The revenge of David. Financing local governments in the production of global public goods

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Abstract

Societies and governments are facing new, mostly never experienced global risks and challenges. We focus on three of them. They are shielding the planet from climate warming, preparing societies to the occurrence of new pandemics, and preserving biodiversity. Response to the global public bads they originate requires an urgent and expanded provision of global public goods. All sectors of the society are involved, from single individuals to the biggest corporations, and all levels of governments as well. In some instances, such as emissions (and cuts to them) individual contributions differ in quantity but not in quality. In other instances, a single contribution is the crucial one but, being a public good, everyone has a strong interest to it. It may be the strongest (who first produces an effective vaccine), or it may be the weakest (who builds the lowest barrier to fires, or to water floods). This produces a dense network of interrelations, where local governments play a primary role, although they may be weak and in need of support.

The paper focuses on financial support to subnational governments, being the most urgent, also considering the context of global growing inequality in wealth conditions in which the new challenges are taking place. The experimental character of most responses also supports the choice. As we have learned from the present pandemic, there were neither valid, agreed upon guidelines available at the beginning, nor vaccines or drugs. In turn, efficient experimenting requires a level play field, hence equalization of resources.

The paper makes specific reference, particularly in the applied part, to Latin America. The region is involved as the other continents in global risks. Huge inequalities extending from individuals to local governments make responses very urgent and important. The paper analyzes alternative instruments for equalization and provides, in the final paragraph, a simulation about extending equalization grants allowing local government to provide effective responses to global risks.

Introduction

This paper explores the perspective on the increased participation of subnational governments, particularly of the local ones, in the provision of global goods, in response to global risks.

Global risks have be definition a planetary impact. However, this impact is very spatially differentiated intensity and elicits responses from all persons and organizations that are also very differentiated. Through this differentiation global risks call also for local government actions, being local governments best equipped for sensing the local impact and for giving responses, as we will see in this paper.

Also, calamities affect more the poor people or those in more exposed situations, who are again most frequently the poorest persons. Since all local governments cannot rely on adequate levels of resources, this implies more redistributive funding of them. Solving the dilemma between the necessary action by all local governments and their differential financial capacity of providing this action is the essence of the paper. It has more the character of a research program, than that of a fully-fledged paper. It uses lots of literature that are unusual in that referred to local governments. These pieces of literature need to be amalgamated with local government issues and points of view. There is a clear recommendation, but there are almost no definite conclusions.

1. Global risks and challenges

Societies and governments all over the world are facing huge and mostly never experienced common risks and challenges. They go from shielding the planet from climate warming disasters, to preparing societies to confront the likely occurrence of new pandemics, whose frequency is likely to increase in an increasingly physically and socially interrelated world, to preserve the environment and particularly bio-diversity, to avoid global financial instability, and last, but in the reality it should be the first, the preservation of peace and security. Societies are witnessing, and suffering from, the increased emergence of global public bads. Responses to global public risks require an increasingly urgent and expanded provision of global public goods and services¹.

Global risks push back societies to a Hobbesian setting, where the fundamental task of the state, or better of all states, international organizations, business and non-business, and individuals is to provide protection to citizens. Protection takes now an inclusive character, where all the stakeholders are called to foster the well being of its citizens and particularly of the weakest ones, who need more protection.

¹ Buchholz and Sandler (2021) propose a very recent review of the literature on public goods with a view of inserting the issues in the framework of global risks.

Reference to a global scale is correct, in view of the planetary impact of the new challenges. It does not imply, however, that responses have to be devised and executed at the global level, engaging only a world government that does not yet exist, international organizations, or the governments of big countries. The main reason is that the impact of global public bads, or more precisely the vulnerability to global risks is extremely spatially differentiated. This becomes evident when we distinguish between physical vulnerability refers to the degree to which a system is susceptible to be damaged by extreme weather events. Here, the human response is not taken into account. Physical vulnerability shows spatial variability also within countries, depending on risks. Coastal zones facing open seas are subject to floods, while those facing closed seas are almost immune. Similar differences in vulnerability can apply to earthquakes. Reduction of biodiversity is a global public good, but propinquity to areas where it takes place, makes its impact much deeply felt.

Social vulnerability is focused on the state of a system prior to any risk. It refers to the degree to which a system is susceptible to damage. The vulnerability of a population, or of a political jurisdiction, such as a municipality or a province, is determined by factors such as poverty, marginalization, and quality of dwellings, the infrastructure of the area, roads, rates of population growth, among others.

Social vulnerability is the source of the biggest variation of the impact from global risks. Studies show for example that urban areas suffer more than rural areas and that zones at the fringes of large metropolitan areas suffer the most. This is, for example, the case of Mexico, as we can observe in Figures 1a and 1b.



Figure 1. Index of climatic vulnerability in Mexican cities

Conurbación de Puebla

Ciudad de Mexico

Source, IMCO, Indice de vulnerabilidad climatica de las ciudades mexicanas. Reporte final. Ciudad de Mexico, 2012

The two following graphics of Figure 2 further illustrate the extreme spatial differentiation of global risks and the derived need of governing the responses at lower levels of government. Risk in question is vulnerability to climate change inside Mexican states. Each graphic shows the number of municipalities with, respectively, a level of medium low (left panel) and medium high (right panel) vulnerability.



Figure 2. Number of municipalities vulnerable to climate change in Mexican states



Source as in Figure 1-

(a) medium low vulnerability

As we can observe, the three states with the highest number of municipalities characterized by medium low and by medium high vulnerability are exactly the same. Hence one could believe in full compensation inside them. Those states would then appear to have no problems with climate vulnerability, which is not the case when we look with more detail.

The extremely differentiated impact at the spatial level calls into action subnational governments, both in the abatement of risks and the adaptation to them. As we will see, local, or better locally produced goods in the areas concerned enter directly, although in radically different ways dictated by the technology of aggregation, in the supply chain of global public goods. A quite relevant case concerning global risks is when the response is determined by the entity that provides the lowest level of the good. For example, forest fires start in the area with the lowest level of prevention and may extent to better-cared areas. Poverty and precarious living conditions are the gates for the spread of epidemics. In this context strategic interrelations with other stakeholders turn more complex and financing becomes a priority. Considering that most tax bases and tax collections are concentrated at the upper level of government devolution of resources to local governments is a pre-requisite to allow these governments to play fully their expected role. Obviously, local government should not work always in isolation, rather the contrary, as

suggested by the literature on global risks. However, to consider cooperation strategies is a complex task that cannot be adequately treated in this paper.

Terminological clarification: global warming

The atmosphere can be viewed as a common pool resource. Total emissions of different gases change its composition, affect its quality and produce the greenhouse effect leading to global warming.

Global warming is a global risk, specifically a public bad, being non rival and non excludable.

Emission of gases are global public bads: non rival and perfectly substitutable.

Reductions of emissions of gases are public goods, with same characteristics.

It does not matter where and by whom the greenhouse gases are reduced.

Agents in the production of global goods and bads include not only individuals, but also governments and other institutions.

Because of perfect substitutability, emissions/reductions of emissions follow, according to the technology of aggregation, the simple sum principle.

This means that the total public good, total reduction of emissions is the simple sum of individual emissions.

We have a typical collective action prisoner dilemma: no agent has an incentive to reduce emissions.

In the absence of a world government, inclusive international agreements are needed and a network of cooperative stakeholders as well.

Financially, donations, grants and loans are needed to support the provision.

2. Policy responses to global risks

From a policy perspective it is useful to distinguish between abatement/mitigation policies, on the one hand, and adaptation/prevention policies on the other, since they may imply different agents and different financing. At the same time, there is not always complete separation between the two response approaches because of the existence of synergies between the two.

Policie	Abatement	Mitigation	Adaptation	Prevention
S				
RISKS				
Occurrence of	Discovery,	Discovery,	Improvement of living	Social distancing,
new pandemics	development,	development,	conditions, reduction of	distribution of masks and
	production and	production and	overcrowding. Subsidies to	other equipment,
	distribution of vaccines	distribution of	poor individuals and	sanitation, safe water
	and drugs	treatments and	compensation of damages	-
	-	drugs	from interruption of business	
		J	activities	
Climate change	Shift to clean,	Promotion of	Mitigation of flood, risks of	Infrastructure more

Table 1. Policies to respond to global risks

	renewable, energies. Sustainable mobility, bike lanes, limiting access to city centers, clean public transport, electric vehicles	cleaner and more energy efficient technologies for manufacturing processes, centralized heat production for residential buildings	fires, forests, improvements in crops, Managing water resources, and Protection of poor individuals from the impacts on their living conditions	resilient to extreme weather, refitting and better insulated dwellings, purchase of ventilators and air conditioners, access to safe water, better health
Prevention of Biodiversity	Protected areas, regulation of use, setting of quotas, allocation of rights, taxes and fees	Replanting, replenishment of fish stock	Compensation for missing or limited use of land, and other resources	Prevention of natural disasters and fires

Table 1 above, lists the main policies available to respond to the three main global risks threatening societies that are analyzed in this paper. They are the occurrence of new pandemics, climate change and destruction of biodiversity. Many important policies are missing since the list has mostly an illustrative function. It shows in *italics* the policies that by their nature have a prevalent local interest while producing externalities with a global impact.

This does not mean, however, that they have to be assigned, and exclusively, to sub national governments. Alternative, and especially cooperative, arrangements are available. Capacity constraints are also most likely. Surely, most responses have an experimental character, implying the involvement of many stakeholders. However, knowledge is limited also at upper levels of government, including international organizations, as we have learnt from the Covid-19 pandemics. In turn, efficient experimenting requires a level play field, including the allocation of resources.

Most of them have a high cost of provision. This characteristic and the existence of externalities imply the need for financing by upper levels of government.

3. Production of global public goods, the aggregation technology

Observation of the technological characteristics of many relevant policies signals the need to foster funding from upper level governments. The aggregation technology refers to the different ways single individuals, or other entities, contribute to the production of public goods, and of public bads as well. Hirshleifer (1983, 1985) has pioneered this literature.

The most referred case in the literature is when the quantity of the public good is variable and amounts exactly to the sum of individual contributions.

 $X = \Sigma_i x_i$, where X is the total quantity and x is the individual contribution.

To make a very popular example, the global amount of CO2 emissions in a single day is equal to sum of CO2 released by each emitter. Emission sources differ only by the quantity of their emissions.

Different aggregation technologies apply when the quantity of the public good is fixed. Take the case of vaccines. Once an effective vaccine is discovered, its formula, when

made available, is a public good. The discovery does not derive from the summation of attempts made in different laboratories, but exclusively by the best attempt. This is the case of the best-shot aggregation technology. ($X = max(x_i)$). Richer and better-equipped stakeholders are the most likely to produce the best shot.

The opposite, but equally very relevant technology is when the social quantity of the public good is determined by the smallest contribution. This case is referred to in the literature as the weakest link. ($X = min(x_i)$). The ocean flows inland through the lowest dike. The containment of a virus is a global public good whose level depends on who, i.e. the state, or other, keeps the barrier at the lowest level.

The classical, Hirshleifer's example: protection against flood of a circular island.

Each citizen owns a wedge-shaped slice of the island and each one builds a dike along the coastal line of the slice.

The lowest dike determines the level of protection against flood, and the dike can be seen as a chain, each link being necessary for achieving the common good. The weakest link determines which level (quality, or quantity) of the good can be achieved.

The contributions are not additive and they cannot –physically- be substituted for each other. A piece of dike higher than the average cannot compensate for a lower piece.

This is a case of weakest-link terminology, where the situation is typical of the stag hunt dilemma first presented by J. J. Rousseau.²

Capacity building is essential when agents differ, partnerships, and others can assist weakest-link agents.

The weakest-link principle applies also within countries. All governments and levels of government are involved in the new Hobbesian tasks. The weakest segments of the population are the most affected epidemics and climate change. Think of overcrowding, of higher risk-exposed occupations, and of missing revenue for those operating in the informal sector, etc. Poor people are also the gates through which the epidemics spread out. They are the weakest link on the social scale. This is a crucial element in a context, such as the present one, of growing wealth inequality, among governments and individuals, requiring support from the richest individuals, or governments to the poorest ones.

4. Stakeholders and instruments available

As stated, responses to global challenges involve everybody and every organization since everybody is affected.

² Two hunters have been waiting all the day for a stag to arrive. Suddenly a hare appears. One hunter is enough to kill the hare, but it provides food only to one of them. There is no assurance that the stag will show up, so the hunt will end up with one hunter killing the hare and leaving the second one to starve.

Stakeholders go from international organizations to single individuals. Instruments vary, going from discovery of relevant goods (such as drugs and vaccines, services, technologies and production processes), to the promotion of agreements and policies, to the effective delivery of policies. Governments, particularly those situated at the lower levels, are the main players in the delivery of policies. Table 2 lists the stakeholders and the instruments available to them for facing global risks. The reference is again to the three main risks here considered.

Policies Stakeholders	Discovery of new products and processes,	Dissemination of knowledge, fostering awareness, global cooperation and action, global plans	Funding	Production and delivery of abatement/ adaptation policies
International organizations	Global promotion, delivery of own studies and research	In house activities, promotion of international, multilateral agreements and conventions; multilateral and bilateral agreements	Grants and loans to national and local governments and non profits	Circumscribed to own facilities and personnel
Businesses	Delivery of own studies and research	Individual and cooperative promotion	Direct investment spending, payment of taxes and fees, purchase of rights, donations	Through their own direct activities worldwide
Non-profit organizations	Promotion of studies and research	Promotion of agreements at all scales of government and businesses. Own activities	Donations and grants	Circumscribed to own facilities and personnel
National governments	Promotion and especially delivery of own studies and research	Individual, cross-borders, and multilevel promotion of agreements and contracts	Direct spending, grants to subnational governments, funding of international organizations, subsidies to businesses and individuals	Through their own direct activities
Local governments (including owned utilities)	Experimentation and use of new products and processes	Promotion of Individual, cross local borders agreements and contracts	Direct spending, subsidies to businesses and individuals	Through their own direct activities
Individuals	Participation to trials, Individual discoveries	Communication, oral and written persuasion activities, participation to decision-making processes.	Donations	All sort of individual and collective activities

Table 2. Stakeholders and instruments for	promotion and delivery	y of policies
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5. Funding

The cost imposed on society as a whole, is enormous, although not fully recognized directly. Delays in reaching agreements and forging commitments are a clear

indication of the size of the burden. Despite the wide perception of global risks and the growing popularity of environmental and other protection goals, delays and postponements come to the fore when it comes to implement costly policies .

Different types of sources of funding are available and their variety allows also some mitigation of political costs. First come, but necessarily non in terms of size, voluntary donations, by individuals and firms (also through non-profit organizations). Then, we have compulsory payments, taxes and fees. These payments can be substituted by costs imposed on firms and individuals through regulation and the introduction of markets of rights (tradable permits to emissions, or to deforestation). To same extent they are alternative instruments. For example, CO2 emissions can be reduced by increasing the excises on emission sources, by increasing limits and standards on emissions and by introducing a market of emission permits.

Clearly, national governments have the upper hand in funding through the levying of taxes and fees. Donations play an important role, considering that everybody is directly affected by the big risks. This fact should also induce vast provision of voluntary work.

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Policies	Occurrence of new	Climate change	Prevention of Biodiversity	
Instruments	pandemics			
Sale of rights	n. a.	Onerous allocation of	Onerous allocation of	
		emission rights	deforestation and use of	
			flora and fauna rights	
Taxes and fees	n.a.	Taxes on emissions of		
		gases, on fossil fuels and		
		other sources of gases		
Spontaneous	From nonprofits,	From non profits,	From non profits,	
donations, tax	businesses and	businesses and	businesses and	
induced donations	individuals	individuals	individuals	
	From governments,	From governments,	From governments,	
Grants	international	international	international	
	organizations	organizations	organizations	
	From governments,	From governments,	From governments,	
Loans	Loans international		international	
	organizations,	organizations	organizations	
financial institutions				
Provision of voluntary	Very important	Crucial for promotion of	Crucial for promotion of	
work		appropriate behavior	appropriate behavior	

Table 3. Sources of funding

6. Combating poverty to reduce risks

We are facing with global risks, situations case where the trade-off between efficiency and equity applies very partially, or not all. Social vulnerability increases with poverty opening the gate to a larger diffusion of higher risks. The weakest/weaker link principle applies to many responses. Poverty induces people to behave in myopic way, or it incapacitates them to comply with obligations (such as paying taxes, or buying rights), or to take preventive measures. This is a very important consideration to have in mind because it shows the political risk of many policies under consideration

Alleviation of poverty demands typical instruments, such as money grants and provision of basic services. More importantly, it has to take place in the wider context of growth promotion.

An example related to biodiversity preservation will suffice. A major thrust of a campaign to create protected areas is to improve production, income, and employment in other areas, including cities, towns, and places where agriculture is already well established.

In other words, what is needed is the promotion of sustainable and inclusive development.

The call to operation of subnational governments is amplified.

7. The relevance of the local level

Most (innovative) sustainable growth policies are performed at the municipal level, particular by big metropolitan cities. Lesser cities and villages are crucial for adaptation policies. Also, the weakest link criterion stresses the need of engaging and supporting local government in the responses to global risks. This leads to a strong need of equalization transfers also to local governments, posing challenges for their construction particularly in terms of providing the needed, more detailed information. In classical (two levels) federations, states or provinces provide equalization grants to their local governments, broadly replicating the federal grants. This is the case of Australia and Canada.

In modern (three levels) federations, such as Brazil, and Germany and in regional and unitary countries, such as Colombia, Chile, Uruguay Bolivia and other, the central government provides equalizations grants to their local governments.

There also cases (as in Germany) of revenue sharing to local governments. However, targeting difficulties can be major.

8. Revenues for subnational governments. Specific versus general, nonconditional and equalization transfers

Local governments are at the frontline of the costly responses, being crucial participants in the supply of global public goods. The need of additional resources can be partly satisfied by the assignment of new own tax instruments, and by opening access to private finance. This satisfies accountability, but is clearly limited in scope in view of the inequality of local wealth conditions and tax bases. Moreover, in a context of growing wealth inequality, the weakest level determines the effectiveness of the responses. Transfers from higher levels of governments are called for. Yet, poorly designed transfers

and absence of effective own-source revenues can lead to irresponsible local behavior and do harm rather than good.

Transfers are both specific/conditional and general/non-conditional. The latter are better equipped to provide equalization, while the former are better used (with a grain of salt) for the implementation of national priorities and for compensating the provision of externalities.

This distinction, when combined with the other distinction between abatement and mitigation policies on the one hand, and adaptation and prevention policies on the other, helps to determine the relative shares of specific and general grants. More precisely, specific/conditional transfers are to be recommended for funding abatement/mitigations policies. They allow inserting these policies in national priorities and plans. We have, also, to keep in mind the best shot characteristics of most abatement and mitigation policies. There is a general benefit from having a large number of organizations taking part in these activities, considering their experimental character. Their global public good character, i.e. the provision of positive externalities, creates incentive problems that specific grants are can able to surmount. These grants are also the appropriate instrument for providing extraordinary relief in case of extreme events (asymmetric shocks). They are currently used (also in LAC countries) to fund prevention policies, but tend to be transformed over time in funds for emergencies (to the expense of prevention), creating huge problems.

Also we have to consider that international- and national-level decision-makers predominantly determine most policies in our areas. However, "finance for adaptation rarely reaches the local actors that require it most urgently, and the essential knowledge and expertise they offer are frequently ignored (IIED 2020; Restle-Steinert et al. 2019). Recent estimates suggest that less than 10 percent of climate finance from international climate funds is dedicated to local action, less than 2 percent of humanitarian aid goes directly to local partners, and less than 5 percent of official designated funding for environmental protection goes to Indigenous peoples and other local communities The barriers to decentralizing finance and power to the local level are widespread and complex. They include systemic social and political barriers related to structural power imbalances between local actors and national and international actors. Administrative barriers related to procurement policies and application and reporting requirements, and capacity barriers among funders, governments, and local partners, also hinder decentralization" (World Resource Institute, 2022.)

This adds to recommending general/non-conditional equalization transfers for funding adaptation/prevention policies. One of the main reasons behind non-conditional transfers is that local beneficiary governments have a better perception of their priorities and needs, than the central government. Considering that responses to global risks are still to a large extent experimental, involving a plurality of innovators and experimenters, strengthens this argument. As a matter of fact, the literature is filled with case studies of local governments' innovative involvement in the responses to global risks.

Obviously, there are many cases of overlapping between abatement/mitigation and adaptation/prevention policies, making the suggested criterion less decisive. To make a very simple example, building bike paths is a typical local good that contributes abating emissions. However, it is not practicable in rugged mountainous areas, which would be left out by a specific grant for bike lanes. This suggests to insert it's funding into a general grant, despite the specificity of the policy.

9. Instruments for equalization revenue-sharing systems versus equalization grants

There are two main instruments for equalization with a view to strengthen response to global risks. They are, first, revenue-sharing systems with a (strong) equity concern and, second, needs and fiscal capacity-based equalization grants. Let's call them fully-fledged equalization grants.

9.1. Revenue sharing systems with (strong) equity content

These systems are widely used: India, South Africa, Germany, Austria and in South American countries, especially in federations. A very recent example of a revenue sharing system targeted also to front a global risk (climate change) and with a relatively strong equity content is the EU Recovery and Resilience Facility.

The EU Recovery and Resilience Facility

Will provide up to €672.5 billion for investment. Breaks down into €312.5 billion in grants and €360 billion in loans.

The grants are allocated according to:

the Member States' population

the inverse of its GDP per capita

the average unemployment rate over the past 5 years (or loss of GDP).

There is a revenue constraint by which 37 per cent of the received grant must be allocated to climate change response policy. In addition, each measure proposed in national plans plan has to respect the "do not significant harm to the environment" principle.

These systems are based generally on a simple, transparent, formula.

They are compatible with sector allocation constraints, such in the case of the EU fund (if it is really considered necessary) and are inherently not subject to frequent changes (in India they can be revised every five years).

The number of allocation indicators has to be kept small, to avoid the risk of contradictory impacts on the allocation. For example, the Indian revenue sharing formula

includes, now, both population and the negative of the rate of growth of population, thus rewarding at the same time the increase and the decrease of the population.

These systems are not much appropriate for targeting specific and crucial needs situations, and for taking into account the exploitation of fiscal capacity, resulting, generally, in limited equalization capacity.

Most Latin American and Caribbean (LAC) countries have a revenue sharing system whose total amount to be allocated is determined according to a given percentage of national GDP. These systems pursue multiple objectives, including efficiency, regional equity, and specific national objectives. Their distribution formulas generally do not include specific indicators of fiscal capacity and/or spending needs.

Rather, many of the distribution formulas try to take into account relative needs through the inclusion of proxy variables, such as population size, rurality, extension of territory, density and/or level of poverty. The ability to capture specific needs is, as a consequence, quite limited. Some of them try to take into account fiscal capacity with aggregated indicators.

The equalization impact of revenue sharing mechanisms is especially evident at the municipal level, where there are a large number of jurisdictions and a huge heterogeneity of situations and, last but not last, the necessary information is much harder to collect.

9.2. Expenditure needs and fiscal capacity-based equalization grants

They are considered the most performing intergovernmental equalization systems, although the way they are constructed inserts a bias towards increasing expenditure by beneficiary governments. Their structure is illustrated by the following formula:

$$Tn = F \sum_{1}^{t} E_{c,d,ef,\dots j} - R \sum_{1}^{s} R_{y_{m,w}}$$

Where:

 T_n is the grant to government n

F is an intensity of distribution parameter, goes from 0 to 1.

The two summation terms are standardized expenditure and revenue, with

E the observed expenditure/standard cost (*t* sectors)

R the revenue base (*s* taxes)

c,d,e, f..j. are standards/parameters defining the t expenditure

y,,,,*w* are standards/parameters defining the *s* revenues

They serve to implement the interjurisdictional equity principle by making residence no more relevant for access to local services and their payment (Boadway and Flatters, 1982).

9.3. Comparing revenue-sharing systems with fully fledged equalization grants

Comparisons can be made from multiple points of view. The most common and easy way to perform is by observing the variation in the distribution of revenue after their allocation. The starting point is the GINI coefficient representing the distribution of own revenues and then adding the equalization instruments and check the impact, as reported in Table 4. Since the table considers all categories of transfers to subnational governments, the redistribution impact is not entirely attributable to the equalization mechanisms.

Table 4 reports the results for a number of Latin American and for four OECD countries.

A variety of situations are presented. The first four rows (bold and capital) depict revenue sharing systems applied to the intermediate level (states and provinces). The next rows (bold and italics) report results for transfer systems to local governments. With the exception of Chile, where a specific equalization grant applies, revenue sharing systems are again operating. The last four rows present four non-Latin American cases. Australia and Denmark are using fully -ledged expenditure needs and fiscal capacity based equalization systems. Germany applies a complex horizontal (transfers originate and arrive from same level governments) and vertical (from higher to lower levels, as is the usual case) revenue equalization system. Canada applies a rather sophisticated system based uniquely on fiscal capacity.

Table 4. The revenue equalization impact of subnational transfers, a comparison.*Gini weighed by the population*

	Before grants		After grants allocation	
	2005	2012	2005	2012
Argentina	0,18	0,16	0,14	0,16
Brazil	0,21	0,21	0,15	0,16
Colombia	0,37	0,34	0,25	0,23
México	0,45	0,39	0,10	0,09
Uruguay	0,28	0,25	0,19	0,16
Bolivia	0,27	0,32	0,16	0,22
Brazil (loc govern)	0,49	0,46	0,24	0,22
Chile	0,46	0,52	0,27	0,27
Costa Rica	0,40	0,34	0,33	0,27
Colombia	0,46	0,43	0,25	0,23
Ecuador	0,58	0,51	0,35	0,36
Germany	0, 06	0,06	0,02	0,02
Australia	0,05	0,07	0,00	0,00
Canada	0,10	0,11	0,07	0,08
Denmark	0,08	0,06	0,04	0,03

Source. Banco Interamericano de desarrollo

As we easily see, the OECDE cases start from lower levels of inequality and reach, together with Chile, the best equalization outcomes. Equalization grants fare better than revenue sharing systems. Mexico with good equalization outcomes seems to contradict this statement. However, the good outcomes derive mostly by the *Aportaciones* that are a set of cost based sector grants. Denmark demonstrates that a fully-fledged equalization grant system is able to perform a significant redistribution also at the local level.

We have to make clear that the exercise has limited significance, because the redistribution impact is measured only in terms of revenue. Economics is based on individual utility and wellbeing. When we introduce these concepts, the results may vary substantially. More specifically, with individual welfare as the basis of comparison, needs and fiscal capacity-based equalization grants became clearly superior, because, first, they consider specific need situations as recognized by beneficiary governments and, second, they consider correctly, by standardizing, fiscal capacity. Let's illustrate this argument with a simple example that contrasts the needs element with fiscal capacity.

We have two households of the same size.

Household A has a marginally higher revenue than household B, but less healthy members, whose care costs more than the revenue gap.

With an equalization grant system that takes fully into account the expenditure needs, the less healthy household A will receive a larger grant, despite its higher revenue. The grants system will be less redistributive if circumscribed to only revenue equalization

10. Some preliminary steps towards the insertion of policy responses to global risks into equalization grants

In what follows we refer to the typical methodology used for the determination of standardized expenditure, *i.e.* the expenditure determined according to the specific needs for each function where subnational governments operate. We abstract from the formal, but crucial, issue of assignment of functions. The basis of this abstraction is two-fold.

First, many when not most functions that are relevant for responding to global risks are already assigned to subnational governments. Second, the assignment procedure is a lengthy one, frequently requiring constitutional review. It is much simpler to decline experimentally a new classification of functions in the allocating schemes.

The steps are detailed into Table 5 that serves also to illustrate the determination of standardized expenditure.

We have four existing/traditional policies: health, social assistance, housing and public hygiene and sanitation and three new functions. They correspond to the three big global risks considered here. They are: preventing/mitigating pandemics, preventing biodiversity reduction and adaptation to climate change. Practically every local government already carries out these functions at least partially. Impending responses to global risks suggest to keep they distinct and expand them.

	Traditional functions to be updated			New functions to be singled out from existing ones and expanded			
	Health	Social assistance	Housing	Hygiene and sanitation	Preventing/mitiga ting pandemics	Preventing destruction of biodiversity	Adaptation to climate change
Present Policies	Focused on prevailing diseases	Alleviation of poverty, assistance to elderly people, etc.	Improving access to affordable housing	Provision of clean water, connection to sewers, washing and cleaning of streets.	Local monitoring of new diseases, and spread of new viruses.	Reforestation, setting of protected areas	Bike lanes, sustainable mobility. Control of traffic to city centers
Present Standard cost = present expenditure	200	150	100	250	0	15	25
Updated/new policies	Strengtheni ng the territorial network for the provision of health services.	Compensatio n of revenue losses during pandemics, after natural disasters; free provision of food during basic items emergencies	Reducing crowding, refitting/insul ation of dwellings	Acceleration and extension of policies	Establishing networks for monitoring spreading of viruses, for distribution of supplies such as masks, testing kits	Expanded creation of protected areas, administration and control of new taxes and fees; strengthening of controls	Refitting, insulations of public premises. Promotion of use of cleaner fuels in public transports. Promotion of efficient use of energy by households and

Table 5. A revised need- based equalization grant mechanism to respond to global risks.A few illustrative examples.

Updated standard costs=initially increased by central government decision	250	200	200	350	30	100	200
Existing indicators of needs	Structure of age of population, morbidity indexes	Poverty indicators. Number of single parent households, etc.	Number of households in precarious housing conditions, etc.	Number of dwellings without access to these services, etc.	n.a.	Surface of protected areas, index of biodiversity	Length of bike lanes. Number of electric buses, etc
New indicators of needs	Number of immune- depressed persons, etc.	Nu mber of persons affected by social distancing measures, by natural disasters, by establishmen t of protected areas	Index of overcrowding , etc.	Same as before	Number of more fragile persons, number of people in homes for the elderly,	Increase of surface of protected areas, forested area etc.	Number of refitted houses. Percentage of population living in extreme climate.

The first row below the functions lists the policies already carried out by our hypothetical government. The second row reports the standard cost, i.e. the actual expenditure made for each function by all subnational governments. The central government takes it for given and applies costing and need parameters to determine the standardized expenditure. The following row reports the new policies needed to respond to global risks. They serve obviously as pure indication and their variety is constrained by the missing imagination of the author. The new standard costs are reported in the next row. Since the central government recognizes the crucial need of expanding subnational governments' responses to global risks, it is ready to increase its financial support, increasing the standard expenditure. We have now two rows with, respectively, the present indicators used for standardization and the new ones (that do not necessarily need to be changed if the old ones are adequate).

Application of new indicators to new standard costs leads to new standardized expenditure, extended also to the response to global risks. The exercise is statistically very easy, but it requires politics embedded choices, such as the choice of the indicators, the weights to be given, how to link them to the standard cost, etc.

Conclusions

As mentioned in the introduction, this paper can not have definite conclusions. It has presented a few aspects related to the policy responses to global risks highlighting the role of local governments and the importance of including alleviation of poverty in these responses.

The combination of these two mentioned facts leads to suggest expanding the role of equalization grants for subnational governments. A short presentation of how to approach this instrument is also made. For Latin American countries it would require a shift from revenue-sharing systems to fully-fledged equalization grants. This is a tough step in political terms. The author believes that it is worth trying.

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