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PRUDENTIAL REGULATIONS FOR GREENING THE FINANCIAL SYSTEM: COPING WITH CLIMATE DISASTERS

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ABSTRACT

Prudential Financial Regulators, Central Banks and Regulatory Authorities, have increasingly come to recognize that they have a role to play in dealing with climate change, including climate disasters such storms, tornados, tsunamis, etc. Such events impact the real economy by destroying physical assets, income opportunities, credit worthiness and the fiscal base. In turn, the financial system is impacted by destruction of collateral and of ability to pay, by an increase in defaults, by required insurance payouts and by a flip in the fiscal balance. Regulators´ policy options can usefully be classified into those that *provide* direct support, those that *promote* supporting responses by the system, those that *protect* from the effects, and those that *prevent* the consequences as much as possible. Regulators also have a role to play in turning prospective (and past) climate disasters to advantage, by inducing assets to become more resistant in the face of climate change, by supporting technological change and by supporting *behavioral change*. Specific Regulatory Policy towards climate disasters involves some general climate change related regulations such as requiring improved building codes for writing mortgages, but also includes pre-positioning regulations to become activated in the climate emergency and also a second set to become activated in the recovery period. Fortunately, the regulatory instruments involved are all well within current established practice.

1. INTRODUCTION

Prudential Financial Regulators, Central Banks and Regulatory Authorities, have increasingly come to recognize that they have a role to play in dealing with climate change. This should not be surprising, considering the extent to which finance plays a role in the everyday life of any society. By the same token, small changes in financial regulation should be expected to have a large impact on financial flows and hence on

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the real economy. Again, this should not be surprising, since financial regulations are designed to have a large leverage effect.[2]

It is worth noting, in addition, that there are technical reasons why it is appropriate for the financial regulators to have concern *and responsibility* for responding to issues of climate change. First, climate change involves a massive externality. Second, when a climate disaster is involved, there is an *acute* externality. Third, it is well established that individual, decentralized, decisions in the face of externalities are most likely to sub-optimal. Fourth, a response is needed that can *permeate* the whole economy, in response to the massiveness of climate change. Finance permeates the economy and therefore financial regulation is such a response. Fifth, the response needs to be actively managed. The financial regulators are equipped to do precisely that.

The specific concern of this paper is present ways in which prudential regulation can be recruited to improve how societies deal with climate disasters. Storms, tornados, tsunamis, floods, and other climate-originated disasters have recently increased in frequency and severity. There is some debate about the causes of this increase and whether it will indeed be lasting. What is unquestionable, however, is that it behooves policy makers, including financial prudential regulators, to improve the manner in which they deal with this challenge.

2. CLIMATE DISASTER IMPACTS ON THE REAL ECONOMY

When a climate disaster strikes, several distinct consequences follow for the real economy.

a. Physical asset destruction
   Windstorms of various types destroy houses, knock down power lines; floods uproot bridges, make buildings uninhabitable and destroy agricultural infrastructure including existing plantings; the combination of wind and water spells great destruction. Climate disasters invariably involve significant loss of physical assets, private as well as public.
b. Income destruction
   With the destruction of physical assets comes the disappearance of employment opportunities. No capital assets: no jobs! True enough, there will be new jobs appearing as a result of the reconstruction, but these are (a) different jobs, requiring different skills, and, (b) they will only appear later –

[2] The Network for Greening the Financial System (NGFS) is the home of the Regulator´s efforts on climate change and related issues. See https://www.banque-france.fr/en/financial-stability/international-role/network-greening-financial-system.
The Alliance for Financial Inclusion (AFI) provides data on the interaction of climate issues and financial inclusion. See https://www.afi-global.org/publications/3036/Inclusive-Green-Finance-A-Survey-of-the-Policy-Landscape

and typically need new funding. The early impact of climate disasters is clearly the loss of income opportunities.

c. Credit worthiness destruction
The disappearance of physical assets and of income spells a reduction in credit worthiness. With fewer assets to pledge and less expected income to show, potential credit shrinks.

d. Fiscal base destruction
The revenue base of local, regional or even national government is also affected by the climate disaster. As physical assets are wiped out, so is the real estate tax base; as income sources disappear, so does the income tax base. Hence climate disasters affect public resources, just when the call upon those resources becomes particularly large.

e. Most immediate needs when disaster strikes
The most immediate needs almost always identified are food and shelter. But a very close third is money, in the form of ready liquidity. When disaster strikes, it becomes necessary to provide immediate substitutes for goods lost (implies needed purchases) and/or it becomes necessary to hire new services (e.g. transport). Both those categories require payment, mostly in cash. Hence the availability of cash can become a crucial need indeed.

A particular case is one in which the installations of financial institutions are affected. If bank offices and/or ATMs are destroyed, the access to cash is made more difficult. Similarly, if phone lines are down, and cellphones are not ubiquitous, determining what cash is needed and where becomes more difficult.

Some of the immediate needs felt by those affected are typically provided for by relatives or friends. First responders are therefore often relatives and kinsmen, especially in more traditional societies. But *organized, professional,* first responders always have an important role to play, in good part because devastation requires collective effort. In addition, as infrastructure is wiped out, the destruction exceeds the capacity of decentralized efforts to cope.

3. CONSEQUENCES FOR THE FINANCIAL SYSTEM (BANKING , INSURANCE, RETIREMENT)

The various components of the financial system will unavoidably be impacted by a climate disaster. But the nature and extent of the impact will be different as between banks, insurance companies and retirement funds. It is worth reviewing these impacts in turn.

a. Owned physical asset destruction
Here we are dealing with the destruction of installations or equipment owned directly by financial institutions, such as the actual destruction of offices where headquarters or branches of financial institutions are located, automatic teller machines damaged through flooding or collapsed ceilings, or real estate owned outright by the financial institution (e.g. rental housing, stores or

offices). In this respect, the financial institution is no different from any other property owner.

b. Collateral destruction

Here what we have a potential loss, which may or may not be realized. Collateral guarantees repayment of a loan. Having it become less valuable does not necessarily imply that the respective loan will not be repaid. However, there is no question that the risk of default goes up when the collateral becomes worth less.

Banks are directly exposed to the reduction in value of collateral. Insurance companies are indirectly exposed, insofar as they own paper backed by such collateral. In sophisticated markets, where mortgages are packaged and then sold to insurance companies *without recourse*, the insurance industry is exposed directly to the change in value of the properties subject to mortgage. In less sophisticated markets, insurance companies may own paper issued by banks, which is used to fund mortgages held on the banks´ own balance sheets. Furthermore, insurance companies may own bank stocks or bonds, which are subject to a decrease in value as a result of a climate disaster.

But insurance companies, especially in smaller jurisdictions and with less mature markets, tend to use reinsurance extensively. As a result, they collect less premium income but also divest the risk onto foreign insurance entities with deeper pockets, typically at Lloyd´s of London. When a climate disaster hits and the respective underlying collateral becomes worth less, it is foreign insurance companies that bear a major part of the brunt.

Retirement Funds present a third type of situation. Typically, the retirement fund is distinct from its management company. Thus losses in the retirement fund portfolio arising from climate disasters are mostly borne by the collectivity of depositors in the respective retirement fund. Only if the legislation specifies that the management company participates in the gains or losses of the fund portfolio, would the management company be exposed to the effects of climate disasters.

c. Ability to pay destruction

Reductions in income can be expected to have a direct correlation with ability to service existing financial commitments as well as new ones. However, the impact on freely disposable income may be much larger than the reduction of income itself. Consider the typical situation of a family of two income earners, one of whom has a salary and another who operates a family business. The salary constitutes 60% of the income and the family business 40%. Now, as a result of a hurricane, the family business loses half of its sales. Family income is now 80% of what it was before. But now there are new required payments for repair of the family store of 10 per period. So if the net freely disposable income before the disaster was 30, it is now zero: 20 of income lost, 10 of income now committed to recovery finance.

Accordingly, the capacity to pay under conditions of climate disaster becomes reduced more than proportionately.

d. Default increases

Defaults are the consequence of either inability to pay or unwillingness to pay. In the presence of climate disasters, both types of default increase substantially. Debtors´ *inability* to meet commitments increases as freely disposable income shrinks. But the *unwillingness to pay* increases as well, as debtors feel more justified in assigning lower priority to paying debts than to other survival needs.

In banks, the increase in defaults expresses itself directly in reduction of debt payments. In insurance companies, payment of premiums will be late, eventually leading to a lapse in coverage. In retirement funds, there will be a reduction of payments into such funds, with the commission base falling accordingly.

e. Insurance payout obligations

Insurance cover for natural disasters in jurisdictions without developed financial markets may be limited, possibly restricted to insurance on some structures, on vehicles and for medical care. As a result, insurance companies may not be enormously impacted in absolute terms. But an undeveloped insurance market also means a low premium revenue base. Hence, even a low payout resulting from a climate disaster can significantly affect the industry. Recall, however, that reinsurance always mitigates this loss.

f. Fiscal balance flip

Fiscal revenue is directly related to the tax base. As climate disaster causes this base to shrink, due to asset and income reductions, so will fiscal revenue. On the other hand, this is precisely when the State will be called upon to provide succor to its citizens, increasing its expenditure. Hence the fiscal balance will inevitably deteriorate, even considering possible contributions from abroad. This implies an increase in the public debt, both domestic and foreign, consequent to the climate disaster.

The impact of climate disasters on financial institutions thus goes well beyond the effect on the physical assets the institutions may own. As the society and economy around the financial institutions are impacted, so too as those institutions. Values of collateral, willingness and ability to pay, default rates, coverage payouts, and fiscal balance will all be affected.

4. POLICY OPTIONS FOR RESPONSE

The tools that prudential financial regulators have available to respond to climate risk, particularly to climate disaster risk, come many shapes and forms. It is useful to classify them into four types of policies as follows:

a. Provide

These are tools in which the financial regulators *provide* direct support in response to the climate challenge. This might be a direct credit program in the Central Bank for loans to residents of the affected areas. Or it might be low interest credit facilities for businesses in the affected areas on the part of a

state-owned development bank. Or it might be exceptional credit to the relevant local authority in view of its disaster-related expenditures.

b. Promote

These are tools by which the financial regulators *promote* actions on the part of institutions in the financial system to abate the consequences of climate disasters. An example would be capital adequacy requirements weighted in favor of climate friendly activities. Another would be differential provisioning of climate-disaster-related lending. Special definitions of credit worthiness in the face of climate disaster would be another. Creation or authorization of special insurance instruments for climate disaster would also qualify.

c. Protect

These are tools that provide loss absorption or compensation. A classical example is disaster insurance, which spreads the loss horizontally over a broad pool of insured individuals, but may need specific regulatory approval. Another example is specially designed finance of the loss, which spreads the impact over time and thus makes it more bearable. Another is pre-installed emergency access to retirement funds. All of these can be combined in many different proportions.

d. Prevent

Preventing climate disasters is obviously not possible. However, under this rubric, the prudential financial regulators take pre-emptive action to *prevent* as much as possible, the undesirable consequences of climatic disasters. This involves requiring the financial institutions to develop awareness of the climate risk that they are running, by suitable reclassification of their loans and their collaterals along an unconventional (to them) dimension. The requirement to install systems of Environmental and Social Risk Management is the canonical example of this type of policy. A *prevention approach* then leads to the development of policies and programs that contain and mitigate the effects of the disaster.

As usual, what specific policies are appropriate for a particular jurisdiction to adopt depends in its institutional circumstances, on its policy traditions and on the exigencies of its particular situation. It should be noted, however, that financial regulators have many tools that can be used for the task at hand; it is not an issue of inventing or designing new tools, rather, it is an issue of using existing tools for a new purpose. Indeed, this new concern can be thought of as part of the financial regulator´s responsibility in maintaining a healthy financial system in the long run. From this point of view, any innovation in financial regulation will redound to the interest of the financial system itself. Finally, it is important to note that coordination of financial regulators´ actions with those of others concerned with climate disasters will leverage all the applied policies to greater advantage.

5. TURNING ADVERSITY TO ADVANTAGE:

Adversity always has a flip side, representing opportunity. Financial regulators also have a role in boosting the capacity of society to turn adversity to advantage. Here are some major instances.

a. Making fixed assets more climate friendly/climate disaster resistant

i. Housing

Building codes are a major determinant in the capacity of housing to resist major climate disasters. Properly anchored roofs are less likely to blow off; double and triple glazed window have substantially greater resistance to storm level winds; thresholds on doors have a capacity to prevent low level flooding; gutters or overhangs designed for heavy rains, with proper runoffs can also reduce damage.

Adequately formulated and fully enforced building codes are a very effective response to recurrent climate disasters.

Taking building codes into account when writing mortgages will go a long way to making it attractive to comply with climate resistant designs.

ii. Other construction

What holds for housing also holds for commercial construction, from hotels to office buildings to warehouses. Building codes that results in climate-disaster-resistant construction represent incorporated learning.

Constructing disaster-resistant roads also presents opportunities. Incorporating a slight curvature, installing lateral run-offs, foreseeing and remedying low points where water will collect, all represent improvements in road design that can be reviewed at a time when finance for the road is being considered. Or, if reconstruction is at issue, when the finance for reconstruction is put in place.

b. Updating technology – building for the longer term

New ways to doing things are continuously being invented and older inventions are continuously being converted to innovations. Some of these are pertinent for mitigating the effects of climate change disasters. Financial regulation has a role in making such innovations amenable for financing.

A pertinent example may be construction with styrofoam blocks. These have a very high insulation factor and thus are effective in situations of both high and low temperatures. They also have adequate tensile strength. But they do not have hard surfaces and hence need both internal and external covering for durability as well as consumer acceptability. They are also a case where economies of scale apply in production. A regulation that authorizes banks to finance “experimental” construction might have just the right effect to stimulate the adoption of this heretofore neglected technology.

c. Generating behavioral change

Climate disasters are events that have major impact. Nobody is unaware of major storms, tornados, floods or tsunamis. The press covers them extensively. As a consequence, citizens generally reexamine their behavior to see if it adequately incorporates the possibility that each of them may also be

affected at some point by a similar catastrophe. Traditional behaviors may then change.

i. Insurance

One would expect losses to make the advantage of being insured much clearer. However, for a citizen or business to become insured, two essential conditions need to be met: (i) appropriate insurance must be on offer, and, (ii) the price must be affordable.

Since insurance is a highly regulated industry, the availability of insurance relevant to climate disasters can certainly be affected by regulatory action. Furthermore, the cost of insurance is related in part to the expected losses on what is insured, but also averaged over time, over coverage elsewhere and over a range of different risks. Insurance essentially involves pooling many different risks in many different places and at many different times. That is the diversification that makes insurance sustainable. Seen from a particular jurisdiction, however, it is reinsurance which allows tapping into the world-wide system. Accordingly, the Insurance Regulator needs to institute appropriate and effective reinsurance regulations.

ii. Savings

Having resources available "for a rainy day", when storms are increasingly frequent, seems like a natural precaution. But it is not enough for an individual to realize that having precautionary savings would be desirable. There must be an institutional opportunity to put these savings aside reliably and with a reasonable return. Here is where *Financial Inclusion* comes in, a topic that currently receives attention in many jurisdictions.

iii. Participation in civil society

When climate disaster strikes, the individual cannot usually cope by him or herself alone. Collective, organized, effort is needed. That implies that lateral ties must exist and get activated when the need arises. Traditional societies have intense ties that have precisely this purpose. With development, some of these ties become weakened. Climate disasters demonstrate the need for communities to come together. Dormant civil society institutions reawaken, mutual help becomes more common, the consciousness of a shared danger and destiny weld communities together. The long term effect is more effective communities and greater participation in civil society organizations.

iv. Citizenship

When climate disaster strikes, government at all levels gets called upon. Citizens discover very quickly whether their authorities are up to the challenge. They also discover that their role as *citizens* is enormously important, especially when they feel that they have a

government *that is less effective than they deserve*! Citizen participation then changes.

The role and effectiveness of financial regulators may then also be called into question. Have they been adequately sensitive to the need to be pro-active in relation to possible climate disasters? Have they done all they could? In a timely fashion?

At times of political activism of citizens, the traditional insulation of financial regulators may wear a bit thin.

6. AVAILABLE REGULATORY INSTRUMENTS

a. General Climate Change Abatement Instruments

In Section 4 above, a typology of policy instruments relevant to climate change was presented. In many cases, their use would make dealing with climate disasters easier. For instance, if directed credit is available, it can be focused on disaster support and remediation; if weighted capital requirements take into account climate issues, they could be tailored to provide relief to disaster remediation; if provisioning is related to climate issue friendliness, provisioning in the case of disaster remediation could be reduced; etc.

One general policy that is particularly relevant to climate disasters relates to the building code standards required for writing mortgages. Since a large fraction of construction is financed directly or indirectly by the financial system, the leverage that the system has to require upgraded building standards is very substantial. With improved building codes, the corresponding structures will be more disaster resistant and numerous benefits will flow therefrom.

Most policies that are capable of taking into account climate change, can also be made to assist in situations of climate disaster. At the same time, there are policy instruments that deal specifically with climate disasters and recovery from them. It is these that the following sections address.

b. Specific Anti-Climate-Disaster Measures

1. Pre-positioning emergency response

i. Access to emergency cash

This is one of the most essential functions and it can have a variety of implementation modalities, depending on the particular situation. For example, if there is an effective digital wallet system in place, then access to emergency cash is almost automatic, all that may be required is to have the cellphone system working and for anyone NOT on the digital wallet system to be issued digital accounts rapidly. If no such digital wallet system is in operation, then much depends on whether ATMs and bank branches

are operating in the geographical space of the disaster, or close enough for affected citizens to have access to such establishments. If not, it may require emergency arrangements with super-markets or pharmacies, which are the main repositories of cash locally, to function in effect as bank agents, and provide cash against suitable documentation. Evidently, such a mechanism needs to be pre-positioned; it cannot be invented ad-hoc when the disaster strikes.

ii. Access to own funds on an emergency basis
Many affected individuals will have liquid or quasi-liquid assets which they are not entitled to access at short notice. An example would be a time deposit requiring permanence for a given period. Another is a bond convertible to cash but only with a waiting period. A third is a retirement fund accessible only at age 65. All of these can be made accessible by regulation when a climate disaster hits. But the terms of access need to be pre-established, for the purposes of proper anticipatory planning on the part of the citizen but also on the part of the financial institution holding the deposit.

iii. Accelerated transfer payments from government
Where transfer payments are in existence, be they conditional transfer payments to mothers, or old age pensions, the argument for disbursing them on an accelerated basis and disregarding the normal payment schedules is very strong.

iv. Expedited partial insurance payouts
Insurance payouts typically take time: an adjuster has to come out, view the damage, assess what is to be paid and then the back office needs to process the payment. None of this is compatible with an emergency situation. The obvious remedy is to have an immediate partial payout, with the balance being processed in the normal way. Such emergency payout could be as high as 30%, depending perhaps on the seriousness of the climate event. No individual damage assessment should be required for this initial payout. Moreover it should be made liquid through any of the channels which handle emergency liquidity.

v. Lending Programs
Citizens affected by a climate disaster will have illiquid assets of various sorts, from land to vehicles to fixed assets. Under emergency conditions, it makes sense for loans to be available under preferential conditions against the pledge of these assets.

There will also be citizens, whose assets have been completely destroyed by the climate disaster. A case in point would be the destruction of house and vehicles for a person not owning any land. But such an individual would nevertheless have human capital, a skill which has enabled him or her to have income in the past. It would not be equitable to lend only against physical assets, human capital must also, under such circumstances, be proper collateral.

It is clear that the rules for such lending need to be pre-established, again allowing for proper advance planning on the part of the citizen as well as on the part of the institution.

vi. Local government finance

When disaster strikes, local government has a role to play, even when it is likely that the national government will have to shoulder most of the burden. However, local government usually has few human resources and is also typically short of finances. It is important, therefore, that an emergency finance system be developed for local government so that it can respond by, for example, hiring its own citizens as clean-up crews. Creating such an immediate local response solves two problems at the same time: it provides manpower for rescue activities and it provides a source of income. It should therefore not be underestimated as an important element of "first response".

2. ***Pre-positioning Recovery Policies***

Once a climate disaster has occurred, its effects evidently need to be remedied; that is the role of *recovery policies*. To the extent they are pre-positioned, they will be more easily and quickly implemented, and most likely, also better designed and more effective.

i. Recovery lending

Injecting credit when there has been a climate disaster is an essential element in any recovery program. However, as part of a package of recovery policies, such lending should have some special characteristics:

1. Terms: the length of the loans should be carefully calibrated to the capacity of the activity financed to service the loan. If farming is involved, the maturation profile of the crop should be respected, e.g. if financing the reinstallation of citrus trees, remember that they will not yield a full crop until the fourth year. If home

reconstruction is involved, build in a grace period for the debtor to find replacement employment.

2. Flexible servicing dates: when rural and agricultural credit is involved, inflexible due dates may be very costly. Especially when the transport infrastructure may have been affected. Allowing payment in a seven or ten day window, may allow the debtor the travel to the bank office when transport is more available, or when farm duties are not so pressing. Alternatively, when digital accounts are available (or can be made available), it becomes much easier to comply with payments on unmovable dates.
3. Interest rates: the real interest rate charged on loans evidently impacts the true capacity of debtors to service the loans they take on. Immediately after climate disasters, the urgency of receiving credit will be great. However, that does not imply that the capacity to service will be high. Hence, regulators must ensure that real interest rates reflect the real risk involved in the loans, and take into account the collective benefit of everyone reconstructing at the same time. The externalities involved argue for lower interest rates as compared to a situation where each loan is evaluated in isolation of others. Given the uncertainties related to recovery, it may also be appropriate to have floating rather than fixed rates, and for the floats to be related to an indicator pertinent to the recovery activities.
4. Built in maturity extensions: under conditions of reconstruction and recovery from disasters, the uncertainty of all time lines becomes greater. Hence it is becomes desirable to build in possible maturity extensions from the outset. Various alternatives exist in this regard: (a) pre-established extension periods at the option of the borrower; (b) grace periods for principal or interest with the postponed payment added at the end, as an extension. There could be compensation for any of these features in the form of a slight increase in the interest rate.
5. Roll-over of emergency loans: once the immediate emergency is over, whatever emergency loans were extended need to be rolled over into more

permanent instruments. The aforelisted considerations will be relevant here as well.

ii. Recovery Credit-Worthiness

Recovery credit worthiness must necessarily be different from regular or conventional credit worthiness, because of the special circumstances surrounding climate disasters. Such recovery credit worthiness could consider the past history of income generation, or it could consider human capital, or it could consider the reconstruction context that the government foresees for the affected area. Criteria for such credit worthiness should be worked out and established by the financial regulator.

iii. Collection of Relevant Data for Insurance

Without data on insurable assets and future flows that are usable for actuarial calculations, no insurance industry can flourish. Hence, collecting pertinent and up-to-date information on flood, earthquake, and windstorm areas, as well as information on the housing stock, on farms and their yields, on various kinds of other assets and infrastructure, all become a part of an effective positioning effort in anticipation of climate disasters. In addition, the historical frequency of climate disasters in any particular jurisdiction will need to be recorded.

iv. Sub-regional and Municipal Finance

Reconstruction and Recovery will clearly require action at the municipal level. Some part of that will have to be financed at the municipal level, and some part at the other sub-regional levels, depending on the structure of the political system. Moreover, some part will be financed by the national government. In any case, it is to be expected that the local government units will need to go into debt for and during Reconstruction and Recovery. Repayment should occur when that period has been completed. Rules and procedures for this purpose should be pre-established so that the financial system as well as the local governments know the terms on which this finance will be forthcoming.

7. IMPLEMENTATION CHALLENGES

a. <u>Triggers for Beginning and for Ending</u>

The onset of a climate disaster is usually easy to determine: nature announces it with far too much clarity. However, administrative action is needed to

officially trigger the prudential emergency measures that have been pre-positioned. What is more, the chain of command for so doing must be clearly established, including substitutes for each stage.

Consider, for instance, the possibility that the Governor of the Central Bank has to declare a Regulatory Emergency, but that this Governor´s whereabouts is uncertain as a result of his own home having been affected by the climate disaster. Who, then, can trigger the emergency?

At the other end, the same decision issues arise: when is the emergency over? Is it over everywhere in the affected area at the same time? Is the emergency active for some aspects and not for others?

b. Geographic Coverage

The climate disaster may be narrowly focused on a clearly defined geographical area, or it may affect a broad area with different intensities. The availability of benefits requires definition of a boundary. For instance, roll-over to debts must be related to businesses located in the areas of impact and no other. But where, exactly, does that area end? And what if an active business, say a farm, is partially inside and partially outside the affected area, as defined?

A further issue relates to possible benefits accruing to *suppliers* of operations in the affected area. Consider a business which sells tractors on credit to farmers in an affected area. Under emergency roll-over provisions, the farmers are now allowed to defer payment of their obligations to a later date. But what, then, happens to the trade credit lender? Is he also authorized to roll over *his* debt to *his* bank under the same regulation?

c. Magnitude of Supports

Are the various supports cumulative? Can one use all of them simultaneously?

If emergency approval of credit is involved, how is the amount of that credit determined? On a historical basis, and if so, on what year or what average of years? Or should it be based on some estimate of what future revenues can bear?

d. Equity of Supports

When disaster strikes, it is especially important that all persons in similar situations be treated equally. But consider two neighbors whose sowings have been wiped out by a flood. Neighbor A has funded his operations by borrowing from the bank, while neighbor B has used his own capital. Would it be fair then, for A to get his loan rolled over and to pay it over five years, while B would get no credit? Fairness in such cases needs to be defined *ex-ante* and be clearly established, so that allegations of undue preference not undermine the valid purpose of the policy.

e. Channels of Support

In emergencies, the bureaucracies designed for normal operations get quickly overloaded, especially if they themselves have been affected by the triggering event. It is to be expected, therefore, that the financial system will come under operational strain. Can enough bank personnel get into the affected area with enough small denomination bills to supply the needed cash? Can the needed

cellphone calls be made informing customers that their funds are available? Or would it make sense for the first responders to be able to provide the affected population with the financial information most crucial for them? If so, what would that information be?

It is well known that, in matters of regulation, the devil is in the details. But that should not be a reason for not proceeding.

8. CONCLUSION

Climate disasters are major events. They affect society and the economy. They also affect the financial system. Financial regulations condition how the financial system responds to these events, hence financial regulators have an unavoidable responsibility.

Until recently, financial regulators did not explicitly address the policy requirements of climate change and climate disasters. That is now changing, under the pressure of the increasing recognition that all policy making bodies need to do their share and that financial regulatory instruments have a unique ability to reach deeply into all parts of the economy.

Where climate disasters are concerned, some of the recent events have been exceptionally dramatic and caused very extensive damage. All types of jurisdictions have been affected, from small islands to large and developed countries.

Financial regulations have a role to play in abating and containing the damage from climate disasters. They also have a role to play in the subsequent recovery actions. *Prepositioning* policy responses is absolutely essential for effective action. Fortunately, what is required in terms of specific regulations is well within the familiar toolkit of the regulators. A quick response to this newly recognized challenge is therefore fully feasible.