

# Accelerating the Speed and Scale of Climate Finance in the Post-Pandemic context

## Supplementary material

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### SM-1 Calculating 2°C-compatible investment pathways

The investment pathways sustaining our numerical analyses are from three sources: projections by four integrated assessment models (AIM, MESSAGE, POLES and REMIND) from the CD-Links European Commission research project (Schaeffer et al., 2020), projections from the International Energy Agency (IEA, 2017) and the OECD (2017). The six projections report energy supply and demand investment for 2°C-compatible development pathways and OECD extends to investment in transport infrastructures (Table 1, line A). CD-Links and OECD also report baseline investments, which allows computing incremental investment needs of the 2°C objective by subtraction (Table 1, line B).

Table 1 Global investment requirements of 2°C pathways, annual averages from 2016 to 2035

Billion 2017 USD	Energy supply & demand			Transport	Total			Ratio to world GDP		
	Min	Mean	Max		Min	Mean	Max	Min	Mean	Max
Estimate of 6 scenarios										
A. Total investment	2,005	2,451	3,102	2,784	4,788	5,235	5,886	3.6%	4.4%	5.1%
B. Incremental investment	174	424	790	278	453	703	1,069	0.3%	0.6%	0.9%
C. Low-carbon investment (3 x B)	523	1,273	2,371	835	1,358	2,108	3,206	1.0%	1.8%	2.8%

Minimum, mean and maximum values are computed over 6 projections (see text). The single transport infrastructure estimate, from OECD, is summed up indistinctly to the 6 energy investment estimates to produce the 'Total' range. Low-carbon investment is the sum of incremental and reallocated investment estimated as twice incremental investment (see text).

From the financial viewpoint, incremental investment is only part of the challenge. Another part is the reallocation of investment within infrastructure sectors towards low-carbon alternatives. Without intending to give a false idea of precision, yet not underestimating the order of magnitude of the reallocation challenge, we use a ratio of 2 to 1 between the amounts of reallocated and incremental

investment required. This leads to a mean value of USD 1,273 billion of annual low-carbon investment (LCI) in energy alone, or of about USD 2,108 billion transportation included (Table 1, line C).

Around 63% of this total should be invested in developing countries and China (IEA, 2021). Assuming that 50% of the corresponding effort will come from public institutions and that 30% of the remainder will be funded by equity capital, the financing requirements through bank loans or bonds are  $63\% \times 50\% \times 70\% = 22.05\%$  of the initial range, i.e. between USD 299 billion and USD 707 billion annually. With the 16.3 leverage of the MSGF (see Section SM-2 below), the average annual amount of guarantee capital required to back the corresponding private and public firms investment of 428 to 1,010 billion USD annual investment is between USD 26 and 62 billion (Table 2).

**Table 2** Guarantee capital required to back Low-Carbon Investment (LCI) by private and public firms in developing countries

Billion 2017 USD	Lower estimate	Higher estimate
A. Average global annual LCI to 2035	1,358	3,206
B. Average annual LCI in developing countries (63% A)	855	2,020
C. Of which covered by private and public firms (50% B)	428	1,010
D. Of which funded by equity and self-financing (30% C)	128	303
E. Private & public firms' LCI in developing countries funded by bank loans or bonds (C-D)	299	707
F. Required guarantee capital with MSGF (C/16.3)	26	62

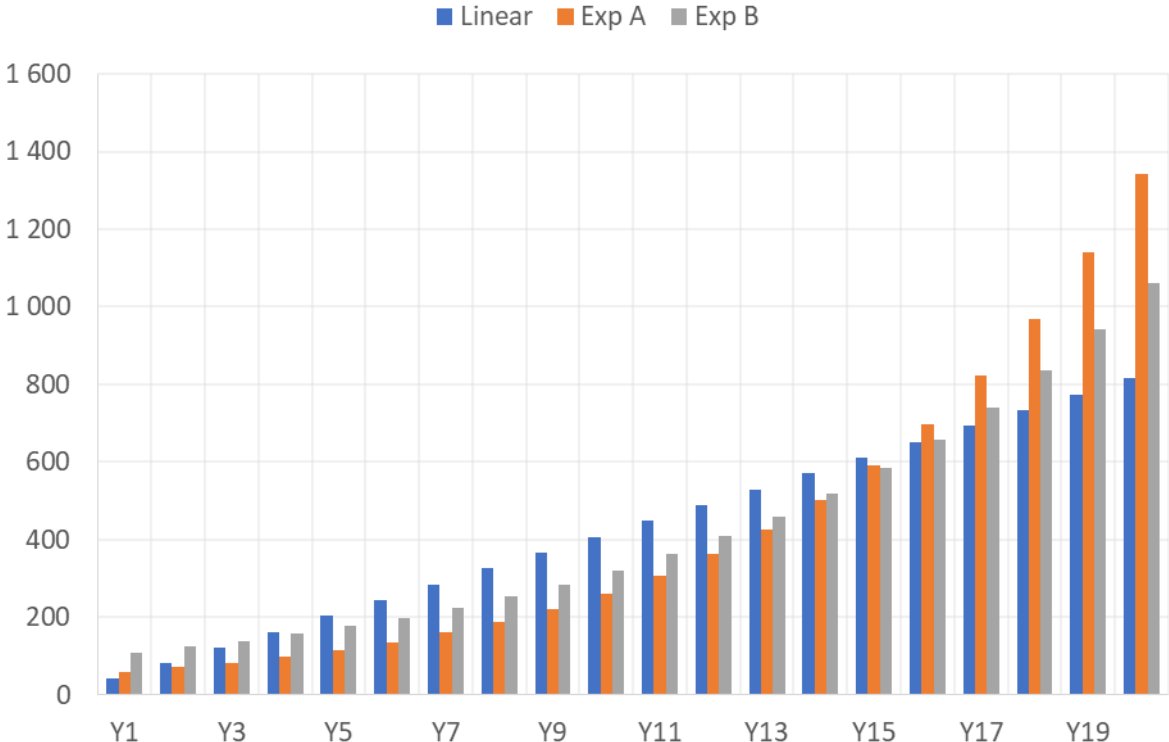
*The 16.3 leverage of the Multi-Sovereign Guarantee Mechanism (MSGF) is explained in Section SM-2 below.*

The economic and political acceptability of the MSGF hangs on the amount of guarantees over its launching phase, when its efficiency has to be demonstrated to make scaling-up attractive for both developed and developing countries. Concerns about the public-budget implications of the system and other political constraints could induce guarantor countries to start with low commitments and to scale them up later, playing on international credibility effects. The time profile of LCIs sustained by public guarantees is thus ultimately a matter of policy judgment.

In the following numerical exploration (see Section 0), we propose three annual investment trajectories that result in identical LCI amounts over two decades. The linear trajectory considers constant annual increases of LCIs from  $I_1$  at year 1 (and  $I_0 = 0$  at year 0) to  $I_{20}$  at year 20. Trivial algebra yields  $I_1 = \frac{2}{21} I_m$  with  $I_m$  the mean investment over the 20-year period. However, we also look at two exponential trajectories, which allow comparison with constant growth paths. The two exponential trajectories consider investments growing from  $I_1$  at constant growth rates  $g$  compatible with assumptions on the ratio  $\rho$  between mean investment over the first five years and  $I_m$ . Therefore,  $g$  is solution to  $20(1 - (1 + g)^5) = 5(1 - (1 + g)^{20})\rho$  and  $I_1 = -g(1 - (1 + g)^5)^{-1} 5\rho I_m$ . 'Exp A' option sets  $\rho$  at 20%, which yields  $g = 0.1776$  (numerically solved) and  $I_1 = 0.1405 I_m$ . 'Exp B' option sets  $\rho$  at 33%, which yields  $g = 0.1269$  and  $I_1 = 0.2562 I_m$ .

For our USD 428-billion lower estimate of 2016-2035 mean annual investment by private and public firms in developing countries (Table 2, line C), the linear trajectory starts at USD 41 billion in year 1 and ends at USD 815 billion in year 20. Exp A trajectory starts at USD 60 billion in year 1 to reach USD 1,342 billion in year 20. Exp B trajectory starts at USD 110 billion in year 1 to reach USD 1,061 billion in year 20 (Figure 1). For the higher estimate of 1,010-billion mean investment over 2016-2035, the three trajectories start at USD 96 (linear), 142 (Exp A) and 259 (Exp B) billion in year 1 and respectively reach USD 1,924 billion, 3,166 billion and 2,504 billion in year 20.

Figure 1 Alternative scaling-up paths of low-carbon investments by private and public firms in developing countries (lower total LCI estimate)



By construction, the three trajectories accumulate into identical  $428 \times 20 = 8,560$  billion dollar investments over 20 years.

# SM-2 Leverage effect of a Multilateral Sovereign Guarantee Fund

For a typical investment project involving 30% equity and 70% loans, and a guarantee covering 70% of these loans, one dollar of guarantee leverages about two dollars of investments ( $1/(0.7 \times 0.7)$ ). Critical questions for the Treasuries of guarantor countries are: (1) how much money to set aside as contingency liabilities for the guarantees, (2) where to keep it, and (3) how to 'mark it to market'. The answers to such questions depend on the retained form of guarantee mechanism. To maximise leverage, we propose that guarantor countries collectively create a Multilateral Sovereign Guarantee Fund (MSGF).

Let us assume that sovereign partners provide guarantee capital with the anticipation that one out of four guaranteed projects will eventually fail. This is overly pessimistic, but national auditors may recommend staying on the safe side with respect to financial institutions. Let us additionally assume that guarantee capital (thus, 25% of the guaranteed investment flow) is delivered half as 'paid-in' capital to a dedicated agency, the MSGF, which appears as shares in the MSGF on the asset side of guarantors' books, and half as 'callable capital', registered in guarantors' books as contingent liabilities to be paid on demand. The multiplier effect would be about 16 times the actual paid-in capital (Table 3). USD 12.5 of paid-in capital would thus generate the ability to provide USD 100 in guarantees, which would in turn generate about USD 204-worth of projects.

Table 3 Effective investment multiplier for a USD 100 guarantee under the MSGF

A. Effective Multiplier (B/Fa)	16.3
B. Total Project Investment (Ba + Bb)	<b>204.1</b>
Ba. Private Sponsor Equity (3/7 x Bb)	61.2
Bb. Private Financing (C / 70%)	142.9
C. MSGF Guarantee (4 x D)	<b>100.0</b>
D. Net Guarantee Capital (F - E)	25.0
E. Payment to External Agency	0.0
F. Total Guarantee Capital (Fa + Fb)	25.0
Fa. Paid-in Equity Capital	12.5
Fb. Callable Capital	<b>12.5</b>

The key advantage of the MSGF, in addition to high leverage, is its financial strength, which would enable it to compensate automatically for the non-compliance of a partner. The automaticity and

speed of payment in the case of default is critical because payments typically have to be made within one to two weeks after any defined default event. In a Contingency Fund, a consensus is needed within the Board, and uncertain in times of crisis. Under an MSGF with a clear shareholding structure, decisions are made according to an agreed-upon governance arrangement and the MSGF has sufficient financial strength to make the expected payments.

This financial strength would increase over time. Indeed, like all financial institutions, the MSGF would invest its liquid reserves of capital funds. Let us assume that these funds earn 5% annual returns through common internal Treasury operations and that the MSGF directly secures 0.5% of guarantee charges — which would be paid to external agencies under other architectures. These charges, assuming the 8:1 leverage ratio between guarantees and the initial paid-in capital, will yield amounts that are equivalent to another 4% return on paid-in capital ( $8 \times 0.5\%$ ). If, say, half of this covers operational costs, then, net of these costs, the MSGF will still accumulate more cash every year on top of its paid-in capital. Assuming no pay-outs from its guarantee operations in the initial phase (expected) and without additional injection of capital by sovereign partners, the extra resource would reach the extent of 7% annually ( $5\% + 4\% - 2\%$ ). Over a ten-year period, the reserves of the MSGF should then nearly double in size compared with the initial paid-in capital with no default. They would increase by about 24% with a 5% default rate. This shows that the size of the initial paid-in matters and that the MSGF should operate cautiously in its first phase to build up sizeable amounts of initial paid-in capital plus accumulated reserves.

The paid-in capital (plus internal reserves) of the MSGF could also be actually treated as a provision to end the fund at any point in time without requiring any further cash outlays from shareholders, if events turned out worse than expected. A 16-time multiplier can also be thought of as a 'self-extinguishing capability' of the MSGF to handle a life-time default risk of 6.25% of its total guarantee portfolio, or 8.92% of the total value of guaranteed projects ( $6.25\% \times 1/70\%$ ), without requiring any more than its initial paid-in capital.

From a fiscal perspective, the dynamic nature of the MSGF capital formation will increase its asset value appearing as equity in the books of guarantor countries. This will hedge against the temptation to exit since exiting countries would immediately lose their ownership rights to a profitable, high-value asset. That feature of the MSGF as compared to other forms is important to gain the confidence of capital markets. Although it is extremely rare for any sovereign entity to renege on legal commitments to callable capital because of the risk of downgrading its entire financial standing and its creditworthiness in global financial markets, exit risks cannot be entirely excluded because of the compelling strength of political uncertainty.

For the bond markets and institutional investors, there are four complementary reasons why the MSGF would likely increase the attractiveness of investments made under its umbrella. The first is much greater transparency than unilateral contingency funds if events induce more capital requirements: the paid-in capital of the MSGF and its internal accumulation over time would remain the front-line buffer for these calls for a considerable length of time. The second is that project priorities and funding will be more transparent and less open to various forms of lobbying whereas unilateral agencies of fragmented regimes would be driven by their own strategic logics and priorities. The third is pre-commitment to the objectives of the MSGF for a substantial length of time, without requiring any further capital injections nor operating on a project-by-project basis. Lastly, pre-commitment under

an MSGF is additionally longer-term. In unilateral regimes, 'pay-as-you-go' approaches to committing financial resources reliably to guarantees would be mirrored in a politically determined and constrained 'granting guarantees-as-you-go' approach with significant transaction costs and further uncertainties each time a substantial number of guarantees came up for approval.

## SM-3 Numerical exploration of the links between investment needs, amounts of guarantees and public costs

### SM3.1 MSGF computations

Appeal of the MSGF to policymakers depends on its public costs, benefits and balance sheet effects. These depend upon, each year  $t$ :

- Project investments  $A_t$ ,
- The default rate of projects  $d_t$ ,
- Risk perception  $\pi$ , which drives the ratio of guarantee capital to guaranteed investment (lines F and C of Table 3 above) and thus the leverage ratio of MSGF capital  $m_t$ ,
- Yearly amortisement of provisioned guarantees at rate  $\delta$ ,
- Guarantee charges at rate  $\rho$ ,
- Return on MSGF capital at rate  $r$ .

For the sake of clarity, we develop the computations of all variables of the MSGF of interest to guarantors' accounts in the case of annual paid-ins to the MSGF (as equity capital). The 'up-front' solution of anticipating paid-ins every five years, to benefit from the high return of the creditworthy MSGF, calibrates on the annual paid-ins variant by requiring the latter variant's exact MSGF capitalisation at the end of each 5-year period.

Under the simplifying assumption that projects default on their first year (if at all),  $X_t$  investment default at year  $t$  is equal to  $d_t A_t$ . Called guarantee  $Y_t$  is the fraction of investment covered by the guarantee,  $Y_t = 70\% 70\% X_t$ , which evenly splits between called paid-in  $D_t = 50\% Y_t$  (the part covered by the MSGF) and called capital  $J_t = 50\% Y_t$  (the part covered by public budgets).

Capitalisation into the MSGF or 'Paid-in Equity Capital'  $B_t$  must cover year- $t$  investment and compensate for previous-year default  $X_{t-1}$  (to maintain climate performance), playing on leverage  $m_t$ . However, returns on MSGF Capital at the end of year  $t - 1$ ,  $G_{t-1}$ , reduce the required paid-in:

$$B_t = \frac{A_t + X_{t-1}}{m_t} - G_{t-1} \quad (1)$$

MSGF Capital  $H_t$  grows with paid-in equity Capital  $B_t$  and returns  $G_t$  net of Called paid-in  $D_t$  and guarantee charges  $E_t$ :

$$H_t = H_{t-1} + B_t + G_t - D_t - E_t \quad (2)$$

Returns on  $H_t$  are straightforwardly  $G_t = r (H_{t-1} + B_t - D_t - E_t)$  while guarantee charges are on the fraction of investment covered by the MSGF, augmented from previous-year default  $E_t = \rho 70\% 70\% (A_t + X_{t-1})$ .

By design, the share of the guarantee materialised as callable capital  $I_t$  equates  $B_t$ ,  $I_t = B_t$ . Callable Capital accumulates into cumulated public provision  $K_t$  with  $\delta$  depreciation and taking account of called capital  $J_t$ :  $K_t = (1 - \delta) K_{t-1} + I_t - J_t$ .<sup>1</sup> Cumulated public costs are the sum of past paid-in equity capital  $B_i$ , called capital  $J_i$  and amortized remaining callable capital  $K_t$ :

$$M_t = \sum_{i=1}^t B_i + J_i + K_t \quad (3)$$

In the case of up-front payments, paid-in equity capital of years 1, 6, 11 and 16 of our 20-year explored horizon are numerically solved to obtain cumulated MSGF capital in years 5, 10, 15 and 20 strictly identical to its equivalent under annual paid-ins (computed by Equation (2) above). Callable capital  $I_t$  is recorded annually, at a level equal to its equivalent under annual paid-ins, from which the (massive) interests on up-front paid-ins are subtracted to materialise the benefit from increased capitalisation on public accounts.

### SM3.2 Numerical exploration

To sustain the analyses of Section 4 of our paper, we developed the numerical exploration of 48 scenarios involving varying assumptions on

- Total investment requirements (investment trajectory  $A_t$ ), for the low (USD 428 billion) and high bounds (USD 1,010 billion) of average annual LCI by private and public firms in developing countries (line C of Table 2);
- Default rate  $d_t$ , either constant at 10% or linearly decreasing from 10% in year 1 to 2% in year 20;
- Risk perception  $\pi$ , either constant through a maintained 1 to 4 ratio of guarantee to guaranteed investment (lines F and C of Table 3 above) or linearly decreasing from 1:4 to 1:10;
- Rate of Return of MSGF capital  $r$ , either at 5% or 7%.

Additionally, all tests consider a 0.5% guarantee charge and a 40% amortization rate  $\delta$  on provisions, to allow cancelling out the liability on projects after a few years (1% of initial provision remaining as liability after 9 years). We report here the parameterisations of our 48 tests (Table 4) as well as the results of Test 1 for illustrative purposes (Table 5). All tests were performed by coding the above MSGF dynamics in simple spreadsheet format. The results of the 48 tests in the format of Table 5, as well as the spreadsheet that produced them, are available from the authors upon request.

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<sup>1</sup> In practice, Callable Capital may translate over time into anticipatory periodic capital injections into the MSGF. We abstract from this complication for the purpose of calculating the effective public cost of guarantee funds.



Table 4 48 explored MSGF parameterisations

	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Av. annual inv.	428	428	428	428	428	428
Inv. Chronogram	Linear	Linear	Linear	Linear	Linear	Linear
Default rate	10%	10%	10%	10%	10% to 2%	10% to 2%
Risk perception	1/4	1/4	1/4 to 1/10	1/4 to 1/10	1/4	1/4
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 7	Test 8	Test 9	Test 10	Test 11	Test 12
Av. annual inv.	428	428	428	428	428	428
Inv. Chronogram	Linear	Linear	Exp B	Exp B	Exp B	Exp B
Default rate	10% to 2%	10% to 2%	10%	10%	10%	10%
Risk perception	1/4 to 1/10	1/4 to 1/10	1/4	1/4	1/4 to 1/10	1/4 to 1/10
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 13	Test 14	Test 15	Test 16	Test 17	Test 18
Av. annual inv.	428	428	428	428	428	428
Inv. Chronogram	Exp B	Exp B	Exp B	Exp B	Exp A	Exp A
Default rate	10% to 2%	10% to 2%	10% to 2%	10% to 2%	10%	10%
Risk perception	1/4	1/4	1/4 to 1/10	1/4 to 1/10	1/4	1/4
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 19	Test 20	Test 21	Test 22	Test 23	Test 24
Av. annual inv.	428	428	428	428	428	428
Inv. Chronogram	Exp A	Exp A	Exp A	Exp A	Exp A	Exp A
Default rate	10%	10%	10% to 2%	10% to 2%	10% to 2%	10% to 2%
Risk perception	1/4 to 1/10	1/4 to 1/10	1/4	1/4	1/4 to 1/10	1/4 to 1/10
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 25	Test 26	Test 27	Test 28	Test 29	Test 30
Av. annual inv.	1,010	1,010	1,010	1,010	1,010	1,010
Inv. Chronogram	Exp A	Exp A	Exp A	Exp A	Exp A	Exp A
Default rate	10%	10%	10%	10%	10% to 2%	10% to 2%
Risk perception	1/4	1/4	1/4 to 1/10	1/4 to 1/10	1/4	1/4
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 31	Test 32	Test 33	Test 34	Test 35	Test 36
Av. annual inv.	1,010	1,010	1,010	1,010	1,010	1,010
Inv. Chronogram	Exp A	Exp A	Linear	Linear	Linear	Linear
Default rate	10% to 2%	10% to 2%	10%	10%	10%	10%
Risk perception	1/4 to 1/10	1/4 to 1/10	1/4	1/4	1/4 to 1/10	1/4 to 1/10
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 37	Test 38	Test 39	Test 40	Test 41	Test 42
Av. annual inv.	1,010	1,010	1,010	1,010	1,010	1,010
Inv. Chronogram	Linear	Linear	Linear	Linear	Exp B	Exp B
Default rate	10% to 2%	10% to 2%	10% to 2%	10% to 2%	10%	10%
Risk perception	1/4	1/4	1/4 to 1/10	1/4 to 1/10	1/4	1/4
Return on MSGF	5%	7%	5%	7%	5%	7%
	Test 43	Test 44	Test 45	Test 46	Test 47	Test 48
Av. annual inv.	1,010	1,010	1,010	1,010	1,010	1,010
Inv. Chronogram	Exp B	Exp B	Exp B	Exp B	Exp B	Exp B
Default rate	10%	10%	10% to 2%	10% to 2%	10% to 2%	10% to 2%
Risk perception	1/4 to 1/10	1/4 to 1/10	1/4	1/4	1/4 to 1/10	1/4 to 1/10
Return on MSGF	5%	7%	5%	7%	5%	7%

Average annual investment is in billion 2017 dollars over the 2016-2035 period. It corresponds to line C of Table 2. Investment chronograms are those illustrated by Figure 1 for the 428 billion average annual investment. Ranges of default rates and risk perceptions indicate starting (year 1) and end (year 20) values, which are connected by linear interpolation.

Table 5 Numerical results of Test 1 parameterisation

Billion 2017 USD	Y1	Y2	Y3	Y4	Y5	Y6	Y11	Y16	Y20
A. Total project investment	40.8	81.5	122.3	163.0	203.8	244.6	448.4	652.2	815.2
X. Investment in default ( $d A$ )	4.1	8.2	12.2	16.3	20.4	24.5	44.8	65.2	81.5
Y. Called guarantee ( $0.7^2 X$ )	2.0	4.0	6.0	8.0	10.0	12.0	22.0	32.0	39.9
Z. Cumulated called guarantee ( $Z_{t-1} + Y_t$ )	2.0	6.0	12.0	20.0	30.0	41.9	131.8	271.6	419.4
B. Paid-in Equity Capital (see 3.1)	31.7	0.0	0.0	0.0	0.0	80.1	115.9	139.1	0.0
C. Cumulated Paid-in Equity Capital ( $C_{t-1} + B_t$ )	31.7	31.7	31.7	31.7	31.7	111.8	227.7	366.8	366.8
D. Called paid-in ( $0.5 Y$ )	1.0	2.0	3.0	4.0	5.0	6.0	11.0	16.0	20.0
E. Guarantee charge ( $0.05 \cdot 0.7^2 (A_t + X_{t-1})$ )	0.1	0.2	0.3	0.4	0.5	0.6	1.2	1.7	2.2
F. Paid-in net of default & charge ( $B - D - E$ )	30.6	-2.2	-3.3	-4.4	-5.5	73.5	103.7	121.4	-22.2
G. Annual interest on MSGF ( $r (F_t + H_{t-1})$ )	2.1	2.1	2.1	1.9	1.6	6.9	13.8	22.9	23.7
H. Cumulated MSGF capital ( $H_{t-1} + F_t + G_t$ )	32.8	32.7	31.4	28.9	25.0	105.3	211.4	350.8	362.9
I. Callable Capital (see Section 3)	0.4	3.1	5.9	8.8	11.8	9.3	16.1	20.7	30.9
J. Called Capital ( $0.5 Y$ )	1.0	2.0	3.0	4.0	5.0	6.0	11.0	16.0	20.0
K. Cumulated provision ( $0.6 K_{t-1} + I_t - J_t$ )	-0.6	0.7	3.4	6.9	11.0	9.9	18.0	20.2	23.3
L. Cumulated Called Capital ( $L_{t-1} + J_t$ )	1.0	3.0	6.0	10.0	15.0	21.0	65.9	135.8	209.7
M. Cumulated public cost ( $C_t + K_t + L_t$ )	32.1	35.4	41.1	48.6	57.7	142.7	311.6	522.8	599.9

See text and above Table 4 for the description of MSGF parameterisation under Test 1.

## SM-4 Computing the cash-grant equivalent of guarantees

The cash grant equivalent of guarantees (CGEG) is the decrease of interest payments on guaranteed LCI loans, which results from their improved ratings.

To work out numbers, we use current spreads to US treasury yield curves depending upon country rating as appearing in existing market data. We aggregate G77 countries in five credit-rating groups based on Standard & Poor's notations.<sup>2</sup> The five groups merge the plus, central and minus nuances of A, B, BB and BBB notations, and consider all other countries, rated or not, as "C and below". Then, on the basis of the lending charges per type of country and of loan maturity, we calibrate the spread reductions to be retained for the calculation of the CGEG.

We do so through the simple rule that MSGF guarantee grants access to the rates of US treasury bonds, for the share of investment covered by the mechanism. We additionally consider lender fees of 100 basis points (bps) and fee reductions of 20%, i.e. 20 bps, thanks to the MSGF (Table 6).

To compute an aggregate CGEG on the basis of the above expected interest rate shifts, we allocate LCIs to countries in proportion of 2017 GDP at market exchange rates,<sup>3</sup> with two exceptions:

- We limit the weight of A-rated countries, among which countries like China, Saudi Arabia or Singapore, to only 5% of their GDPs. These countries do not have the same interest for guarantees as other developing countries because they have far larger domestic financial capacities; they could however be part of the system for political reasons and to have access to Climate Remediation Assets (see Section 3.3 of our main text).
- We exclude Cuba, the Korean Democratic Republic, Iran and Syria because their C to U ratings result directly from the current geopolitical state of affairs and including them distorts the insights of **Erreur ! Source du renvoi introuvable.** (primarily because of the importance of Iran).

We additionally simplify computations by assuming that all loans covering LCIs have 10-year maturities. Table 4, Section 4.2 of our main text, reports the resulting CGEGs.

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<sup>2</sup> As reported by the Trading Economics website on October 8<sup>th</sup>, 2018.

<sup>3</sup> World Bank Indicator code EN.ATM.CO2E.KT, extracted on October 8<sup>th</sup>, 2018.

Table 6 Effective 10-year interest rates and their reductions under MSGF

Rating	Maturity	Spread to US	Interest rate	Fees	Rate w/o MSGF	Spread reduction	Fee reduction	Rate with MSGF
A	3 years	80	377	100	477			
	5 years	115	420	100	520			
	10 years	175	497	100	597	123	20	455
	15 years	235	568	100	668			
BBB	5 years	130	435	100	535			
	10 years	250	572	100	672	175	20	477
	15 years	370	703	100	803			
BB	5 years	200	505	100	605			
	10 years	350	672	100	772	245	20	507
	15 years	500	833	100	933			
B	5 years	600	905	100	1005			
	10 years	900	1222	100	1322	630	20	672
C	2 years	1700	1988	100	2088			
	10 years	-	2500	100	2600	1525	20	1055

The spread reduction of C rating flows from assuming a 2500 bps benchmark (C-rated countries currently do not access 10-year maturities).

## SM-5 The export multiplier and consecutive fiscal benefits

The export multiplier (or foreign trade multiplier) is a commonly used coefficient that operates like the Keynesian multiplier (Polak, 1947). It is a measure of the impact of increased exports on national income. As exports increase, the revenue generated by export industries increases as well. Part of it is saved, part is spent to purchase imported goods and services, and the remainder is spent in additional domestic demand. Therefore, the value of the export multiplier is  $\frac{1}{s+m}$ , with  $s$  the marginal propensity to save and  $m$  the marginal propensity to import. The smaller these two propensities, the larger the multiplier value, and vice versa.

When the export shock under scrutiny (in our case, that prompted in guarantor countries by increasing low-carbon investments in host countries) is small, it is convenient to approximate the multiplier by considering that  $s$  and  $m$  equate the observed saving and import ratios (to GDP) of the economy. The underlying assumption is that marginal behaviour is identical to average behaviour. Rather than being applied to national income, the multiplier can be applied to fiscal pressure with a view to measure the fiscal benefits from increased exports.

**Erreur ! Référence non valide pour un signet.** displays data required to compute the fiscal revenues generated per dollar of guaranteed project on the above basis, for a sample of countries. For the OECD as a whole, this fiscal income from guarantees (FIG) is at 0.585, building up from an export multiplier of  $1.92 = 1 / (0.22 + 0.3)$ , 33.8% fiscal pressure and accounting for a pessimistic 10% default rate on projects ( $0.585 = 1.92 \times 0.338 \times 0.9$ ). Considering the 16.3 leverage of the MSGF on gross public costs (the callable capital written as liability on guarantors' books), the tipping import content (TIC) at which fiscal benefits from exports dominate gross public costs is 10.5%.

These calculations capture orders of magnitude of the mechanisms at play but have to be used with caution. They may differ significantly over the short-term, depending on fluctuations of the marginal propensity to save induced by economic circumstances. For example, Drescher et al. (2020) report a 0.4 marginal propensity to save of European households in the current pandemic context, to be compared with the average 0.25 rate for the EU countries of our sample in 2019. However, such fluctuations do not substantially change the conclusion that the TIC is far below the minimum 35% import content of cross-border financed projects: even retaining a 40% marginal saving rate only increases the TIC from 10.5% to 14.1%.

Table 7 Export multiplier and fiscal benefits

	GDP	$s$	$m$	$f$	$e$	FIX	TIC
Australia	1,397	0.220	0.220	0.290	2.273	0.659	0.103
Canada	1,736	0.200	0.333	0.335	1.876	0.629	0.108
France	2,715	0.230	0.328	0.454	1.792	0.814	0.084
Germany	3,861	0.290	0.411	0.387	1.427	0.552	0.123
Italy	2,004	0.210	0.285	0.425	2.020	0.859	0.079
Japan	5,082	0.280	0.183	0.312	2.160	0.674	0.101
Spain	1,393	0.230	0.319	0.347	1.821	0.632	0.108
UK	2,829	0.130	0.327	0.330	2.188	0.722	0.094
USA	21,433	0.190	0.146	0.245	2.976	0.729	0.093
OECD	53,689	0.220	0.300	0.338	1.920	0.650	0.105

GDP in billion current USD,<sup>4</sup>  $s$  the saving rate,<sup>5</sup>  $m$  the import rate<sup>6</sup>,  $f$  the rate of fiscal pressure<sup>7</sup> from The World Bank for year 2019. The export multiplier  $e$  is computed as  $1/(s + m)$ , the fiscal income from exports (FIX) as  $f \times e$  and the tipping import content (TIC) as  $1/(0.9 \times \text{FIX} \times 16.3)$  (see text).

<sup>4</sup> <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>

<sup>5</sup> <https://data.worldbank.org/indicator/NY.GNS.ICTR.ZS>

<sup>6</sup> <https://data.worldbank.org/indicator/NE.IMP.GNFS.ZS>

<sup>7</sup> <https://data.oecd.org/tax/tax-revenue.htm>

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