and economic institutions are cutting through administrative red tape. The financial instruments available to governments now need to be seen in a new context and adapted to a situation in which speed is essential.

References

1. Donahue, John D., and Joseph S. Nye, eds. Market-Based Governance: Supply Side, Demand Side, Upside, and Downside. Brookings Institution Press, 2002. http://www.jstor.org/stable/10.7864/j.ctvc16p58
2. Ellerman D., D. Harrison, P. Joskow, Emissions Trading in the US Experience, Lessons and Considerations for Greenhouse Gases, Pew Center on Global Climate Change, 2003. Washington
3. Gates B., How to Avoid a Climate Disaster. Random House, 2021.
4. Nordhaus, William. 2015. "Climate Clubs: Overcoming Free-Riding in International Climate Policy." American Economic Review, 105(4):1339-70. DOI: 10.1257/aer.15000001
5. Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action (Political Economy of Institutions and Decisions). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511807763
6. Pigou A.C. The Economics of Welfare. Macmillan, London, 1934, p. 25.
7. Stiglitz J., T.N. Tucker, G. Zucman, The Starving State. Why Capitalism's Salvation Depends on Taxation. Foreign Affairs, January/February, 2020.
8. Tietenberg, T. (2006). Emissions Trading: Principles and Practice (2nd ed.). Routledge. https://doi.org/10.4324/9781936331284

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