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FONDATION POUR LES ÉTUDES ET RECHERCHES SUR LE DÉVELOPPEMENT INTERNATIONAL

Using a Vulnerability Index to Simulate a Reallocation of SDRs?

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The voluntary reallocation of a portion of Special Drawing Rights (SDRs) from advanced countries to developing countries is potentially an important transformation in the international monetary system. Attention has so far been focused on the channels of this reallocation, because of the need to preserve the reserve asset nature of SDRs. The IMF is considering three options (Pazarbasioglu and Ramakrishnan, 2021). First, it is proposed to increase the size of the Poverty Reduction and Growth Trust (PRGT). Second, the IMF could create a new IMF-administered Resilience and Sustainability Trust, or RST: The proposed RST would support policy reforms to help build economic resilience and sustainability in low-income countries and small states, as well as vulnerable middle-income countries. Third, the IMF could channel SDRs to other prescribed SDR holders, comprising 15 organizations including the World Bank, some regional central banks, and multilateral development banks. The three options are non-mutually exclusive.

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LA FERDI EST UNE FONDATION RECONNUE D'UTILITÉ PUBLIQUE. ELLE MET EN ŒUVRE AVEC L'IDDRI L'INITIATIVE POUR LE DÉVELOPPEMENT ET LA GOUVERNANCE MONDIALE (IDGM). ELLE COORDONNE LE LABEX IDGM+ QUI L'ASSOCIE AU CERDI ET À L'IDDRI. CETTE PUBLICATION A BÉNÉFICIÉ D'UNE AIDE DE L'ÉTAT FRANÇAIS GÉRÉE PAR L'ANR AU TITRE DU PROGRAMME « INVESTISSEMENTS D'AVENIR » PORTANT LA RÉFÉRENCE « ANR-10-LABX-14-01 »

... /... It is equally important to discuss the final geographical distribution and use of these re-allocated SDRs. An important issue is the determination of the beneficiaries and how they will be targeted (Cabrillac and Guillaumont Jeanneney, 2022). It is particularly the case for the PRGT or the potential RST for which reallocated amounts would be determined by the IMF quotas formula. The IMF quota formula was not designed for the purpose of targeting the poorest countries and, as shown in this brief, only gives a small weight to a debatable measurement of vulnerability. Not all developing countries have the same vulnerabilities, the same needs or the same absorptive capacity. The current IMF quotas formula while already taking vulnerability into account to a small extent does not seem appropriate to reallocate SDRs to and between vulnerable countries.

This brief argues that country vulnerability, in all its main dimensions, should guide this redistribution. This raises several technical questions. Through a series of simulations, we illustrate the differences in terms of reallocation of SDRs obtained from the current IMF quotas formula and from a vulnerability base formula. We selected the new Commonwealth Secretariat Universal Vulnerability Index (UVI) to measure vulnerability (Kattumuri and Mitchell, 2021; UN-OHRLLS, 2021). Simulations show that reallocated SDR shares are decreasing with vulnerability with the quotas formula and are increasing with the vulnerability-based formula. Sub-Saharan Africa as well as the least Developed Countries (LDCs) and Small Island Developing States (SIDS) would be the main beneficiaries from the use of a vulnerability-based formula. It appears possible to design a simple and transparent reallocation model that takes the multiple dimensions of vulnerability into account.

Vulnerability taken into account so far

The reallocation of SDRs based on country vulnerability is consistent with the purpose of addressing the long-term need for reserves, of increasing the resilience and stability of the global economy and of helping the most vulnerable economies cope with the impact of COVID-19. The purpose of an SDR allocation is to strengthen the foreign exchange reserves of countries vulnerable to a balance of payments crisis of global origin. The appropriateness and size of the global SDR allocation is therefore determined by the residual foreign exchange needs of vulnerable countries in the event of a global shock (Cabrillac, 2021).

To understand how to design the framework for the reallocation of SDRs, one has to understand how to best take vulnerability into account, and how it differs from the current IMF quotas formula.

According to the IMF, the quota formula is used to help assess members' relative position in the world economy and it can play a role in guiding the distribution of quota increases. The current formula was agreed in 2008 and is as follows (IMF, 2008):

$$CQS = (0.50*GDP+0.30*Openness+0.15*Variability+0.05*Reserves)^{0.95}$$

Where

CQS = calculated quota shares;

GDP = a blend of GDP converted at market rates and PPP exchange rates averaged over a three-year period. The weights of market-based and PPP GDP are 0.60 and 0.40, respectively;

Openness = the annual average of the sum of current payments and current receipts (goods, services, income, and transfers) for a five-year period;

Variability = variability of current receipts and net capital flows (measured as a stan-

dard deviation from the centered three-year trend over a thirteen-year period);
Reserves = twelve-month average over a year of official reserves (foreign exchange, SDR holdings, reserve position in the Fund, and monetary gold); and
k = a compression factor of 0.95. The compression factor is applied to the uncompressed calculated quota shares which are then rescaled to sum to 100.

This fundamental points behind the formula is that it should be simple and transparent and that GDP is the main variable reflecting relative positions in the global economy. The formula has not evolved much over time, following the original objectives of maintaining international monetary stability. While the formula allocates quota shares to countries with the greatest need for SDRs, these countries are not necessarily those most in need when their vulnerability and poverty levels are considered. The international push for a voluntary reallocation of a portion of SDRs to help disadvantaged countries represents a completely different objective than those reflected by the IMF quotas formula.[1] Contrary to GDP, one might reasonably surmise that the variability variable is particularly relevant for low-income members. The underlying argument for a variable based on the variability of current receipts and net capital flows is that such a variable reflects a potential need to borrow from the IMF. However, the weight given to this variable is very low. Similarly, a high openness represents a significant exposure to international shocks such as Covid-19. Those two variables interact with one another and represent a narrow approximation of economic vulnerability.[2] Furthermore, it is unclear if the variability variable is clearly reflecting volatility of current receipts and net capital flows considering how it is designed.[3]

A country's vulnerability is generally designed by the risk that it will be affected by exogenous shocks, either external or natural. These could be economic shocks, climate change shocks or shocks related to political fragility. A country's structural vulnerability results from the size and recurrence of these shocks, as well as from the potential impact they may have on the country due to its economic and social structure. The structural vulnerability associated with a low level of structural resilience generates a vicious circle where shocks have not only an immediate impact, but also lower the capacity to adapt to future shocks. Taking into account GDP per capita as a proxy for poverty in an overall need of external finance also help capturing this relationship.

SDR reallocation according to structural vulnerability

In order, to consider vulnerability in a clearer and more significant way, we propose 3 formulas that are compatible with the IMF quotas formula while better defining vulnerability and also giving it a larger weight. We then simulate the reallocated shares obtained with each one of them and compare the results with the reallocations obtained using the quotas formula. More details on the rationale and methodology of building a (performance and) vulnerability-based formula are given in Guillaumont, Guillaumont Jeanneney and Wagner (2021).

The simulations cover 108 developing countries. G20 countries as well as countries with a GNI per capita value above twice the World Bank's high-income threshold (> 25070)

1. The 69 currently PRGT-eligible countries have a cumulated quota share of 3.3%.
2. The larger openness, the greater the impact of volatility. This is why a better estimation of the impact of export instability on growth is obtained when the export instability variable is multiplied by the export to GDP ratio, that is when it is a 'weighted' instability.
3. Instability is always relative to a reference or trend value, measured for example, by the average absolute deviation from a trend or by the variance of this deviation. When the series is non-stationary the question of the reference is critical. The three years trend used by the IMF does not appear to be able to capture the long-term trend value of the series (Guillaumont, 2009).

are excluded from the sample of countries.

For the first two reallocation formula, we use four indicators that allow us to identify the country's need for SDRs: population (POP), vulnerability (VUL), GNI per capita (GNI), and balance of payments current account credit (BOP) per capita.

To measure vulnerability, we use the structural universal vulnerability index (SUVI) of the Commonwealth Secretariat (Kattumuri and Mitchell, 2021), which integrates three dimensions of structural vulnerability: a) economic, b) environmental and c) social vulnerability as well as the d) structural resilience of the country :

a) The Economic Vulnerability to External and Natural Shocks Index take into account both the structural exposure of countries to those type of shocks and the intensity of past (and recurrent) shocks.

b) The Physical Vulnerability to Climate Change Index reflect the growing influence of climate change measured only through its physical manifestation and assessed according to the country exposition to it.

c) The Socio-Political Vulnerability Index measure the recurrence of conflicts and violence in its various dimensions that the organization of society is unable to ward off.

d) The structural resilience index takes into account the levels of capital (physical and human), per capita income, infrastructures, connectivity and demographic factors that can determine the capacity and resources of the state to respond adaptively to shocks. This variable allows us to measure structural vulnerability independently of the will or capacity of the governments.

SUVI is then the ratio of the combination of the three structural vulnerabilities over the level of structural resilience.

The GNI per capita is also a fundamental factor to be integrated into the reallocation rule. Indeed, it is both an indicator of needs as well as an indicator of capacity to access international finance.

The credit of the balance of payments on the population is an element specific to the reallocation of SDRs. This variable allows us to measure a country's exposure to the international market and thus its vulnerability international crisis such as COVID-19. It reflects the residual foreign exchange needs of vulnerable countries. The second formula introduces an alternative weighting of population size as a trade-off between per capita reallocation and the handicap of small population.

The third formula also introduces a governance index as an additional criterion to become a Performance and Vulnerability based reallocation (PVBA). We measure performance as the arithmetic average of the six World Bank's World Governance Indicators (WGI) components[4].

First formula (S1):

$$A = POP^{*} VUL^{*}(GNI/POP)^{0,5} {}^{*}(BOP/POP)^{0,5}$$

Second formula (S2):

$$A = POP^{0,6}{}^{*}VUL^{*}(GNI/POP)^{0,5} {}^{*}(BOP/POP)^{0,5}$$

Each formula gives a reallocation score to each of the 108 countries. The ratio of each score over the total sum of scores gives the share of total resource reallocated to each country, such as:

$$Share\ in\ total\ reallocated\ SDR = A/\sum A$$

Introducing population size in the formula is useful to balance country reallocations with per capita reallocations and larger countries have larger financing needs. On the other hand, a small population is a handicap for the country. Smallness is an important structural factor explaining greater exposure to exogenous shocks and the lack of capacity to cope with, through at

4. Ideally, using the World Bank's Country Policy and Institutional Assessment (CPIA) would have been more in line with how performance is introduced in formulas used by IFIs for the allocation of concessional funds. However, the World Bank's CPIA is only available for IDA eligible countries. By using the WGI rather the CPIA we are able to simulate reallocation for a larger and more relevant set of developing countries.

least three main channels: (i) trade intensity; (ii) government size; and (iii) social cohesion.

Third formula (S3) :

$A = POP^{0,6} * VUL * (GNI/POP)^{1/3} * (BOP/POP)^{1/3} * WGI^{1/3}$

Each variable, excluding population, is normalized and scaled from 1 to 6. The GNI per capita criterion was reverse normalized instead of simply normalized. It therefore acts as a negative factor of reallocation. Population is in millions of inhabitants.

We use data from international institutions to create our reallocation rule. Population and GNI data are from the World Bank. Balance of payments current account quota and credit data are from the IMF[5]. WGI data are from the WGI project. Finally, vulnerability data are from Commonwealth Secretariat (SUVI).

Simulation results

Results according to the three formula are provided in Figure 1 below. Individual simulated reallocations for each of the 108 countries are provided in appendix 2.

Figure 1 provides a clear overview of the fundamental differences between the IMF quotas formula and a vulnerability-based reallocation. Using the IMF quotas formula implies that reallocated SDR shares would be decreasing with vulnerability as measured by the Commonwealth Secretariat SUVI. Alternatively, as expected, the share of reallocated SDRs would be increasing with vulnerability according to the three vulnerability-based formulas using this index. To be noted. according to simulations 1 to 3, the relationship between reallocated shares and vulnerability is increasing but non-linear. This is mainly due to the fact that structural vulnerability is not poverty and many highly vulnerable countries such as the SIDS are not always poor. This is particularly true for vulnerability to climate change. Similarly, population size is negatively correlated with vulnerability as a small population size is a critical aspect of SIDS vulnerability.

Simulation results found in Table A1 in Appendix shows that Africa gets the majority of the reallocated SDRs in each simulation. This is due to the number of Sub-Sahara Africa (SSA) countries (42 out of 108) in our sample, but more importantly to the high level of vulnerability and poverty of many SSA country. The comparison of SSA relative SDR reallocations according to IMF quotas (among the 108 countries considered) displayed in the second column of Table A1 with columns 3 to 5 clearly shows that the reallocation on the basis of IMF quotas does not correspond to the relative needs of the poorest and most vulnerable countries. A similar point can be made for the LDCs, which account for a large share of the reallocations in each of the formulas (about 50%). Similarly, it is, as expected, the low-income and lower-middle income countries that present the largest share.

SIDS receive very little of the reallocated SDRs as a group. This is primarily due to their small size. However, when analyzing reallocations per capita, the impact of the weight given to population is clear. According to formulas 2 and 3, when the weight given to population size is reduced to consider the disadvantage of having a small population, the SIDS per capita share of reallocated SDR becomes higher than any other category. The last three columns of Table A1 show the impact of a lower population exponent on the average per capita allocation for each category. The SIDS are the primary ben-

5. Because of missing values, we had to perform an imputation of the current account credit variable of the balance of payments per capita for 10 countries. To do this, we used linear regression imputation. We estimated the balance of payments current account per capita as follows:

$BOP/POP = \alpha + \beta_1 * GNI/POP + \beta_2 * log(POP) + \beta_3 * oil + \beta_4 * SIDS$

With oil a binomial variable taking a value of 1 when the country is an oil exporter and 0 otherwise and SIDS a binomial variable taking a value of 1 when the country is a small island developing state and 0 otherwise. We then determine the theoretical value of the balance of payments current account credit per capita for these countries by applying the estimated factors to the known variables.

eficiaries of such a modification of the formula. Compared to S1, S2 implies that the per capita allocation of SIDS is about 8 times larger than the average per capita allocation.

Concluding remarks

As SDRs are allocated on the basis of quotas, it is clear that their reallocation under this rule would not correspond to the relative needs of the poorest and most vulnerable countries. The question of a fair, effective and transparent reallocation arises as well as the question of appropriate criteria to be used.

If this reallocation were to be made again on the basis of quotas, the gains obtained by each developing country would not be distributed according to the needs resulting from poverty or vulnerability. If, on the contrary, it was agreed to reallocate SDRs on the basis of specific criteria, what will take some time, these should include the structural vulnerability of countries, as explained above, rather than the current external shocks faced by individual countries as a result of the pandemic and the accompanying global recession.

Thus, it is necessary to agree on the short versus long-term objective of a new SDR reallocation. Indeed, the exceptional economic shocks faced by many developing countries as a result of the pandemic and the accompanying global recession has highlighted specific needs. But the reallocation of SDRs should be aimed at mitigating medium- and long-term impact of potential future shocks, i.e. at building resilience to them.

Figure 1: Reallocated shares per decile of the vulnerability indicator – SUVI (as a % of total reallocated amount). Vulnerability based in red, green and blue, IMF quotas formula in purple.

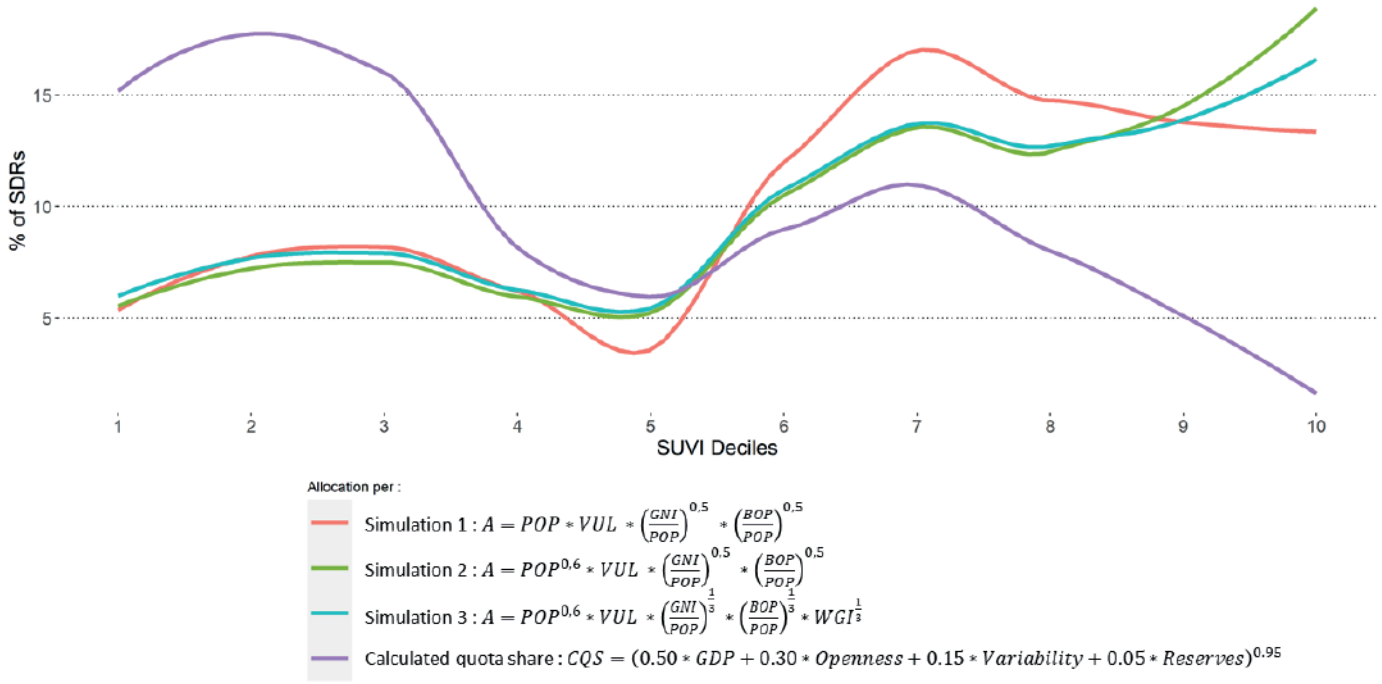

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Table A1: Simulations results

			Total Share (in %) $\sum \frac{A}{\sum A}$				Average ratio of per capita shares on the sum of shares divided by the sum of inhabitants $\frac{1}{n}\sum\left(\frac{\frac{A}{\sum A}/POP}{\sum\frac{A}{\sum A}/\sum POP}\right)$		
			Reallocated Shares according to				Reallocated Shares according to		
	Number of countries	Average Vulnerability levels (SUVI)	IMF quotas Formula	S1	S2	S3	S1	S2	S3
Region (WB)									
South Saharan Africa	42	3.02	24.94	52.20	56.11	54.95	1.45	2.79	2.75
East Asia and Pacific	18	2.22	15.10	10.35	9.69	10.22	1.09	7.90	8.86
Latin America & Caribbean	23	1.69	19.42	5.63	8.46	9.34	0.80	3.59	3.98
Europe & Central Asia	8	1.32	6.00	1.88	2.97	3.10	0.57	1.12	1.17
Middle East & North Africa	10	1.94	26.23	10.91	10.52	9.99	0.99	1.96	1.78
South Asia	7	2.20	8.31	19.03	12.26	12.39	0.95	1.85	1.96
Income group (WB)									
LIC	25	3.56	9.06	34.87	40.93	39.32	1.70	2.70	2.55
LMIC	42	2.08	41.08	50.13	40.88	41.92	0.98	2.88	3.05
UMIC	37	1.88	45.33	14.63	17.56	17.90	0.91	4.85	5.34
HIC	4	1.28	4.53	0.37	0.64	0.86	0.58	4.00	4.58
UN categories									
SIDS	27	2.30	3.93	1.72	4.77	5.03	1.14	8.63	9.59
LDCs	44	3.06	17.82	47.89	54.14	52.69	1.46	3.97	4.14

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