Project A

Costs $100 million

Prevents on average $20 million of losses per years

Project B

Costs $100 million

Prevents on average $5 million of losses per years
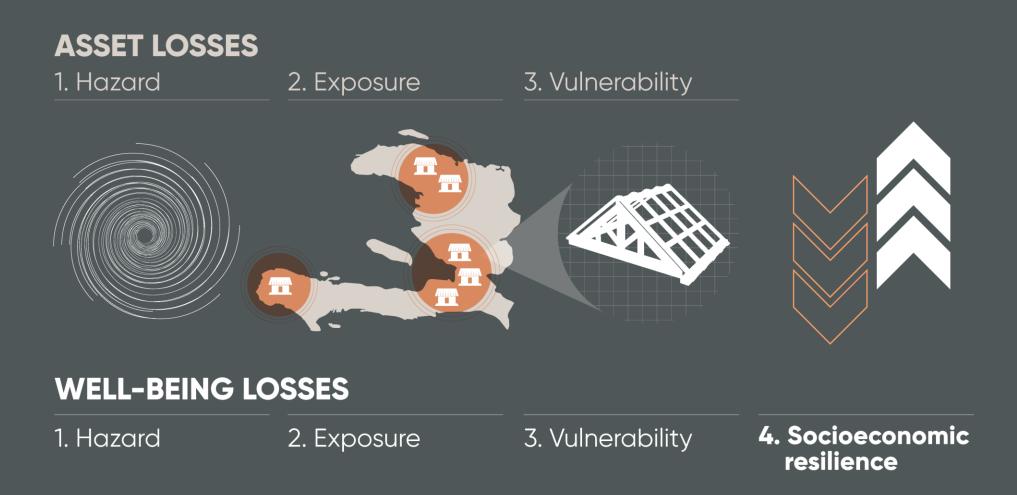
Traditional risk assessment combines hazard, exposure and vulnerability of assets ...

ASSET LOSSES

1. Hazard

2. Exposure

3. Vulnerability

We also account for who is affected, and their resilience—that is, the capacity of affected people to cope with and recover from the shock

ASSET LOSSES

1. Hazard | 2. Exposure | 3. Vulnerability

WELL-BEING LOSSES

1. Hazard | 2. Exposure | 3. Vulnerability | **4. Socioeconomic resilience**

WE HAVE 3 MAIN MESSAGES.

MAIN MESSAGE #1
Disaster risk reduction is poverty reduction ...
... and poverty reduction is disaster risk reduction
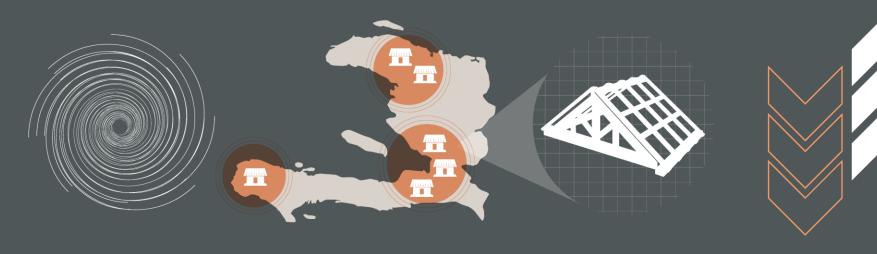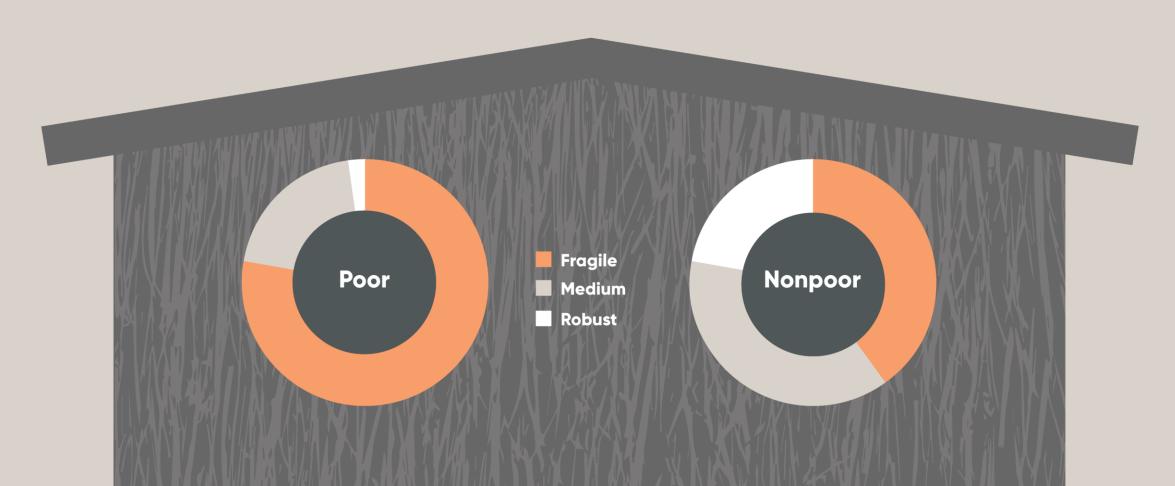
Poverty → **Disaster losses**

Poverty ⟫⟫⟫⟫⟫⟫⟫⟫⟫ **Disaster losses**

ASSET LOSSES

1. Hazard   2. Exposure   3. Vulnerability

WELL-BEING LOSSES

1. Hazard   2. Exposure   3. Vulnerability   **4. Socioeconomic resilience**

Poverty ⟫⟫⟫⟫⟫⟫⟫⟫⟫ Disaster losses
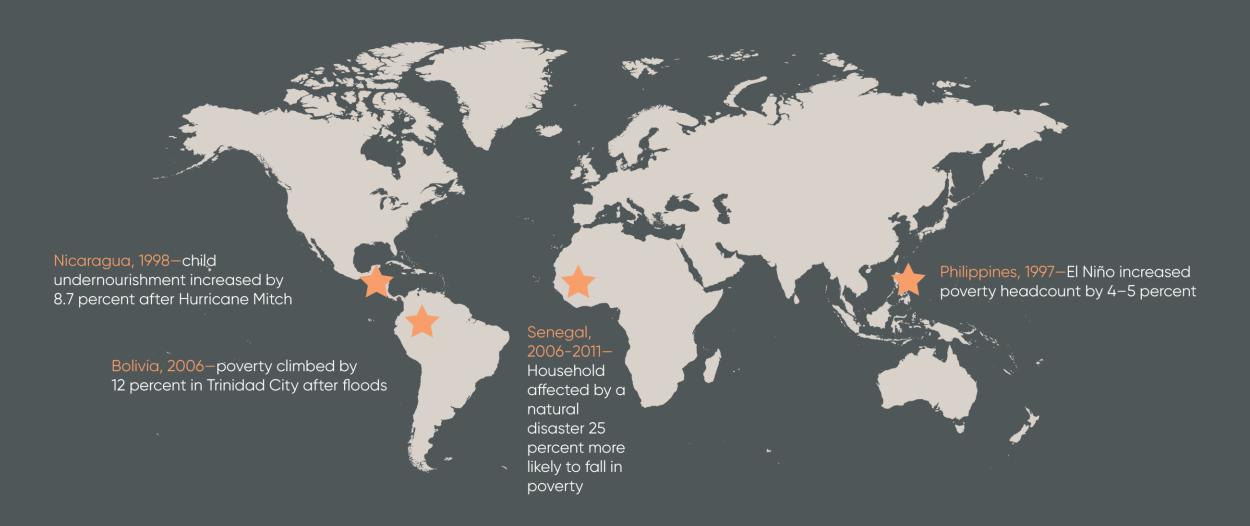
**Poor people's assets are more fragile—
for instance, poor people are 2 times more likely to live in fragile buildings**

Poor

Nonpoor

■ Fragile
■ Medium
□ Robust

Poverty

Disaster losses

Poverty **Disaster losses**

Poverty >>>>>>>>>>>> Disaster losses

Nicaragua, 1998—child undernourishment increased by 8.7 percent after Hurricane Mitch

Bolivia, 2006—poverty climbed by 12 percent in Trinidad City after floods

Senegal, 2006-2011—Household affected by a natural disaster 25 percent more likely to fall in poverty

Philippines, 1997—El Niño increased poverty headcount by 4–5 percent

Poverty <<<<<<<<<<<< Disaster losses

Poverty ►►►►►►►►► Disaster losses

If natural disasters could be prevented next year, 26 million people would escape poverty.

Panel a

Annual average no. falling into poverty (thousands)

- Earthquakes
- Storm surge
- Tsunami
- Windstorm

Panel b

Annual average no. falling into poverty (thousands)

- Floods
- Drought

Poverty ◄◄◄◄◄◄◄◄◄ Disaster losses

MAIN MESSAGE #2

Natural disasters affect well-being more than traditional estimates suggest.

We model losses in terms of well-being, not only asset— accounting for differences between poor and non-poor people.

Hazard

- Flood level
- Wind speed
- Hard and soft protection
- Temperature
- Precipitations

Exposure

- Location of people and assets
- Occupation

Asset losses

- Housing and infrastructure quality
- Livestock and other assets
- Early-warning systems

We model losses in terms of well-being, not only asset—accounting for differences between poor and non-poor people.

Hazard

- Flood level
- Wind speed
- Hard and soft protection
- Temperature
- Precipitations

Exposure

- Location of people and assets
- Occupation

Asset losses

- Housing and infrastructure quality
- Livestock and other assets
- Early-warning systems

Income losses

- Diversification of income
- Link between assets and income
- How long will the shock last?

We model losses in terms of well-being, not only asset—accounting for differences between poor and non-poor people.

Hazard

- Flood level
- Wind speed
- Hard and soft protection
- Temperature
- Precipitations

Exposure

- Location of people and assets
- Occupation

Asset losses

- Housing and infrastructure quality
- Livestock and other assets
- Early-warning systems

Income losses

- Diversification of income
- Link between assets and income
- How long will the shock last?

Consumption losses

- Social protection
- Savings and borrowing
- Insurance and remittances

We model losses in terms of well-being, not only asset—accounting for differences between poor and non-poor people.

Hazard

- Flood level
- Wind speed
- Hard and soft protection
- Temperature
- Precipitations

Exposure

- Location of people and assets
- Occupation

Asset losses

- Housing and infrastructure quality
- Livestock and other assets
- Early-warning systems

Income losses

- Diversification of income
- Link between assets and income
- How long will the shock last?

Consumption losses

- Social protection
- Savings and borrowing
- Insurance and remittances

Well-being losses

- Marginal utility of consumption
- Income distribution
- Non-consumption poverty

We model losses in terms of well-being, not only asset—accounting for differences between poor and non-poor people.

Hazard

- Flood level
- Wind speed
- Hard and soft protection
- Temperature
- Precipitations

Exposure

- Location of people and assets
- Occupation

Asset losses

- Housing and infrastructure quality
- Livestock and other assets
- Early-warning systems

Income losses

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Consumption losses

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Well-being losses

- Marginal utility of consumption
- Income distribution
- Non-consumption poverty

$$\text{socioeconomic resilience} = \frac{\text{asset losses}}{\text{well-being losses}}$$

Socioeconomic resilience (percent)—117 countries

In Germany, resilience is 76 percent.
Losing $1 in a disaster has the same effect on well-being as a decrease in national consumption by about $1.2

In Malawi, resilience is 60 percent.
Losing $1 in a disaster has the same effect on well-being as a decrease in national consumption by $2

Socioeconomic resilience (%)

- 25–51
- 51–59
- 59–65
- 65–72
- 72–81
- No data

Asset losses are estimated at
$300 billion per year. (UN, 2015)

Risk to assets
(%GDP per year)
- 0.00–0.20
- 0.20–0.30
- 0.30–0.50
- 0.50–0.90
- 0.90–4.52
- No data

But socioeconomic resilience is
below 100 percent everywhere.

**Socioeconomic
resilience (%)**
- 25–51
- 51–59
- 59–65
- 65–72
- 72–81
- No data

=

Well-being losses average $500 billion per year

Risk to well-being
(% of GDP per year)
- 0.00–0.30
- 0.30–0.50
- 0.50–0.90
- 0.80–1.50
- 1.50–4.55
- No data
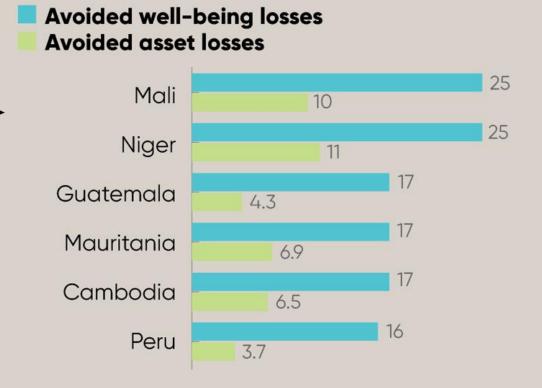
These estimates can also be used to target intervention in high-priority countries

Avoided well-being losses
Avoided asset losses
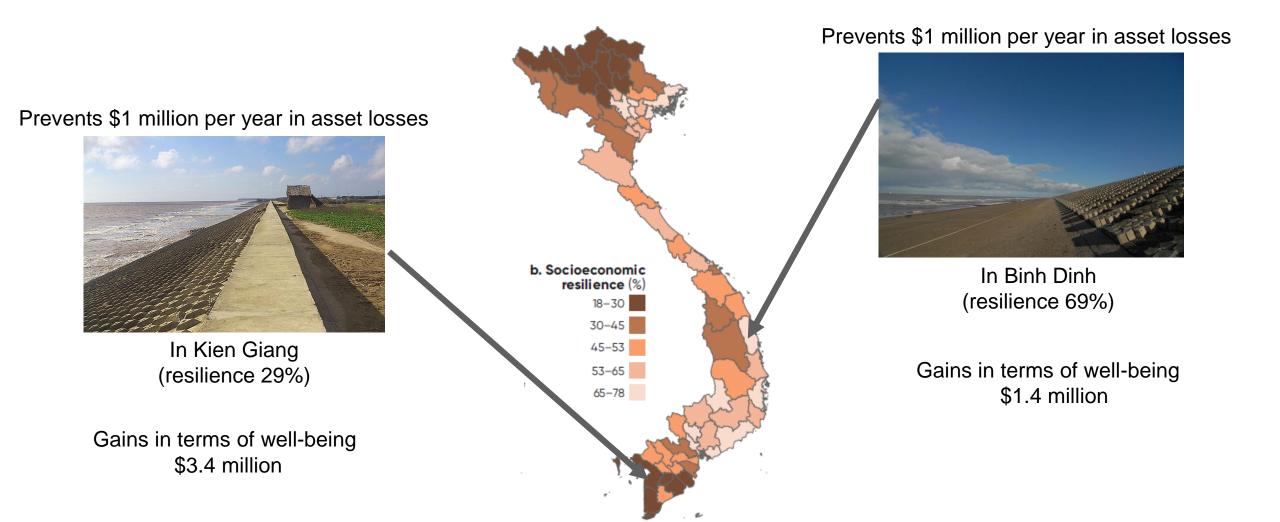
Benefits from reducing the exposure of poor people, by 5 percent of total exposure. →

In countries with low resilience, the benefits from lower exposure are magnified.

Where risks are very concentrated, interventions are more efficient.

Country	Avoided well-being losses	Avoided asset losses
Mali	25	10
Niger	25	11
Guatemala	17	4.3
Mauritania	17	6.9
Cambodia	17	6.5
Peru	16	3.7

These estimates can also be used to target intervention within countries

Prevents $1 million per year in asset losses

In Kien Giang
(resilience 29%)

Gains in terms of well-being
$3.4 million

Prevents $1 million per year in asset losses

In Binh Dinh
(resilience 69%)

Gains in terms of well-being
$1.4 million

b. Socioeconomic resilience (%)

▬	18–30
▬	30–45
▬	45–53
▬	53–65
▬	65–78
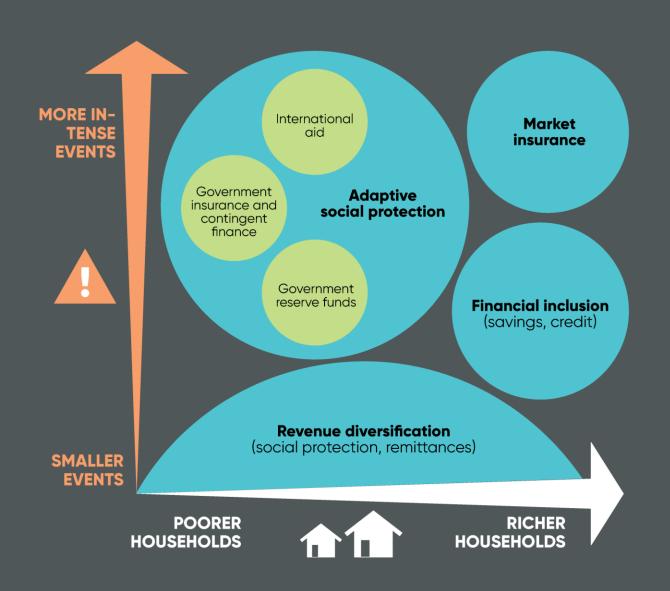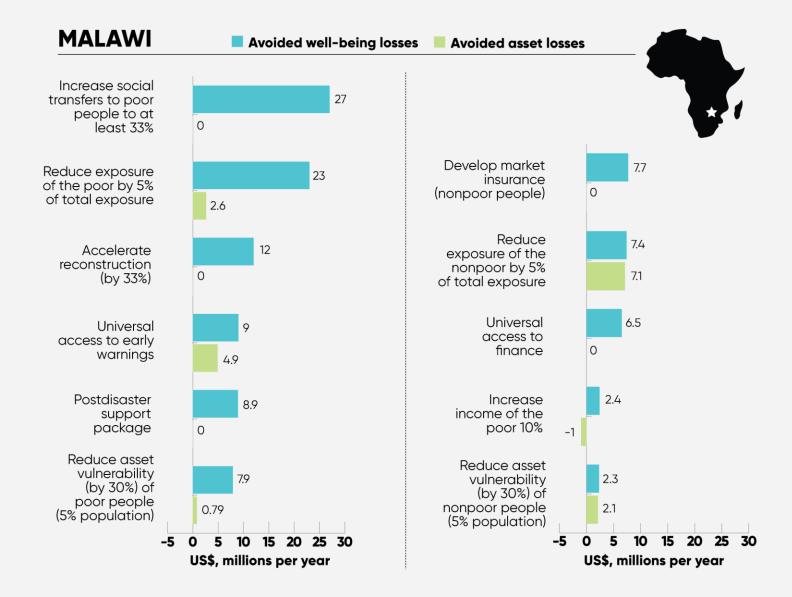
MAIN MESSAGE #3
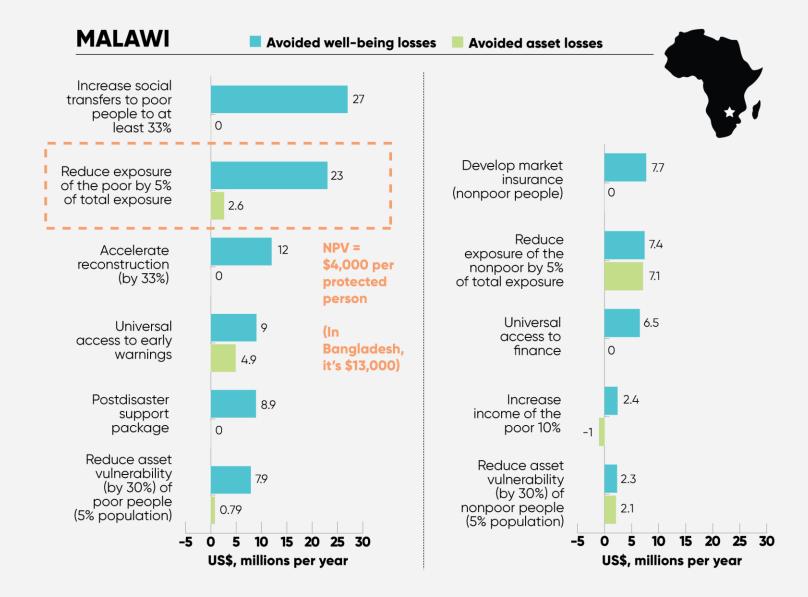
Policies that make people more resilient can save $100 billion a year.

A "resilience policy package"
If applied in the 117 countries, well-being losses would be reduced by $100 billion a year.

MORE IN-TENSE EVENTS

SMALLER EVENTS

International aid

Government insurance and contingent finance

Adaptive social protection

Government reserve funds

Market insurance

Financial inclusion
(savings, credit)

Revenue diversification
(social protection, remittances)

POORER HOUSEHOLDS

RICHER HOUSEHOLDS

Strategies need to be designed at the country level.

MALAWI
■ Avoided well-being losses ■ Avoided asset losses

Intervention	Avoided well-being losses	Avoided asset losses
Increase social transfers to poor people to at least 33%	27	0
Reduce exposure of the poor by 5% of total exposure	23	2.6
Accelerate reconstruction (by 33%)	12	0
Universal access to early warnings	9	4.9
Postdisaster support package	8.9	0
Reduce asset vulnerability (by 30%) of poor people (5% population)	7.9	0.79

US$, millions per year

Intervention	Avoided well-being losses	Avoided asset losses
Develop market insurance (nonpoor people)	7.7	0
Reduce exposure of the nonpoor by 5% of total exposure	7.4	7.1
Universal access to finance	6.5	0
Increase income of the poor 10%	2.4	-1
Reduce asset vulnerability (by 30%) of nonpoor people (5% population)	2.3	2.1

US$, millions per year

Strategies need to be designed at the country level.

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■ Avoided well-being losses ■ Avoided asset losses

Strategy	Avoided well-being losses	Avoided asset losses
Increase social transfers to poor people to at least 33%	27	0
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Universal access to early warnings	9	4.9
Postdisaster support package	8.9	0
Reduce asset vulnerability (by 30%) of poor people (5% population)	7.9	0.79

NPV = $4,000 per protected person

(In Bangladesh, it's $13,000)

US$, millions per year

Strategy	Avoided well-being losses	Avoided asset losses
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US$, millions per year

Strategies need to be designed at the country level.

MALAWI ■ Avoided well-being losses ■ Avoided asset losses

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- 0

Reduce exposure of the poor by 5% of total exposure
- 23
- 2.6

Accelerate reconstruction (by 33%)
- 12
- 0

Universal access to early warnings
- 9
- 4.9

Postdisaster support package
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- 0

Reduce asset vulnerability (by 30%) of poor people (5% population)
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US$, millions per year

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Reduce asset vulnerability (by 30%) of nonpoor people (5% population)
- 2.3
- 2.1

US$, millions per year

Strategies need to be designed at the country level.

MALAWI

■ Avoided well-being losses   ■ Avoided asset losses

Increase social transfers to poor people to at least 33%
27
0

Reduce exposure of the poor by 5% of total exposure
23
2.6

Accelerate reconstruction (by 33%)
12
0

Universal access to early warnings
9
4.9

Postdisaster support package
8.9
0

Reduce asset vulnerability (by 30%) of poor people (5% population)
7.9
0.79

Develop market insurance (nonpoor people)
7.7
0

Reduce exposure of the nonpoor by 5% of total exposure
7.4
7.1

Universal access to finance
6.5
0

Increase income of the poor 10%
2.4
-1

Reduce asset vulnerability (by 30%) of nonpoor people (5% population)
2.3
2.1

US$, millions per year

US$, millions per year

Strategies need to be designed at the country level.

MALAWI ■ Avoided well-being losses ■ Avoided asset losses

US$, millions per year

Left panel:

Strategy	Avoided well-being losses	Avoided asset losses
Increase social transfers to poor people to at least 33%	27	0
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Accelerate reconstruction (by 33%)	12	0
Universal access to early warnings	9	4.9
Postdisaster support package	8.9	0
Reduce asset vulnerability (by 30%) of poor people (5% population)	7.9	0.79

Right panel:

Strategy	Avoided well-being losses	Avoided asset losses
Develop market insurance (nonpoor people)	7.7	0
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Increase income of the poor 10%	2.4	-1
Reduce asset vulnerability (by 30%) of nonpoor people (5% population)	2.3	2.1

Strategies need to be designed at the country level.

MALAWI ● Avoided well-being losses ● Avoided asset losses

Increase social transfers to poor people to at least 33% — 27 / 0

Reduce exposure of the poor by 5% of total exposure — 23 / 2.6

Accelerate reconstruction (by 33%) — 12 / 0

Universal access to early warnings — 9 / 4.9

Postdisaster support package — 8.9 / 0

Reduce asset vulnerability (by 30%) of poor people (5% population) — 7.9 / 0.79

US$, millions per year

Develop market insurance (nonpoor people) — 7.7 / 0

Reduce exposure of the nonpoor by 5% of total exposure — 7.4 / 7.1

Universal access to finance — 6.5 / 0

Increase income of the poor 10% — 2.4 / -1

Reduce asset vulnerability (by 30%) of nonpoor people (5% population) — 2.3 / 2.1

US$, millions per year

Priorities are very different in high-income countries: low-hanging fruits are not there any more...

GERMANY

■ Avoided well-being losses ■ Avoided asset losses

Left chart:

Intervention	Avoided well-being losses	Avoided asset losses
Reduce exposure of the nonpoor by 5% of total exposure	240	200
Accelerate reconstruction (by 33%)	240	0
Develop market insurance (nonpoor people)	160	0
Reduce exposure of the poor by 5% of total exposure	130	52
Universal access to early warnings	90	69
Reduce asset vulnerability (by 30%) of nonpoor people (5% population)	72	60

US$, millions per year

Right chart:

Intervention	Avoided well-being losses	Avoided asset losses
Reduce asset vulnerability (by 30%) of poor people (5% population)	45	16
Postdisaster support package	24	0
Universal access to finance	23	0
Increase social transfers to poor people to at least 33%	0	0
Increase income of the poor 10%	-18	-22

US$, millions per year

INCREASE SOCIAL TRANSFERS TO POOR PEOPLE BY AT LEAST 33%

★ Top 15—absoute terms
☆ Top 15—relative terms

A APPENDIX

Study results for 117 countries

Country	GDP per capita (US$, PPP-adjusted)	Population (millions)	TODAY			WITH RESILIENCE PACKAGE (AND EARLY WARNING)			Annual well-being gains from resilience package (US$, millions, PPP-adjusted)
			Risk to assets (%of GDP)	Resilience (%)	Risk to well-being (% of GDP)	Risk to assets (%of GDP)	Resilience (%)	Risk to well-being (% of GDP)	
Albania	$9,961	3	0.99	69	1.43	0.91	84	1.08	92
Angola	7,488	21	0.15	31	0.48	0.12	60	0.20	441
Argentina	18,087	41	0.44	57	0.78	0.43	73	0.59	1,283
Armenia	7,527	3	0.73	71	1.03	0.70	81	0.86	34
Australia	42,834	23	0.20	72	0.28	0.20	82	0.25	272
Austria	44,056	8	0.24	73	0.32	0.24	82	0.29	113

UNBREAKABLE

≫≫ The effects of policy options on well-being and asset losses in 117 countries

Stephane Hallegatte
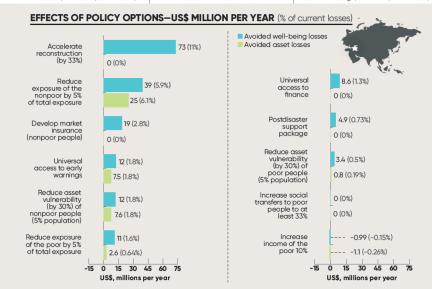Adrien Vogt–Schilb
Mook Bangalore
Julie Rozenberg

50 🌐 WORLD BANK GROUP

AZERBAIJAN

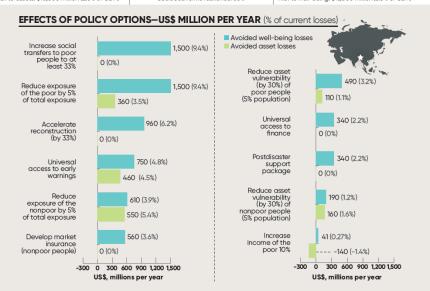| Risk to assets: $410 million (0.26% of GDP) | Socioeconomic resilience: 61% | Risk to well-being: $670 million (0.43% of GDP) |

EFFECTS OF POLICY OPTIONS—US$ MILLION PER YEAR (% of current losses)

■ Avoided well-being losses
■ Avoided asset losses

Accelerate reconstruction (by 33%): 73 (11%) / 0 (0%)
Reduce exposure of the nonpoor by 5% of total exposure: 39 (5.9%) / 25 (6.1%)
Develop market insurance (nonpoor people): 19 (2.8%) / 0 (0%)
Universal access to early warnings: 12 (1.8%) / 7.5 (1.8%)
Reduce asset vulnerability (by 30%) of nonpoor people (5% population): 12 (1.8%) / 7.6 (1.8%)
Reduce exposure of the poor by 5% of total exposure: 11 (1.6%) / 2.6 (0.64%)

Universal access to finance: 8.6 (1.3%) / 0 (0%)
Postdisaster support package: 4.9 (0.73%) / 0 (0%)
Reduce asset vulnerability (by 30%) of poor people (5% population): 3.4 (0.5%) / 0.8 (0.19%)
Increase social transfers to poor people to at least 33%: 0 (0%) / 0 (0%)
Increase income of the poor 10%: −0.99 (−0.15%) / −1.1 (−0.26%)

US$, millions per year

BANGLADESH

| Risk to assets: $10,000 million (2.3% of GDP) | Socioeconomic resilience: 66% | Risk to well-being: $15,000 million (3.5% of GDP) |

EFFECTS OF POLICY OPTIONS—US$ MILLION PER YEAR (% of current losses)

■ Avoided well-being losses
■ Avoided asset losses

Increase social transfers to poor people to at least 33%: 1,500 (9.4%) / 0 (0%)
Reduce exposure of the poor by 5% of total exposure: 1,500 (9.4%) / 360 (3.5%)
Accelerate reconstruction (by 33%): 960 (6.2%) / 0 (0%)
Universal access to early warnings: 750 (4.8%) / 460 (4.5%)
Reduce exposure of the nonpoor by 5% of total exposure: 610 (3.9%) / 550 (5.4%)
Develop market insurance (nonpoor people): 560 (3.6%) / 0 (0%)

Reduce asset vulnerability (by 30%) of poor people (5% population): 490 (3.2%) / 110 (1.1%)
Universal access to finance: 340 (2.2%) / 0 (0%)
Postdisaster support package: 340 (2.2%) / 0 (0%)
Reduce asset vulnerability (by 30%) of nonpoor people (5% population): 190 (1.2%) / 160 (1.6%)
Increase income of the poor 10%: 41 (0.27%) / −140 (−1.4%)

US$, millions per year

14