

THE IMPACT OF PRE-ARRANGED DISASTER FINANCE: EVIDENCE GAP ASSESSMENT

RUTH VARGAS HILL, ALEJANDRA CAMPERO PEREDO,
AND MARCELA TARAZONA

Abstract

This paper examines the evidence on how to prepare better for disasters, specifically the evidence on the welfare impacts of interventions that pre-arrange finance for disaster response. The review considers both interventions that strengthen the ability of individuals and firms to pre-arrange finance for disasters, and interventions that pre-arrange finance for governments, humanitarian agencies, and NGOs for disaster response. It considers the evidence from peer-reviewed publications that use a valid method for assessing impact.

We find that the quality of evidence is mixed across this space. There is stronger evidence on the impact of interventions that increase a household's ability to pre-arrange finance for a disaster than on the benefits of pre-arranging finance for public disaster response. Evidence on meso-insurance is limited.

Despite the weaknesses of the evidence base some clear findings emerge. When financial markets are more complete, people are much better able to manage disasters—but there are limits. Interventions that extend the geographic reach of informal risk-sharing networks improve the ability of households to protect their welfare from the impact of disasters, but strengthening informal networks carries costs to network members. Insurance brings welfare benefits, but the cost of making insurance—particularly income insurance—more accessible is likely to be high, and the low quality of many insurance products raises the question of whether the money purchasers spend on insurance will make them better off. Cash transfers made in disasters protect household welfare. Nutrition interventions and infrastructure reconstruction also help. Setting up pre-arranged financing can, but does not necessarily, result in better public support to households at the time of a disaster. More evidence on this issue is particularly needed.

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About the Centre for Disaster Protection

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About the authors

Ruth Vargas Hill is Chief Economist at the Centre for Disaster Protection, Alejandra Campero Peredo is a consultant at the Centre for Disaster Protection and Marcela Tarazona is Head of Climate Finance at Genesis Analytics.

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SECTION 1

● INTRODUCTION

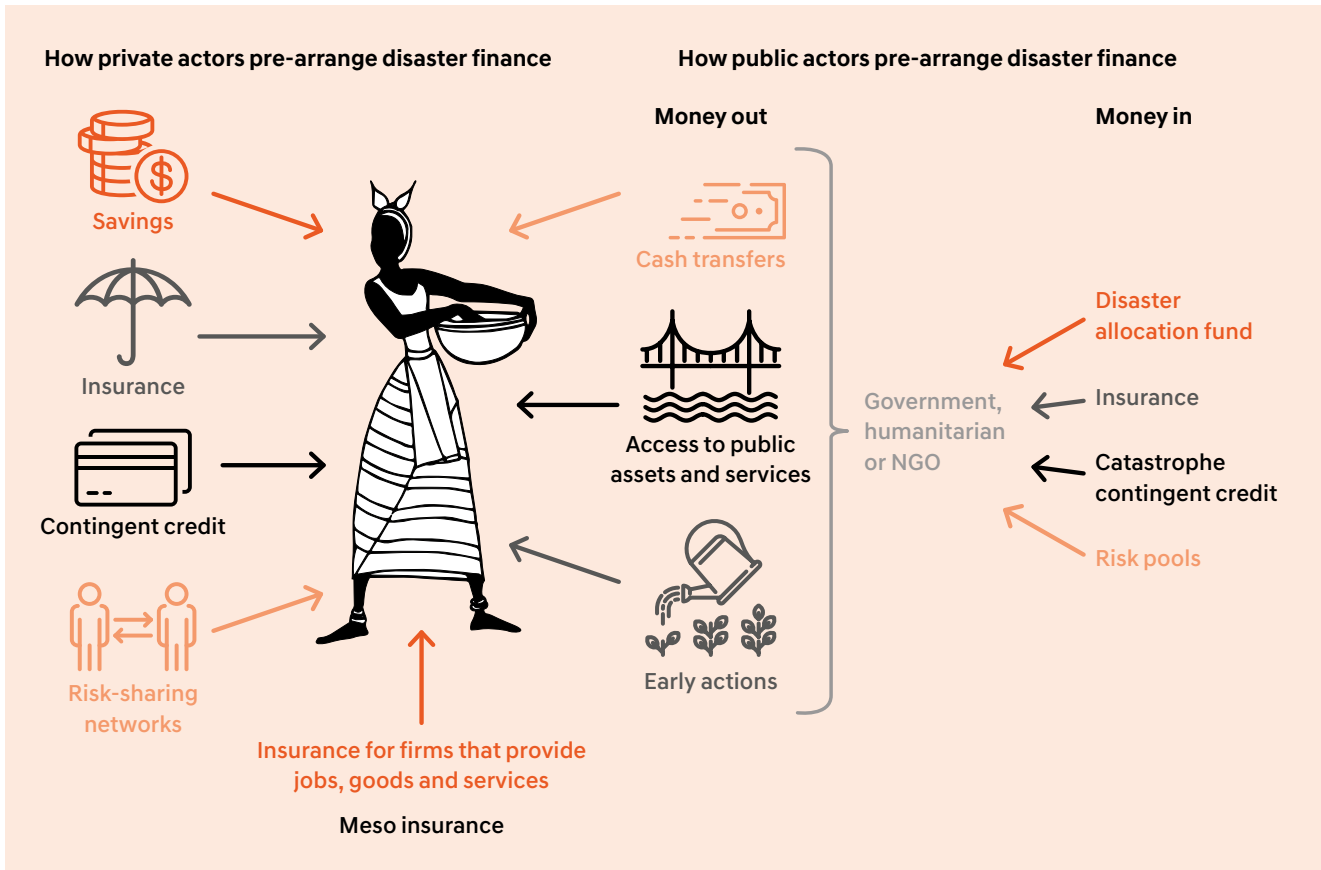
There is a strong body of evidence that points to the large and long-run negative impacts that disasters have on welfare. This provides a compelling case that the current policy response to disasters is inadequate and that we ignore better preparation for disasters at the peril of reversing gains in progress against welfare. This has been thoroughly underscored by the covid-19 pandemic, which has set back a decade of progress in extreme poverty reduction globally.

In this paper we examine the evidence on how we can prepare better, specifically the evidence on the welfare impacts of interventions that pre-arrange finance for disaster response. The main goal of this evidence gap

assessment is to examine the quality of the evidence base to identify where evidence gaps lie. However, we also summarise the main findings of the literature reviewed.

The review considers both interventions that strengthen the ability of individuals and firms to pre-arrange finance for disasters, and interventions that pre-arrange finance for governments, humanitarian agencies, and NGOs for disaster response. The coverage of the review is highlighted in Figure 1. The ways in which private actors (individuals and firms) pre-arrange finance for disasters appear on the left, and the ways in which public actors (governments, humanitarian agencies, NGOs) pre-arrange finance for disasters appear on the right.

Figure 1: Timing of commitments and disbursements



The focus of the review is on the impact of public action.

This means that when considering the ways in which private actors pre-arrange finance, we focus on evidence on interventions that increase access to it. For example, households might buy flood insurance or put money aside for a year when there is a bad harvest. The review considers evidence on the impact of interventions that increase access to flood insurance or savings.

Across all interventions the focus of the review is evidence on the impact of interventions on people facing disaster—the woman (or child or man) at the centre of Figure 1.

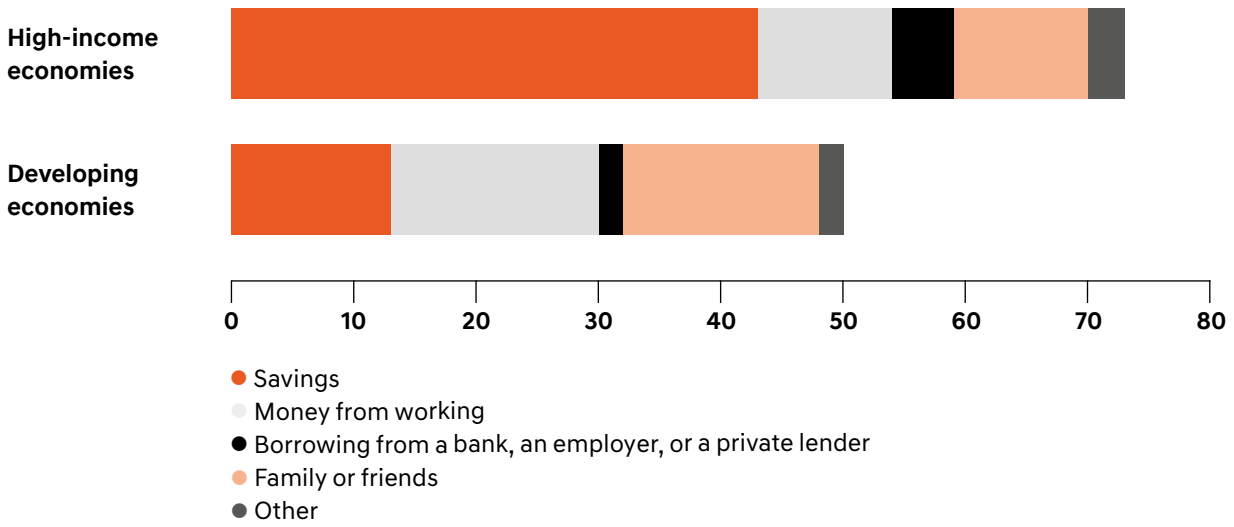
This means that when reviewing interventions that strengthen the ability of governments, humanitarian agencies, and NGOs to provide support and services in disasters (by pre-arranging the finance that goes into disaster response, ‘money in’), we also consider whether or not they result in improved support and service provision to households (‘money out’).

Although all these mechanisms are considered, it is worth noting that households primarily rely on private markets and networks for raising emergency funding in a disaster.

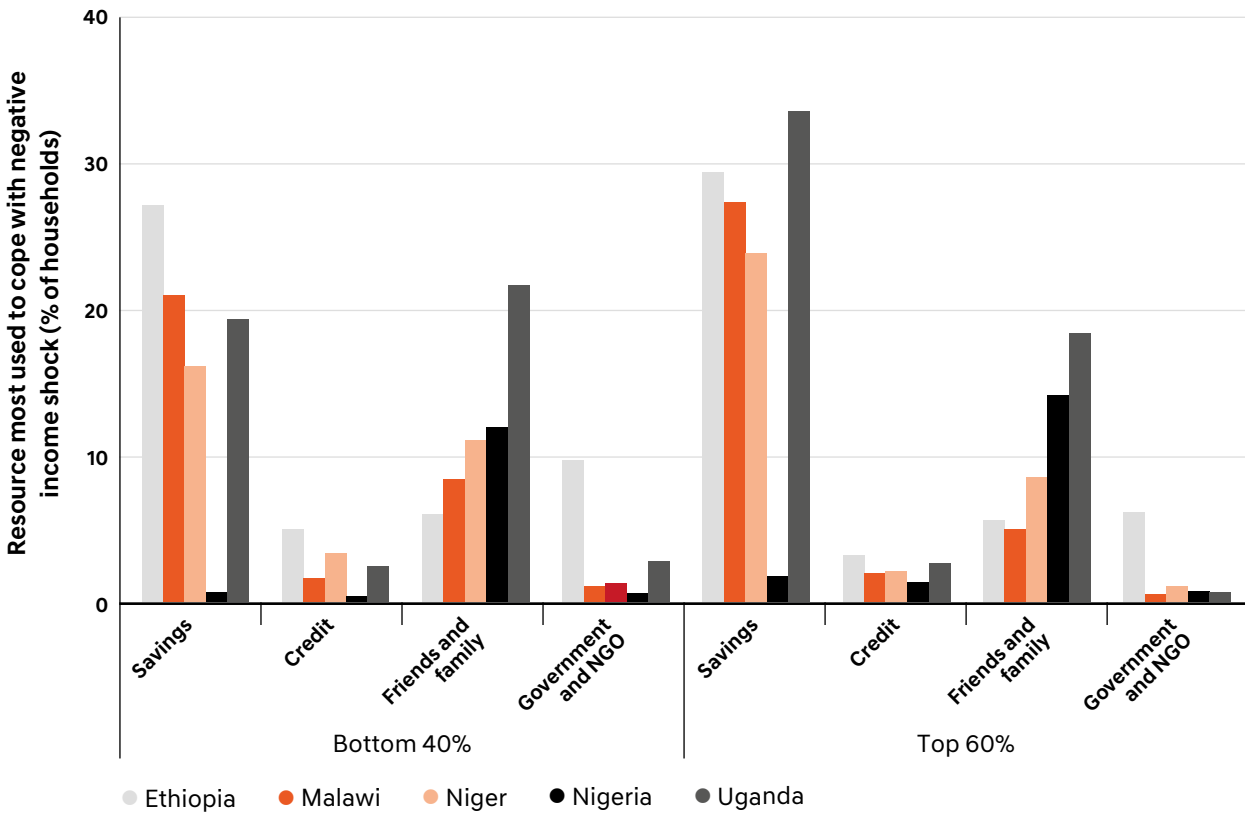
The main pre-arranged sources of finance that households use to finance disaster response are savings and informal networks. Borrowing is used, but it is rarely pre-arranged contingent credit. Global Findex, which conducts nationally representative surveys in over 140 economies every three years, asks households how they raise emergency funds. In developing economies, households report a fairly even split between saving, working to raise more funds, and asking for help from family and friends (Figure 2, top). Comparable household surveys from five countries in Africa were analysed in Nikoloski *et al.* (2018) and found similar responses when households were asked how they had coped with recent big shocks they had faced. Savings and friends and family were the most important mechanisms for both the poorest and richest households. Very few households relied on government and NGO support. Ethiopia was the only country where this was above 1%–2% (Figure 2, bottom).

Figure 2: How households finance how they cope with disasters

Adults able to raise emergency funds (%), 2017



Source: Global Findex



Source: Nikoloski, Christiaensen, and Hill in Hill (2019)

The review focuses on peer-reviewed publications identified through Google Scholar searches on key terms. A publication was included if it was a systematic review, a qualitative theory-based impact evaluation, or a quantitative impact evaluation in which the treatment and control groups were identified through randomisation, regression discontinuity design, or propensity score matching. For sovereign instruments, ex-ante simulations were also reviewed given this is a prevalent method for evaluation in this area. The strength of evidence was assessed based on the number of evaluations that were identified, but also based on the breadth of contexts they covered and the strength of their findings. If at least eight evaluations were found the evidence is graded as ‘strong’, between three and eight as ‘some’, and one to two as ‘little’.

We find that the quality of evidence is mixed across this space. There is stronger evidence on the impact of interventions that increase a household’s ability to pre-arrange finance for a disaster than on the benefits of pre-arranging finance for public disaster response. Strong evidence is found on the impact of providing cash transfers in a disaster (even if not through pre-arranged finance) but much of it comes from evidence on regular, non-emergency cash transfers. There are only a few evaluations of transfers provided because of a disaster. Some evidence is found on nutrition support, and little evidence is found on reconstruction despite strong evidence on provision of nutrition services and infrastructure investments. Evidence on meso-insurance is limited. The evidence on the costs of providing interventions that increase a household’s ability to pre-arrange finance for a disaster is limited.

Despite the weaknesses of the evidence base some clear findings emerge. When financial markets are more complete, people are much better able to manage disasters—but there are limits. Interventions that extend the geographic reach of informal risk-sharing networks improve the ability of households to protect their welfare from the impact of disasters. Heavily subsidised insurance brings welfare benefits, or at least the belief that welfare is better protected brings about welfare gains as evidenced through behaviour change. There is weak evidence that interventions to increase savings can help, and there is one promising study on the potential benefits of contingent credit. However, the cost of making insurance—particularly income insurance—more accessible is likely to be high, and the low quality of many insurance products raises the question of whether the money purchasers spend on insurance (even when subsidised) will make them better off. Strengthening informal networks carries the cost of *ad hoc* taxes that

are imposed on network members and can induce perverse behaviour. The benefits and costs of each intervention will need to be assessed in each context, and often in comparison to other alternate interventions.

Cash transfers made after disasters (or as they are about to strike) protect household welfare, and there is some evidence that nutrition interventions do too. The evidence base on cash transfers in disaster response is not as strong as the evidence base on regular cash transfers, but it still points to strong positive impacts. Nutrition interventions after a disaster reduce malnutrition and save lives and have broader impacts on schooling and child labour. However no public support has been found reliable enough to provide benefits in advance of a disaster by providing a secure guarantee of support should a disaster strike.

Setting up pre-arranged financing for disasters for public actors can—but does not necessarily—result in better support to households at the time of a disaster. There are two compelling rigorous evaluations that show the impact of pre-arranged finance. However, there are also examples of pre-arranged finance with no evidence of impactful support provided to households as a result. And some examples of impactful support being provided with no pre-arranged finance. More evaluations would be helpful to highlight cases of impact and identify constraints when no impact has been realised. The current evidence underscores that although financing is an essential part of an effective response, there are other constraints (Clarke and Dercon, 2016).

A visual executive summary indicating where the evidence is strong and weak is presented in Table 1. The strength of colours represents the amount of evidence found, not whether the evidence showed a clearly positive story. In some cases (such as the impact of sovereign money in mechanisms) the evidence shows a mixed picture. The text in each cell indicates the overall finding. The full reference list behind this table is presented in the annex.

The paper proceeds as follows. In Section 2 we provide further detail on the scope of the review and the methods used. This explains the choice of rows and column found in Table 1, and the categories used in the table. The following sections then provide some detail on the evidence listed in Table 1. First we summarise evidence on household interventions (Section 3), sovereign, humanitarian, and NGO interventions (Section 4) and meso level interventions at the firm level that fall between these two (Section 5). The final section concludes.

Table 1: A visual executive summary of evidence on pre-arranging finance for disaster response

Welfare impact		Characteristics of pre-agreed finance that would make it impactful					
		Focuses on poverty	Offers good value	Is timely	Provides a trusted guarantee	Creates power for those facing risk	Aligns with the bigger picture
Interventions that strengthen the ability of individuals to pre-arrange finance for disasters							
Savings	Little evidence	Strong evidence of barriers for the poorest	No evidence	No evidence	No evidence	Little evidence	
Networks	Strong evidence of positive impact (with mobile money), also some evidence of negative side effects	Strong evidence of a mixed story: strongly relied upon by the poorest but the poorest have weaker networks	No evidence	No evidence but the impact results suggest they are timely	Some indirect evidence that it is strong given costly avoidance behavior undertaken to avoid payments, although no direct evidence	No evidence	
Contingent credit	Little evidence	Little evidence	Little evidence	No evidence	No evidence	No evidence	
Insurance	Strong evidence of positive impact	Some evidence of relevance but also strong evidence of barriers for the poorest	Little evidence. Available evidence suggests costs are high	Basis risk: strong evidence to show it is a concern, little evidence on quantifying it. Timely payments: little evidence	Strong evidence	Little evidence	
Interventions that pre-arrange finance for governments, humanitarian agencies and NGOs to provide support and services in a disaster							
Money in: financial instruments	Some evidence of impact, but some evidence of no impact and ex-ante simulations do not show clear benefits	Little evidence. For anticipatory action and adaptive social protection there is some evidence, but not other interventions	Little evidence	Strong evidence of timely payouts to countries but not to households	No evidence	Little evidence	Some suggestive evidence that it helps
Money out: cash transfers	Some evidence on positive impact. Strong evidence on regular transfers.	Some evidence	Strong evidence	Strong evidence	No evidence of positive impact, some evidence of unpredictability limiting impact	Little evidence	
Money out: rebuilding	Little evidence on rebuilding. Strong evidence on returns to infrastructure.						
Money out: public services	Some evidence of impact of emergency nutrition support. Little evidence on other services						
Interventions that strengthen the ability of firms and financial institutions to pre-arrange finance for disasters							
Meso level insurance	Some evidence on impact						

● METHODS

2.1 Scope and criteria for inclusion

For private actors we examine insurance, savings, contingent credit, and informal networks for individuals. We do not consider credit that has not been arranged in advance. Informal networks are only considered to the extent they are invested in in advance of disasters. We examine whether the instrument is impactful in disaster response and what interventions increase its use.

Firms or financial insurance can also be insured to continue providing market services (for example credit) in a disaster. This is termed meso level insurance and is also considered.

For public actors we examine mechanisms that pre-arrange finance for response and the support to households that it finances. Good preparedness for disaster response means doing much more than arranging financing for response. For governments and humanitarian organisations or NGOs, disaster response requires having financial or budgetary instruments that ensure money is available when needed (money in) and getting in place all the processes to ensure that the money is spent on providing what households need when they need it most (money out). For money in, the review includes insurance, contingent credit, risk pools, and crisis allocation mechanisms (including for forecast-based financing). For money out, we have looked at the main things that are funded by money in instruments: cash transfers, provision of public services, and rebuilding of public assets. There are many other things that are important in response, such as providing information and legal protection, but as these are not usually financed through pre-arranged financing these are not included in the review.

A disaster is defined as a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins (IFRC, 2021). The fact that disasters overwhelm a community's ability to cope is important for this review as it means that we do not include evidence on shocks that affect one household but not others in their community at the same time. For example, job loss from one firm going bankrupt, or loss of life or health from a heart attack.

This scope of the review aligns with the definition of disaster risk financing (DRF). The Centre for Disaster Protection defines DRF as 'the system of budgetary and financial mechanisms to credibly pay for a specific risk, arranged before a potential shock' (Centre for Disaster Protection, 2019). This covers a broad set of interventions, and the Centre's strategy notes that this can include 'paying to prevent and reduce disaster risk, as well as preparing for and responding to disasters'. By focusing this review on financing just for responding to disasters we are taking a narrower focus in order to keep the scope manageable as a broad range of financing instruments and activities can be covered by reducing risk.

The primary focus of this review is assessing impact: impact on welfare and income growth. As such this is not a full review of the evidence on DRF. A number of aspects on DRF design and implementation are not covered.

We used Google Scholar as the search engine for the articles as our search criteria required that we search across disciplines. Articles were identified through a Google Scholar search using 'impact evaluation' AND [keywords]. Keywords included the name of the

intervention or other terms designed to capture relevant results. In some cases, the name of the intervention alone was sufficient to yield a high number of relevant articles. In other cases, background reading was carried out to identify appropriate search terms that would yield useful results.

An article was included in the review if it was: (i) a systematic review, (ii) a quantitative impact evaluation with defined treatment and control, where the control group was identified as a result of randomisation of the treatment, a natural experiment such as regression discontinuity design, or through propensity score matching, or (iii) a qualitative theory-based impact evaluation. We also considered ex-ante simulations for sovereign DRF instruments given this is an approach often used to assess impact in that area. We also wanted to ensure included papers reported accurate findings. Peer review is an important part of determining validity of findings. Published journal articles are a clear indication that peer review has been present, but publication by an organisation as a report or working paper often also indicates that a peer review process has taken place. These were all included, but mimeographs and master's theses were not included.

Google Scholar provides a large number of results sorted by relevance. We went through the search results in order of relevance (i.e. the order in which they appear in Google Scholar). For each search, the first 100 results were reviewed. If, at the 100th article, the yield of relevant results was greater than 20%, the review continued until the yield dropped below 20%. If, at the 100th article, the yield of relevant results was less than 20%, the search was concluded.

In practice, it was not always possible to determine inclusion from the initial review of abstracts. If the quality criteria could not be assessed with the information

available in the abstract or a free version of the paper, then the paper was read to assess this. In practice, many papers were identified as a result of snowballing from the papers included in an initial Google search, particularly from review papers.

2.2 Assessing impact

Assessing the impact of pre-arranged disaster financing on people's lives is challenging. For sovereign DRF instruments it can be hard to follow the money to the point where it is spent and has an impact. It can be hard to make sure enough households are receiving services covered by money out processes. And given pre-arranged financing only kicks into gear when a disaster occurs, it is challenging to have everything lined up for an impact evaluation in the right place at the right time.

Even when we can measure the impact, this is for some types of household and for one type of disaster. These measures of impact provide an indication of the intervention's value, but the measured impact may not be reflective of impact under disasters of different severity (Rosenzweig and Udry, 2020). In the absence of impact evaluation results, there are other pieces of information that can be informative. Ex-ante simulations can be informative of likely impacts.

Given the challenges to conducting impact evaluations in this area, we also examine the evidence that interventions have characteristics that are likely to result in impactful support to households. The Centre for Disaster Protection highlights seven characteristics (the '7 habits') of highly effective of DRF interventions (Hill and Scott, 2020) and proposes that interventions that score well on these characteristics are more likely to have a meaningful impact in improving the lives of people affected by disasters (see box 1). While it is important to continually assess the accuracy of these assumptions, the evidence review evaluates evidence against these habits.

Box 1: The '7 habits' of highly effective DRF

Effective DRF:

- 1. Focuses on poverty:** Disasters disproportionately affect the poorest people. Effective DRF focuses on the risks that are of greatest importance to poor households, or those that are just one disaster away from being in poverty, and the financial support reaches them in a way that best meets their needs. An example might be sovereign insurance payouts financing cash transfers through a social protection programme that targets poor households, or specifically rebuilding the roads or services that poor people most rely on. When this is not the case, DRF may still secure valuable benefits, such as preventing budget reallocations away from core public services, or preventing inflationary fiscal spending, which can be very harmful for poor households. But it is worth assessing whether benefits are well targeted to those most affected by the disaster.
 - 2. Offers good value:** There are lots of different instruments and approaches that could be used for DRF and it makes sense to use financial products that provide the most cost-effective protection, taking into account costs for maintenance and development.
 - 3. Is timely:** Good DRF provides support when it is needed. This may mean providing support before a crisis to reduce its impacts,¹ or providing support early on after a disaster hits and before people use costly coping mechanisms in order to manage. It is important to ensure that finance will be triggered at an appropriate time for the actions that it is supposed to fund. Triggers and proposed actions need to match for the development impact of DRF to be maximised.
 - 4. Provides a trusted guarantee:** If it is unclear whether people will receive support when there is a crisis, they alter their behaviour in ways that have long-term economic and wellbeing impacts, for example, reducing food intake or selling assets. Even if the crisis does not occur, without confidence in support arriving when needed, households will lack the peace of mind needed to make the right investments, such as in their children's schooling or in agricultural investments at the start of the season. This quiet cost of uninsured risk that occurs every year, whether a disaster occurs or not, has a substantial impact on a household's ability to move out of poverty. Great DRF gives households confidence that they will be covered should a crisis develop. It provides certainty of support, even while
- people continue to face much uncertainty about the future. Confidence can be built through a strengthening of 'the social contract' (with the government communicating and proving over time that it will be there with safety net support when households need it, for example), or through the provision of understandable and credible financial contracts with clear payout terms.
- 5. Creates power for people facing risk:** The best DRF puts power in the hands of at-risk people and communities, giving them a choice over how they manage their risks. This is just as true for sovereign risk financing instruments as it is for humanitarian interventions or individual insurance policies. Examples of empowering DRF include: prioritising the use of country-owned safety nets or domestic financial markets that work well; meaningful participation in government DRF programmes during design, implementation, monitoring and evaluation; and building the financial capacity of NGOs to respond to disasters. It also includes more choice over financial risk management products at the individual level, and consumer rights protection that protect the rights of buyers.
 - 6. Aligns with the bigger picture:** DRF does not take place in a vacuum. It needs to work in relation to other risks, including long-term evolving risks from climate change, and it should build on existing approaches in a country with an eye on building broader resilience. An example would be a DRF initiative that aligns with the government's DRF strategy and disaster risk management policy, utilises systems that already exist in a country (maybe early warning or social protection systems), and builds in ways of reducing risk rather than just responding to it (perhaps by improving planning and preparedness).
 - 7. Improves constantly:** DRF is a new area and we are still learning about what works. This can happen through technical scrutiny at key points as well as by embedding a monitoring and evaluation (M&E) system. M&E can provide an important accountability function and facilitate learning, but this is greatest when information on performance is publicly shared. With more data and information on what works in the public domain, we can make sure that it is not just individual DRF projects that are constantly improving, but that this is also true on a global level.

Source: Hill and Scott, 2020

¹ Based on projections that a crisis is coming, for example 10-day flood forecasts.

For each intervention, the evidence base on these habits is considered. Given we are assessing the quality of evaluations, we do not separately consider the ‘improving constantly’ habit. ‘Aligns with the bigger picture’ is only assessed for DRF instruments in Section 4, which examines pre-arranging finance for governments, humanitarian organisations and NGOs. This is because this is not so relevant for individual instruments that are used by individuals or money out instruments.

The counterfactual used in this review varies based on the study, but in nearly all cases the studies that examine impact compare support against a counterfactual of no support. In some cases, the interventions are compared to regular cash transfers, and in some cases they are compared to traditional disaster response. Evidence on the timing and cost of response is available in some studies, but there is no counterfactual or benchmark to reference it against.

2.3 Grading the strength of evidence

The strength of evidence in a given area was evaluated based on the number of evaluations that were identified, but also based on the breadth of contexts they covered and the strength of their findings. We evaluated the evidence of impact as ‘strong’ if at least eight rigorous evaluations were found. ‘Some evidence’ was used when three to eight evaluations were found, and ‘little evidence’ when one or two evaluations were found.

● STRENGTHENING THE ABILITY OF INDIVIDUALS TO PRE-ARRANGE FINANCE FOR DISASTERS

3.1 Savings

Savings are the most widely reported coping mechanism households use to manage shocks.

Hypothetical questions in the Global Findex database on how households would finance emergencies, showed that 20% of individuals (with little difference between men and women) would rely most on savings, second only to family and friends (Demirguc-Kunt *et al.*, 2015a).²

Although widely used, the received wisdom is that savings are better suited to helping households manage small income shocks. They may be a first line of defence in protecting welfare from large covariate shocks, but the seminal literature on shocks and savings shows that they do not provide adequate protection against large income losses (Kazianga and Udry, 2006; Fafchamps, Udry and Czukas, 1998; Deaton, 1991). In this section we examine the evidence that interventions aimed at increasing savings have helped households better withstand the impact of disasters.

It is important to note that often savings are informal and kept outside of the formal banking system: 60% of adults in sub-Saharan Africa save money, but only 16% of these people use a financial institution to do so (Demirguc-Kunt *et al.*, 2015b). Others keep saved cash hidden in the home or use it to participate in informal savings clubs such as rotating savings and credit associations (ROSCAs).³ The limited use of formal savings accounts makes saved cash more susceptible to lose value, and more subject to temptation for use for other purposes (sometimes as a result of requests from others). To

protect against this, many households often choose to save in the form of physical assets such as small ruminants. Animals are purchased at harvest time when income is high and are sold when financial needs press or when shocks hit. A large literature highlights how saving in the form of assets also carries its own return. This means that some households choose not to dis-save assets when large shocks hit, choosing to protect their assets instead at the cost of a short-run reduction in consumption (McPeak, 2004; Hoddinott, 2006; and Carter and Lybbert, 2012).

Evidence on impact

There is a growing robust evidence base that shows that helping individuals save helps them manage smaller shocks. This is particularly true for health shocks and savings interventions targeted at women (for example, Dizon *et al.*, 2020; Delavallade *et al.*, 2015; Beaman *et al.*, 2014; Dupas and Robinson, 2013).

There is less robust evidence on the effectiveness of savings interventions in helping households respond to disasters. Karlan *et al.* (2017) find suggestive evidence that strengthening village savings groups in Malawi, Ghana, and Uganda helped households manage drought, although the results are not robust to multiple hypothesis testing. Demont (2020) finds that, in eastern India, households in self-help group interventions were better able to withstand droughts. Jans-Harms (2017) and Danai Manyumwa *et al.* (2018) find that the ability to cope with

² These questions are asked for emergency funds of 5% of gross national income (GNI) per capita in each country in which the Global Findex survey is conducted.

³ About 40 million unbanked women and 30 million unbanked men in sub-Saharan Africa use informal groups to save.

disasters is stronger in places with savings groups, but it is not clear whether this is the result of stronger savings or something else. Guo and Narita (2018) simulate the long-run impacts of allowing households to withdraw from pension funds in the wake of a cyclone using the example of Cyclone Winston in Fiji and highlight real benefits and costs of allowing this. None of the analyses identifies whether any impact comes because savings allow households to diversify and increase their income streams, or because savings help households manage shocks. The conclusion of the review of Clark *et al.* (2015) seems to still hold, namely that the evidence on the impact of savings on the ability of households to smooth consumption is still mixed. This in part reflects the general lack of evidence on the impact of savings, although this is an area where the number of studies is increasing.

More evaluations on the impact of savings interventions in helping households manage disasters are needed.

Particularly those that rigorously test the degree to which strengthened savings helps households manage the impacts of a disaster. There are no studies that examine how the risk-management aspect of savings impacts behaviour in advance of a disaster, but it is also not clear how this impact could be disentangled from the liquidity benefits of strengthened savings in a study design.

Evidence on the 7 habits

Focuses on poverty

Evidence that examines the use of savings to cope with different types of shocks, highlights that poor households are much less able to use savings than rich households—on average savings are used a third less often by households in the bottom 40% than households in the top 60% (Nikoloski *et al.*, 2018). Savings are also less available for rural households regardless of poverty status, resulting in many rural households using assets to manage risk.

However, savings interventions have often been well targeted to poor and marginalised households and effective at increasing their savings (see for example Dupas and Robinson, 2013). It is also useful to note that increased savings have been a core early aspect of the graduation approach, which is targeted to ultra-poor households (Banerjee *et al.*, 2015). In addition, savings-group interventions have often been targeted to women. The missing piece is to show that these interventions have been effective at increasing the degree to which poor households and women can rely on savings to cope with a disaster given we know full risk-sharing in the household is not present (Dercon and Krishnan, 2000).

Offers good value

This review could not find any studies that examined the cost-effectiveness of household savings as an instrument for managing risk, although there are a number of analyses showing the cost-effectiveness of interventions to improve savings (for example see Greaney *et al.*, 2016; Dupas and Robinson, 2013). There is some evidence that there is a trade-off between cost-effectiveness and inclusiveness in interventions to improve savings (Greaney *et al.*, 2016). Holding savings to cope with a disaster can be costly, particularly for low probability, high-impact disasters. A more cost-effective financial plan would likely be one that includes some level of savings but used in combination with other financial instruments that can more cost-effectively transfer risk across other households and years. A better understanding of the cost of using savings and the optimal level of savings in relation to other instruments is a key evidence gap that needs to be addressed.

Is timely

The evidence review did not highlight any analyses focusing on timeliness as an outcome measure. Although it is reasonable to expect that, perhaps with the exclusion of commitment savings products, the withdrawal and use of savings in a disaster could be very quick.

Provides a trusted guarantee

There was no evidence found on this. Although again it is probably reasonable to expect that individuals will trust that they can withdraw money from institutions that they are willing to trust with their savings.

Creates power for people facing risk

There is an emerging evidence base that being a member of a savings group can be empowering for marginalised groups. Locus of control has been found to increase in some studies (disabled members in India), and in qualitative evaluations the impact of savings on empowerment increased. Impacts are found in conflict settings (Bass *et al.*, 2016). **This has not yet been tied to a reported empowerment to manage risk**, but the evidence does point to this being an intervention that is empowering for those facing risk.

3.2 Risk-sharing networks

Transfers of money between family and friends in the aftermath of a disaster are central to household risk management. Households across countries in sub-Saharan Africa report that assistance from family and friends is their second most important means by which they manage shocks, and it is particularly important for the poorest 40% of people in any country. This is also the

most commonly reported way of households financing an emergency (Demirguc-Kunt *et al.*, 2015a).

Evidence suggests households invest in risk-sharing investments in advance of disasters. Although these transactions are for the most part *ad hoc* (in some cases more formalised rules have emerged, e.g. Dercon *et al.*, 2006) and occur after a disaster, a large body of work highlights that transfers made in these networks are reciprocal (e.g. Jack *et al.*, 2013; Fafchamps and Lund, 2003; Platteau, 1997). In other words, these are relationships and networks that households invest in continuously and are not only relied upon after a shock. Ambrus *et al.* (2014) state it as ‘connections between individuals serve as social collateral to enforce informal insurance payments’. There are also some informal risk-sharing networks that are more formalised with clear payment and payout allocation rules. These are often to cover funeral or healthcare costs, or other idiosyncratic shocks (Dercon *et al.*, 2006).

While transfers within these informal networks have traditionally been seen as more effective at insuring idiosyncratic shocks rather than covariate shocks that are likely to affect all members of a network at once (Morduch 2002), there is some evidence this may be changing. Networks have increasingly been used to insure against covariate shocks as mobile money and higher rates or rural to urban migration have increased the geographic reach of any network (Yang and Choi 2007; Meghir *et al.*, 2020; Jack, Ray and Suri, 2013; Blumenstock, Eagle, and Fafchamps, 2011).

Evidence on impact

Recently, a number of studies have provided strong causal evidence on the impact of interventions that strengthen risk-sharing networks. A review is provided in Suri *et al.* (2021). These papers assess the impact of interventions that increase the scale of the risk-sharing network or reduce the costs associated with making transfers within the network. Interventions to aid migration do the former, and mobile money does both. In Bangladesh, an intervention that increased seasonal migration improved risk-sharing, which increased welfare by 13% (Meghir *et al.*, 2020). In Vietnam, households with migrants were better able to insure against the impact of a typhoon, and their ability to do so was stronger the further the migrants were located (Gröger and Zylberberg, 2016). Similar evidence is found in Nicaragua (Millan, 2019). In Kenya, mobile money has strengthened risk-sharing to the point that consumption is fully insured against shocks—because of increasing the number of transfers and the diversity of senders (Jack and Suri, 2014). This was true

for all shocks as well as a large drought shock that occurred during the time of the survey and reduced consumption among non-mobile money users by 20%. Similar findings were found for floods in Mozambique (Batista and Vicente, 2018) and for violence in Kenya (Morawczynski and Pickens, 2009). In Tanzania, consumption is fully protected from small village-level rainfall shocks for those who have mobile money (Riley, 2018) and households are protected from falling into poverty and reducing investments in human capital (Abiona and Foureaux Koppensteiner, 2018). It is not clear whether there are different impacts for men and women.

However, although informal transfers are a strong tool used by households to finance disaster response, some papers show that they are not entirely benign, so there may be costs to interventions that strengthen them. The use of informal networks to manage risks carries a cost that can be difficult to quantify. Recent work has documented that the expectation that better off network members will support those less fortunate than themselves can encourage people to avoid investing in visible high return activities, and to engage in costly strategies to hide or tie up financial capital (Fafchamps and Hill, 2017; Brune *et al.*, 2016; Jakiela and Ozier, 2015). In Cameroon, nearly 20% of members in a microfinance network took loans for the sole purpose of signalling that they had no cash (Baland *et al.*, 2011).

A key evidence question is whether the impact and reach of informal networks can be supported whilst reducing some of the negative impacts of the transfers. This could be through formalising the network with some clear rules as has been the case in funeral insurance mutuals in Ethiopia (Dercon *et al.*, 2014). It can also be through insuring the *ad hoc* tax nature of these rules. Kazianga and Wahhaj (2020) are offering insurance to urban migrants to insure remittance flows back to rural sending families. This seems a particularly productive line of experimentation and evidence building. A second evidence question is how formal safety net transfers fit with this. When is the point at which this offers a more inclusive and impactful approach? Given the low coverage of safety nets in many countries in Africa, this may be a long way off.

Evidence on the 7 habits

Focuses on poverty

As reported above, poorer households rely on this source of support in a disaster more than non-poor households but there is no analysis on the degree to which interventions to strengthen them are effective at targeting poorer households. The degree of inclusivity of

networks is high, and equal treatment appears to be particularly important in some contexts: for example, in rural Ethiopia every household in the community will routinely be part of a funeral insurance mutual with equal payments and payout rules. The intervention considered by Meghir *et al.* (2020) is particularly targeted to poorer areas of Bangladesh.

Studies also show that better-off households have larger, more diverse, and more well-endowed networks compared to poorer households. This evidence shows quite strongly that poorer households have smaller networks than better off households. Even though that is the case this literature confirms that informal risk sharing strategies are particularly important as a risk coping strategy for households who have little access to other financial instruments (Harrower and Hoddinott, 2005; Grimard, 1997). However, a key concern with risk-sharing networks as a tool to manage risk is that they can reinforce or exacerbate existing inequalities within a society (see for example Ambrus and Elliott, forthcoming). A strategy that relies on this mechanism alone would leave poorer households with less insurance against a disaster than better-off households.

Offers good value

As noted above, many of the costs of informal transfers are quite hidden, made through investments in connections over many years and sometimes causing costly avoidance behaviours. The literature already documents reciprocity and avoidance costs. It is not clear that this can be turned into cost estimates. Further evidence on avoidance costs could be useful given the literature on that is quite narrow (the four papers cited above).

Is timely

The review did not find any evidence on the timeliness of transfers although the impact results suggest they are timely.

Provides a trusted guarantee

There is no evidence in the literature on the degree to which interventions to strengthen risk-sharing networks provide enough assurance to bring greater peace of mind or the higher levels of investment in productive activities that can result from being insured. However, the evidence presented in the value for money section shows that the strength of the expectation that money will be provided is such that it encourages costly

aversion behaviour on the part of the potential benefactor. This suggests the guarantee provided is quite strong.

Creates power for people facing risk

There is no evidence on this.

3.3 Contingent credit

There is a strong body of evidence showing that households borrow after a disaster to meet basic consumption needs, often taking loans at high interest rates. This is a strategy used by a household after a disaster strikes and is not agreed in advance. There is some evidence to suggest that access to consumption credit is particularly weak after a disaster as demand increases without a commensurate increase in supply (in some cases even a worsening if lenders face access constraints in places hit by a shock). Positive findings from early trials of recovery loans (for example in the aftermath of Typhoon Haiyan) could encourage lending institutions to overcome these barriers.

However, there has been little experimentation with establishing contingent credit or pre-agreed lines of credit before a disaster. Some literature has looked at how credit repayment can be postponed or cancelled during a disaster, which is covered in the meso-level section below, but there is only one paper examining the use of contingent credit at the household level (Lane, 2020). Much greater experimentation and evidence is needed in this area. Given, there is only one paper we summarise its findings in the next paragraph and do not examine each of the 7 habits separately also.

Lane (2020) shows that putting in place contingent credit contracts that provided guaranteed finance to a borrower in advance of a disaster protects assets and consumption when disaster strikes, and enables households to take on more high-return, higher risk investments, which led to higher average income levels. Demand for the product was strong, with households valuing a guarantee of a post-flood loan, 1.8 times more than a pre-flood loan. Among pre-qualified households, demand was slightly stronger among households that were more vulnerable to risk. However, the paper provides no evidence on where these pre-qualified households lie in the consumption distribution, or the differential likelihood of male and female borrowers to access this type of credit.

3.4 Insurance

Few households report using insurance to manage the impact of disasters. This reflects the fact that formal insurance markets are often missing. Also, when they do exist, there has been low take-up in voluntary insurance markets.

Low demand for insurance could reflect the low quality of insurance contracts that are offered. If the quality of the insurance product is low, demand for that product should remain low (Vasiliky *et al.*, 2020; Carter and Chiu, 2020; Ward and Makhija, 2018; Clarke and Wren-Lewis, 2013). Although there are few published analyses of the quality of insurance projects, those that have been published show that a pure weather index product can be very low quality, even to the extent it does not make purchasers better off (Clarke 2016). There is increasingly a literature on how the quality of insurance products can be improved such that they do offer a value proposition to households that can be understood and known at the time of purchase. In their review, Carter and Chiu (2020) note that there have been a number of different approaches to measuring the quality and effectiveness of agricultural insurance in managing risk (for example, Carter and Chiu, 2020, Morsink *et al.*, 2016) and that more work is needed on how to use these measures to certify the quality of index insurance and integrate quality measures into consumer protection policies.

Another possibility, however, is that insurance is too expensive, particularly for insurance income such as crop insurance. Globally, markets for asset insurance (auto, property, life, health, and casualty insurance) are much more likely to be well developed than markets for income insurance. This reflects the reality that the costs of providing insurance are significant, making the product typically most appealing when current losses have dynamic spillovers, such as is the case for asset losses.

There is a recent, relatively large, literature on the welfare impacts of better access to asset and income insurance. A handful of papers have looked at the first order question of whether insurance improves welfare in a disaster. Some evaluations have not been able to look at this because the insured event did not occur. A much larger literature has looked at whether having insurance has brought about behavioural benefits, improving welfare even when the policy is not triggered. Given the number of papers in this area some meta-reviews have also been conducted (Carter and Chiu, 2020; Carter *et al.*, 2017; Jensen and Barrett, 2017; Tadesse *et al.*, 2015; Cole *et al.*, 2012; Miranda and Farrin, 2012). These reviews can be referenced for more detail.

Many of the interventions in this area have been focused on gifting or heavily subsidising insurance and assessing the impacts, rather than testing how to build sustainable insurance markets. A rigorous randomised control trial (RCT) can be designed for such interventions, allowing welfare impacts to be identified. The literature reviewed for this study does not provide evidence that developing private insurance markets without heavy public involvement is feasible. However, it does provide a rigorous basis for examining the impacts of providing increased access to insurance contracts to households. The question for public policy is whether taking this approach—heavily subsidised insurance—to supporting households in a disaster is more impactful and cost-effective than alternative approaches, such as providing cash transfers in a crisis. There is only one paper that examines this question by comparing the impact and costs of subsidised insurance to regular cash transfers (Jensen *et al.*, 2017).

Evidence on impact

There is a small evidence base documenting that insurance improves welfare when disaster hits. Two studies show that livestock index insurance in Northern Kenya reduced consumption reduction and distress asset sales during a drought among insured households (Janzen and Carter, 2019; Jensen *et al.*, 2017). Consumption impacts were larger for poorer households and asset impacts were present for richer households (Janzen and Carter, 2019). The impact of insurance was the same size as the impact of a cash transfer safety net, but at a much lower cost (Jensen *et al.*, 2017). One study (using propensity score matching) shows similar results for livestock insurance in Mongolia: households with insurance recovered faster from the shock (Bertram-Huemmer and Kraehnert, 2018). Three studies (Boucher *et al.* (2020) for crop insurance in Mozambique and Tanzania; Hill *et al.* (2019) for crop insurance in Bangladesh; de Janvry, Ritchie Ramirez, and Sadoulet (2016) for crop insurance in Mexico) show insurance payouts allowed farmers to spend more on crop production or farm at a larger scale following a drought. This had an impact on yields and income (Hill *et al.*, 2019; de Janvry *et al.*, 2016), but no impact on consumption was documented. Further evidence is needed to understand the welfare gains across contexts. There is a need for more replication studies to show the impact of insurance on welfare, and how it varies across contexts, size of disaster and insurance instruments. These impacts also need to be compared against the full cost of offering the insurance, including the design costs, which can be quite large (see section on value for money below).

Thusfar, welfare analyses have been conducted with household-level welfare indicators and do not consider impacts on men or women separately. This means there has been no analysis to look at whether the benefits of insurance are shared equally within the household, and what important drivers of that are (for example, does the gender of the policy holder matter? Does the type of shocks insured matter?). Studies looking explicitly at within-household welfare outcomes, such as nutrition, are needed.

There is a much larger literature documenting that a benefit of insurance is increased investment in income-earning activities. There are 10 studies across contexts and products showing that productive investments increase significantly when insurance is provided: Bulte *et al.* (2020) for multiperil crop insurance in Kenya; Stoeffler *et al.* (2020) for area yield in Burkina Faso; Hill *et al.* (2019) for rainfall and area yield insurance in Bangladesh; Jensen *et al.* (2017) for livestock insurance in Kenya; Cai (2016) for area-yield insurance in China; Fuchs and Wolff (2016) for rainfall index insurance in Mexico; Cai *et al.* (2015) for swine insurance in China; Mobarak and Rosenzweig (2013) for rainfall index insurance in India; Elabed and Carter (2014) for area yield insurance in Mali; and Karlan *et al.* (2014) for rainfall index insurance in Ghana. The range of impact is about a 15%–30% increase in farm investment (Carter and Chiu, 2020). Insurance does not encourage households to necessarily take inappropriate levels of risk but allows households to reduce costly risk-avoidance behaviour.

Although insurance increases investment, there is less evidence on the overall benefits of this on income (for some of the reasons in Rosenzweig and Udry, 2020), but in some cases positive income effects are documented. The evidence gap here is not so much on the question of whether there are behavioural impacts—the findings across a number of varied contexts are quite robust—but rather a better understanding of what determines the magnitude of these impacts (trust in the insurer, clarity around the cover and contingencies of the contract, and cost of insurance) and what income gains look like when insurance is purchased across multiple years. It is also important to answer the question of whether the behavioural response to subsidised insurance is consistent with encouraging cost-effective investments in risk reduction. One paper suggests it is not (Fuchs and Wolff, 2011). It is worth noting that further studies in this area can help answer the question of what the benefits of being on contract are, given microinsurance schemes entail households being in a very explicit contract.

Evidence on the 7 habits

Focuses on poverty

First, does insurance provide protection against risks that are important for poor people?

The risks and contexts that microinsurance products cover are quite broad. Although more developed markets exist in middle-income countries, there has been considerable experimentation in much poorer contexts such as lagging regions of Kenya and Ghana, and very low-income countries such as Burkina Faso and Mali. There is evidence to suggest they can be relevant.

More evidence on relevance for poor households could be provided but it is not a clear evidence gap that needs to be filled. Most empirical studies on insurance include an introduction that details why the insured risk is an important source of covariate risk for poor households and use existing analysis to make this case. There have been fewer quantifications of the share of variation in income that the insurance is designed to insure against. It is also the case that the types of shock that are insured are somewhat supply driven. They are the ones for which there are reasonable indices with enough historical data to allow insurance to be provided. The supply requirements rule out some sources of risk that are important for vulnerable households, such as conflict.

However, a clearer evidence gap emerges when considering relevance for women. Three studies have looked at how insurance take-up varies by gender (Hobbs, 2019; Bageant and Barrett, 2016; Delavallade *et al.*, 2015). One study finds no gender differences in demand for insurance, but two do find differences and emphasise the role of relevance in explaining the gender gap in demand. For example, Delavallade *et al.* (2015) find that insuring health shocks is more important to women than it is to men given they carry a large share of the burden of managing ill health within the household. The hypothesis that emerges from these studies is that the insurance needs of men and women are different. This is a finding that is supported by the evidence from the choice experiment presented in Akter *et al.* (2016), which suggests a gender gap in preferences for flood index insurance in Bangladesh. More evidence on this is needed though and how this is reflected in the development of insurance products that are relevant for both women and men.

Second, is insurance accessible and purchased by poor households? Very few studies have systematically examined the question of equity in insurance demand but those that have are not encouraging. Although the papers on insurance that were reviewed offered insurance to smallholder farmers, this does not mean they are necessarily targeted at the poorest households. Most

empirical analyses collect data on study farmers with little reference to where they sit in the national income distribution. This means there is little evidence on whether the study population is representative of poor or better-off farmers. Only one study has looked at the benefits of insurance for landless agricultural workers, a group that could not directly benefit from purchasing insurance (Mobarak and Rosenzweig, 2013). The relationship between household wealth and demand has been documented in some studies (Jensen *et al.*, 2018; Takahashi *et al.*, 2016; Cole *et al.*, 2013; Giné, Townsend and Vickery, 2008), and shows that poorer households are less likely to purchase insurance. Other demand analyses have not reported results on this.

There is a collection of papers that show that insurance demand is constrained in ways that suggest the constraints are higher for poor households. These constraints include, liquidity constraints (moving the payment to the end of the insured period, Liu *et al.*, 2020; Casaburi and Willis, 2018), financial literacy and knowledge about the new insurance product (Vasilaky *et al.*, 2020; Cai and Song, 2017; Cai *et al.*, 2015) and higher basis risk as a result of living further from target weather stations (see references under timeliness below). From other literature, we also know that in general, the poorest households are the ones with the largest liquidity constraints, the lowest levels of financial inclusion and the least-likely to be early adopters of new technologies. Better evidence on if and how to equity can be improved is needed.

Offers good value

More evidence on costs is needed. Initial evidence suggests insurance can be expensive, especially when sales volume is low, but it may still be cheaper than other forms of support. There is a lot of data on the cost of insurance to households, and in most cases information on the multiple is provided or can be calculated from reported information.⁴ However, this often hides design and setup costs and is not consistently reported. More consistent reporting on this would be beneficial, as well as analysis on how to reduce costs, such as through better information (Osgood and Shirley, 2012). The evidence reported suggests that providing insurance is not cheap, especially in early years when the ratio of design and other fixed costs to sales revenue is high. However, it may still be cheaper than other forms of support. Jensen *et al.* (2017) compare subsidising insurance (even when subsidies are very large) to providing cash transfers and show that insurance is cheaper (including subsidies) than providing cash transfers for the size of impact it has, but

more evidence on this is needed. In general, more evaluations that compare and cost different approaches to increasing protection for households are needed given the question facing policymakers is which of many different strategies to use to support households.

One distinct strength of the evidence base on index insurance is the wealth of rigorous evidence on the elasticity of demand with respect to price. This data has been collected by randomising prices in several settings, and in some cases randomising the mechanism by which the discount is provided: whether it is embedded in the price or provided through a discount voucher; whether it is provided via a discount at the time of purchase or a rebate (for example Hill *et al.*, 2019; Hill *et al.*, 2016; Karlan *et al.*, 2014; Cole *et al.*, 2013; McIntosh *et al.*, 2013; Cai *et al.*, 2020). A range of price elasticities has been collected, but they usually fall within a range of about 0.5–0.8, suggesting demand is highly sensitive to the price. Results suggest little sensitivity of the elasticity to the mechanism used to vary prices. This, combined with the fact that demand tends to be modest even at quite high levels of subsidies, has implications for value for money in that it suggests that high levels of subsidies are needed to sustain demand.

Few analyses have looked at how to reduce the cost of marketing insurance through innovative marketing arrangements. Bundling with inputs and credit is common. Further evidence on how to reduce the marketing costs would be beneficial, for example through mobile financial platforms.

There is also a question as to whether climate change will make certain geographies or population groups so vulnerable to disasters that insurance becomes increasingly expensive, to a point that it does not provide good value for money without further developments (e.g. more diversified local insurance markets or increased involvement of global reinsurers). This may be a significant evidence gap going forward.

Is timely

Being timely means providing support when needed. Index insurance typically pays out quite quickly after payment is triggered or the end of the season, but delays are more likely for indemnity insurance. However, this is under-documented in the literature. In schemes where this is not the case it is detrimental to the value proposition of insurance (Ghosh *et al.*, 2021; Stoeffler *et al.*, 2020).

4 The multiple is the ratio between the expected value of the insurance contract and the cost of providing or purchasing the contract.

The main challenge to the timeliness of support provided through microinsurance is the presence of basis risk, which can be high in some of the index products available, particularly those based on a single rainfall trigger. Basis risk in this context is the risk that a loss has been experienced by a household caused by the event that is ostensibly covered by the insurance policy, but the insurance contract has not paid out because the index that is being used by the contract to determine payouts has not recorded a loss. This makes the purchaser worse-off than if they had no insurance, as they now have a loss and have paid the insurance premium. There is no universally agreed measure of basis risk, and given the significant data requirements of quantifying this, there are fewer studies that have measured basis risk. There is a need to standardise measurement and perhaps most importantly, investments are needed in long-term data on agricultural and welfare outcomes that would allow basis risk to be quantified.

Although measuring basis risk is challenging, when it has been measured it is large. Basis risk has been measured for India and Kenya (Jensen *et al.*, 2016a; Clarke *et al.*, 2012). There are also other studies that have looked at how well measures used in indices in general—such as the water requirement satisfaction index (WRSI) or normalized difference vegetation index (NDVI) — capture real variation (e.g. McLaurin and Turvey (2011) for the United States). This is a useful input to assessing basis risk in a contract but not the same given the choice of triggers and the payout structure in a contract is also a source of basis risk.

Basis risk not only reduces the ability of an insurance product to provide welfare benefits to farmers (Clarke, 2016), it also means confidence in the product can be misplaced and gains from this confidence short-lived (see next subsection). A collection of studies show, through randomising the degree of basis risk farmers face, that basis risk reduces demand for insurance (Hill *et al.*, 2016; Jensen *et al.*, 2018; Mobarak and Rosenzweig, 2013). A considerable literature documents innovation in design to increase the quality of insurance products (see for example, Ceballos *et al.*, 2019; Carter *et al.*, 2017; Conradt *et al.*, 2015; Elabed *et al.*, 2013). Given that basis risk for pure weather index products can be so large as to render them of little value (even harmful if also sold at unsubsidised prices, Clarke, 2016), there is considerable need for further innovation in this space, by looking at cost-effective alternative (or back-up) indices.

Provides a trusted guarantee

The large number of studies documented in the previous subsection showing the impact of insurance contracts on behaviour even in the absence of payouts, indicates the powerful role of insurance in providing a trusted guarantee. The explicit contract nature of insurance allows households to believe they are in a secure contract of risk transfer and are happy making behavioural decisions consistent with this belief. The pattern of findings is consistent with these impacts being larger in contexts where levels of trust in the insurer are higher and when belief in the level of insurance provided by the contract is stronger. A better understanding of what drives security in the contract would be immensely helpful both for the insurance literature and for understanding how pre-arranged publicly-provided disaster response can also achieve these benefits. It is also important to note that being trusted in the long run also requires being trustworthy, which requires keeping basis risk low and having rules to manage basis risk events.

Further studies documenting the mental health benefits of insurance because of increased peace of mind would be beneficial. There is one study (Tafere *et al.*, 2018) that documents the increase in subjective welfare of insured Ethiopian households in advance of any payments.

Creates power for people facing risk

For insurance, customisation is a way to provide the policy holder with control over what they insure. For insurance, people can choose whether to enter a contract and how they manage their risk. When contract options are limited though, farmers have limited choices about how they manage their risk, only being able to vary the quantity of insurance purchased. In some contexts, a menu of insurance contracts are being offered. Where this has been done and choices have been documented, a wide range of choices are observed, reflecting underlying differences in risk exposure as well as preferences (Ceballos and Robles, 2020; Hill and Robles, 2011).

3.5 Summary and horse races

In summary, some conclusions emerge from the evidence on interventions that strengthen the ability of individuals to pre-arrange finance for disasters.

Interventions that extend the geographic reach of informal risk-sharing improve the ability of households to protect their welfare from the impact of disasters. Heavily subsidised insurance brings welfare benefits, or at least the belief that welfare is better protected brings about welfare gains as evidenced through behaviour change. There is weak evidence that interventions to increase savings can help, and one very promising study on the potential benefits of contingent credit.

Although few papers examined the cost of interventions, the evidence points to key questions about the costs, or limits, to the markets or behaviours they seek to strengthen.

The cost of making insurance—particularly income insurance—more accessible is likely to be high, but more concerning is the low quality of many insurance products. This raises a real question as to whether the money spent on insurance by individuals does actually make them better off. The cost of strengthening informal networks is the *ad hoc* taxes that are imposed on network members, which can induce perverse behaviour. The cost of having adequate savings available to manage in a disaster could be quite high. Thus, although the evidence on impact is collectively quite strong, and as we will see much stronger than for pre-arranged finance for public interventions, it is not necessarily the case that strengthening privately held pre-arranged finance will be the first best policy option. The benefits and costs will need to be assessed in each context.

This means that more horse races—analyses that compare multiple prospective interventions—are needed to help inform which type of intervention most merits investment. More evaluations of individual interventions are needed, particularly for savings and contingent credit, but often the policy question is which option to invest in. This requires horse races that compare different approaches with respect to cost and impact. This is true both between the interventions reviewed in this section, but also between the interventions reviewed in this section and other interventions (including those reviewed in the next two sections). Only two studies like this were reviewed. The Jensen *et al.* (2017) paper reports results from a comparative study between an unconditional cash transfer programme and a livestock insurance programme in northern Kenya, and Delavallade *et al.* (2015) compare savings and insurance in Burkina Faso and Senegal.

There is also no evidence in the literature reviewed on the right combination of instruments, or how this may vary across households. Quite a bit has been written about the interaction between formal insurance and risk-sharing, and a paper on savings and risk-sharing. These papers look at whether formal financial instruments will replace informal insurance. The evidence is conflicting, with some showing a relationship between formal and informal insurance (Dercon *et al.*, 2014; Mobarak and Rosenzweig, 2013), and others no relationship (Takahashi *et al.*, 2019). Dupas *et al.* (2019) show savings can strengthen informal risk-sharing within a village (and less reliance on family members living further away). Otherwise, there is not a lot of evidence assessing combinations of instruments. More evidence looking at the complementarities between instruments and the appropriate portfolio would be good. However, much more evidence on the individual instruments is probably needed first.

● PRE-ARRANGING FINANCE FOR GOVERNMENTS, HUMANITARIAN AGENCIES, AND NGOS

This section examines the impact of pre-arranging finance for the support provided by governments, humanitarian agencies, and NGOs in a disaster. There is very little evidence that examines both how an intervention was financed ('money in') and the impact it has (the impact of getting 'money out'), so in addition to looking for any cases that do examine both, we also examine evidence on the impact of interventions that are typically part of money out plans.

4.1 Money in

In this section we examine evidence that pre-arranging finance for disaster spending improves the support provided to households. All types of pre-arranged finance are considered: sovereign insurance, risk pools, catastrophe bonds, contingent credit and disaster allocation funds. These are collectively referred to in this section as 'DRF instruments'.

Evidence on impact

There is limited ex-post evidence of the economic or welfare impacts of disaster macro level insurance. There are three rigorous evaluations: two showing impact and one not. One quantitative analysis examines the impact of disaster funds (FONDEN in Mexico) on local economic activity and finds that when disasters were covered by transfer from the fund, local economic recovery was accelerated by a year or two (del Valle *et al.*, 2020). In the first three months after the disaster as reconstruction activities are planned, there was no difference between municipalities receiving a FONDEN transfer and those that did not (but also experienced disaster). However, between 4 and 15 months after a disaster, there was a significant increase in economic activity in municipalities that received the transfer as measured by nightlights. Back of the envelope calculations indicate that the 6% increase in brightness of night lights was about equivalent to a 2.5% increase in municipal gross domestic product (GDP). This effect had dissipated two years after the disaster as those

municipalities experiencing losses but not receiving the transfer caught up. Additional work, currently unpublished but using the same estimation strategy, shows that FONDEN transfers fully reduced immediate post-disaster excess mortality with impacts lasting beyond two years (del Valle, 2021).

A second quantitative impact evaluation examines the impact of the UN Office for the Coordination of Humanitarian Affairs (OCHA) pre-approving funding against humanitarian action plans that will be triggered in the event a disaster strikes. The action plan was for humanitarian cash transfers in Bangladesh that were triggered by a predicted flood water level indicator. Households receiving the transfer were 36% less likely to go a day without eating during the flood, were 12% more likely to evacuate household members, and 17% more likely to evacuate their livestock. Three months after the flood, households that received the transfer reported higher child and adult food consumption (4% and 7% higher respectively) and wellbeing (13% higher). They also experienced lower asset loss (8% less likely to lose small livestock, 5% less likely to lose poultry), engaged in less costly borrowing after the flood (3% less likely to borrow, interest rates were 12% lower when they did), and reported higher employment (6% more likely to work, 7% higher hours worked). Other anticipatory action programme evaluations discussed in more detail in the cash transfer section show similar results (Gros *et al.*, 2019; Gros *et al.*, forthcoming).

A third, theory-based evaluation of sovereign insurance provided to Malawi, Mauritania and Senegal by the Africa Risk Capacity (ARC) was not able to evaluate its impact on households but did evaluate the key steps in the chain needed to ensure impact (government capacity, contracts and contingency plans in place, model triggering and implementation of contingency plans (OPM, 2017)). It found that none of the key steps required for impact scored satisfactory progress, making impact unlikely. Some of this evidence is reported further below.⁵ According to the ARC process audit in Mauritania (Kimetrica, 2015), almost half of the households receiving food as part of the ARC contingency plan were deterred from undertaking distress sales of livestock during that time, but there is no quantitative impact evaluation to support this. Although contingent credit has been used by sovereigns in a number of different settings, there is limited evidence on its impact. The available evidence of the effectiveness of the World Bank's contingent credit instrument, the Catastrophe Deferred Drawdown Option (Cat DDO), is mixed (World Bank, 2017).

The rest of the evidence on the economic or welfare impact of DRF instruments at the sovereign level (four papers) comes from simulations in which the benefits of DRF instruments are estimated in economy-wide models with mixed results. Further details of each paper are provided in Box 2. In sum, this body of evidence does not offer strong evidence that investing in DRF instruments is universally impactful, although under some conditions it can be. Mechler (2004) shows advantages for Honduras but not Argentina; Bevan and Adam (2020) find post-financing through taxation is preferable, but in certain circumstances insurance is better than ex-post budget reallocations; and Cantelmo *et al.* (2019) show investments in adaptation are generally preferred to investments in financial protection but when faced with liquidity constraints and very effective public spending, financial protection is strongly beneficial. Cebotari and Youssef (2020) highlight there is demand for insurance among small island economies if the cost of insurance is low enough.

Box 2: Simulating the economic benefits of sovereign DRF instruments

There are four papers that simulate the benefits of sovereign DRF instruments:

- Adam and Bevan (2020) use a general equilibrium model to examine the effects natural disasters and alternative reconstruction paths.⁶ The model is calibrated to data from the Caribbean Catastrophe Risk Insurance Facility (CCRIF) to examine different post-disaster financing mechanisms including reserve depletion, budget reallocation, sovereign disaster insurance, debt, and taxation. Findings suggest that disaster insurance is expensive and plays a limited role in financing reconstruction. Budget reallocations are potentially damaging, especially if they use operations and maintenance expenditures. Tax financing is the best choice in the absence of donor support or contingent credits.
- Cebotari and Youssef (2020) study the impact of sovereign disaster insurance through stochastic simulations of disaster incidence and the ensuing debt and output dynamics. The model sets out the trade-off between growth and debt involved in making risk transfer decisions and calculates the optimal level of risk transfer based on government risk preferences and country risk exposure. When insurance costs are relatively low compared to expected payouts, the decision to insure is straightforward. But in cases where the costs are high (for example, small countries that are highly exposed), less than complete insurance will likely happen.
- Cantelmo *et al.* (2019) use a dynamic general equilibrium model calibrated to St. Lucia's economy to show that two fundamental elements of resilience to climate change and natural disasters [financial protection (insurance and self-insurance) and structural protection (investment in adaptation) strategies] considerably reduce the output loss from natural disasters. While structural protection generates a bigger pay-off because of its effect on reducing the cost of disasters, financial protection is preferable when liquidity constraints limit the ability of the government to rebuild public capital promptly. The estimated trade-off is sensitive to the ability of governments to access finance for public investment.
- Mechler (2004) uses a stochastic simulation to study the macroeconomic costs of disasters and the costs of disaster risk management with the objective of providing insights into the specific conditions where risk transfer is an option that provides benefits and increases social welfare. The model was applied to two case studies, Honduras and Argentina. In the case of Honduras, it found benefits to insuring infrastructure against disaster risk. The volatility of economic development was reduced while average losses to GDP due to opportunity costs of premium payment were relatively low. For Argentina, no benefit was found for the different insurance options studied.

5 Africa Risk Capacity (OPM, 2017): DFID commissioned the independent evaluation of ARC (2015-2024). Only the results of their first formative evaluation have been published. This is a theory-based evaluation including questions relevant to some of the 7 habits.

6 An earlier version of this was published as: Adam C. and Bevan D. (2016) 'Financing the reconstruction of public capital after a natural disaster', Policy Research Working Paper 7718, World Bank, Washington D.C.

Whilst the evidence on the economic and welfare impacts of DRF instruments is limited, there is stronger evidence from ex-ante simulations that find these instruments reduce volatility in budget revenue and expenditure. There is a broad body of literature looking at the impact of disasters on fiscal revenue and expenditure, which can provide useful estimates of potential post-disaster financial needs and inform DRF needs. This goes beyond the scope of this review, but we include two examples that illustrate this. Nishizawa *et al.* (2019) estimate the effects of severe natural disasters on fiscal revenue and expenditure in Pacific island countries. These are combined with information on the frequency of large disasters to calculate the rate of budgetary savings needed to build appropriate fiscal buffers that would self-insure countries against natural disaster shocks and facilitate quick disbursement for recovery and relief efforts, and protection of spending on essential services and infrastructure. Nakatani (2019) studies how small developing countries should formulate a fiscal policy to achieve economic stability and fiscal sustainability when prone to disasters. His paper shows how natural disasters affect long-term debt dynamics and proposes fiscal policy rules that could help insulate the economy from the shocks with an application to Papua New Guinea.

Two papers simulating the impact of sovereign DRF instruments on budget processes also show the benefits of reduced budget volatility. Cardenas *et al.* (2007) use the International Institute for Applied Systems Analysis (IIASA)'s interactive catastrophe simulation model to examine the economic benefits and costs of investing public resources in two risk-transfer instruments—reinsurance and a catastrophe bond—in Mexico. Both the bond and the reinsurance perform well in reducing the volatility of budget resources (with the catastrophe bond a better choice based on the simulation and its assumptions). Clarke and Mahul (2011) provide a dynamic financial model to guide policymakers in the design of optimal sovereign financial strategies based on a combination of reserves, contingent credit, and reinsurance. The dynamic financial model is illustrated in three case studies: agricultural production risk in India, tropical cyclone risk in Fiji, and earthquake risk in Costa Rica. The potential savings generated by a contingent credit facility are calculated. In the case where a government allocates reserves into a disaster fund, securing contingent credit can make the country worse off.

There is little evidence on the impact of pre-arranged financing on the ability of governments to anticipate and plan for disasters. According to Oxford Policy Management (OPM, 2017), some positive but limited evidence was found for the case of Mauritania and Kenya

where the contingency planning process was seen to be useful in improving the systems for planning. No further evidence was found. It is worth noting that no evidence for macro-level 'moral hazard'—the idea that governments with subsidised pre-arranged finance engage in less risk-reduction—was found either.

Evidence on the 7 habits

Focuses on poverty

Some DRF instruments are designed to target the poorest and most vulnerable, in particular when used for humanitarian anticipatory action or linked to shock-responsive social protection systems (Cubas *et al.*, 2020). For example, Ethiopia has secured committed financing for its social protection mechanism (Productive Safety Net Programme (PSNP)), and has additional funding through pre-arranged donor commitments for scale-up. The Philippines used humanitarian funding to vertically expand its social protection programme (Pantawid Pamilyang Pilipino Program (4Ps)) to respond to Typhoon Haiyan in 2013. The Hunger Safety Net Programme (HSNP) in Kenya has the ability to expand coverage from 100,000 to more than 300,000 households (funded by donors) by disbursing emergency cash transfers to vulnerable households during time of drought, based on pre-agreed triggers. Gros *et al.* (2019) and Gros *et al.* (forthcoming) show that anticipatory action was targeted to vulnerable households and communities in Bangladesh and Mongolia. However, in many cases DRF instruments provide money as general budget support, and there are no studies looking at whether they allow countries to have a more poverty-focused disaster response.

Offers good value

Governments, donors, multilateral development banks (MDBs) and most DRF stakeholders advocate for the use of a risk layering approach to DRF instruments to ensure they provide value for money. A framework for ex-ante evaluation of DRF instruments that allow governments to choose between them and to estimate the optimal portfolio is developed in Clarke *et al.* (2017), and there are a number of studies that undertake ex-ante assessments of risk layering. Also, two recent reviews have examined the degree to which risk layering is being used. The Global Risk Financing Facility (GRiF) (2021) provides a comprehensive review of the use of risk layering in practice and Martinez Diaz *et al.* (2019) calculates the number of countries using combinations of three types of risk financing instruments and explores what drives the use of risk layering.

Both reviews conclude that risk layering is little done in practice. Martinez-Diaz *et al.* (2019) find that fewer than 10% of countries used three approaches, and a third used two of the three. The complexity of risk layering relative to government capacity, and limited need (if disaster risk is low or humanitarian aid is widespread) are given as reasons for its low use.

There is not a lot of evidence on the cost effectiveness of standalone instruments. The GRiF (2021) review cites evidence from the Warsaw International Mechanism for Loss and Damage (2016), which finds that although risk layering is optimal, standalone instruments can be a useful place to start. Clarke and Hill (2013) use cost-benefit analysis to assess ARC. The magnitude of ARC's benefits depends on the principles of insurance. Benefits will be higher when the insurance is used to cover extreme rather than frequent disasters, when the cost of insurance is not too high, when payouts are triggered by indices that accurately capture the impact of extreme events, and when payouts provide insurance for well-functioning subnational aid provision.

Is timely

Despite a strong conceptual argument for the speed and timeliness of response that pre-arranged financing should allow, there is little evidence that shows DRF instruments do this. The one exception is the work on anticipatory action, which shows that pre-positioning finance against a clear plan with triggers results in humanitarian actors delivering support to households much more quickly (Gros *et al.*, 2019; Gros *et al.*, forthcoming; Pople *et al.*, 2021).

There is evidence that payments to governments are made quickly when triggered. A number of papers argue sovereign risk pools are designed to provide timely finance that improves financial liquidity after a disaster (ARC in Okonjo-Iweala and Thunell, 2015; CCRIF in World Bank 2013; Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) in Carter, 2015). There is no systematic review of the evidence on the speed of disbursements (Schäfer and Waters, 2016), but the speed of disbursements to governments has been recorded. Both the ARC and CCRIF websites cite examples of disbursements arriving within three days of the instrument being triggered. OPM's evaluation of ARC describes ARC's response in Mauritania as 'the quickest ever achieved' (OPM, 2017). Vyas *et al.* (2016) record that CCRIF transferred all payouts to governments within 14 days of the disaster and PCRAFI transferred all payouts within 10 days of the disaster. CCRIF has been able to retain clients by offering timely payouts to governments (Martinez-Diaz, 2019). Dana and von Dahlen (2014)

report that Colombia drew down on a contingent loan on 24 December 2010 following major flooding, and disbursements were made on 27 December 2010. During covid-19 contingent credit that was pre-arranged through Cat DDOs disbursed much more quickly than other instruments (Hill *et al.*, 2020).

However, there is evidence that quick disbursement of money at the sovereign level has not necessarily allowed quick support to households. Evidence from Mauritania's experience shows that it is possible for ARC payouts to facilitate quick and effective emergency response: distribution of support to households started two months earlier than normal (OPM, 2017). However, in three out of four cases ARC missed its target payout time of 120 days (Vyas *et al.*, 2016). The experiences of Niger and Senegal highlight the obstacles presented by country public financial management and bureaucratic systems in transferring funds and more generally in implementing the plan (OPM, 2017). In general, it is striking how little evidence there is on how payouts make their way through the budget system.

Basis risk in index-based instruments also limits the ability to provide support to households when they need it. Malawi's late ARC payout during a severe drought in 2016 was widely perceived to be a situation where the risk model and ARC processes did not function appropriately, delaying disaster response. This also happened in the case of CCRIF, which did not trigger a payment for floods that occurred in Jamaica in 2017 or for the losses generated by Hurricane Matthew in the Bahamas in 2016. And PCRAFI did not trigger for the Mw8 earthquake in the Solomon Islands or for the tsunami in Santa Cruz Island in 2013. Some countries have left these risk pools owing to the lack of payments (Muir-Wood, 2017). Martinez-Diaz *et al.* (2019) note that risk pools need to increase their efforts to manage basis risk.

Provides a trusted guarantee

There is no evidence on this.

Creates power for people facing risk

There is a strong potential for pre-arranged finance as part of preparedness to create power for those at risk, as upfront planning allows for greater participation and co-creation of solutions with affected communities. However, the evidence base on accountability and participation in pre-arranged disaster finance is very nascent and there is little evidence that this is happening. A paper specifically reviewing recent experiences in this area (Swithern, 2021) highlights the potential for increasing accountability in disaster response that is provided by pre-planning the response

with financing. It provides some recent good examples of building accountability, but the main conclusion is that much more needs to be done to ensure accountability in DRF programmes.

Aligns with the bigger picture

There is suggestive evidence in the policy literature that, when well implemented, the use of DRF instruments can support the development of a holistic approach to disaster risk management and risk reduction. Evaluations have reported that sovereign insurance (CCRIF, ARC, and PCRAFI) catalyse the use of risk assessments, which helps countries to better understand, model, and assess their risks (Schäfer *et al.*, 2016). A recent World Bank literature review references evaluation reports that show that implementing Cat DDOs in Costa Rica, Peru, the Philippines, and Colombia improved dialogue on disaster risk management and helped the formulation of concrete plans as a result of elevating the discussion of disaster risk management to the Ministry of Finance (GRIF, 2021). Neither of these reviews (GRIF, 2021; Schäfer *et al.*, 2016) have documented any causal evaluations of this claim, although it is challenging to provide causal evidence for this type of claim.

Evidence from risk pools also provides some support for the fact that DRF instruments can help governments develop a coherent plan to disaster response. In particular ARC, which supports its member states in the development of their capacity to anticipate, plan, finance and respond to climate-related disasters. According to OPM's evaluation of ARC (OPM, 2017): (i) there are examples of improved inter-ministerial dialogue and communications on disaster risk management in risk pool member countries, but the dialogue is limited in breadth and depth, and as such is unlikely to be sufficiently transformative or sustainable; (ii) in Mauritania, the government saw itself as actively involved in the development of ARC, which appears to have created an early commitment to investing in it and testing the idea. This was not confirmed in other case studies. Other countries with weaker capacity and lower income per capita have been less actively involved in working with ARC, which has slowed down the update of ARC products (Martinez-Diaz *et al.*, 2019).

There is no specific research showing that using DRF instruments helps governments take into account the longer-term impacts of climate change.

4.2 Money out

There is little evidence of the impact of pre-arranged finance for publicly provided disaster response. A large part of the challenge has been the inability to show how the financing provided by DRF instruments in a disasters allows quicker, more effective support to affected people, and that this made a positive difference in their lives.

In this section we examine evidence on the impact of interventions that pre-arranged finance is most often used for. For example, if resources mobilised through DRF instruments were financing adaptive social protection, what does the cash transfer literature suggest the impact would be? How would it fare on targeting, adequacy and timeliness? If DRF instruments finance quicker infrastructure replacement (bridges, roads, electricity) what does the infrastructure literature suggest would be the impact? If resources mobilised through DRF instruments are financing service delivery during a crisis, what does the literature suggest the impact would be?

This section, then, describes what we know about the potential impact of pre-arranged finance for disaster response. The remaining evidence challenge is to show

more consistently that pre-arranged finance does indeed result in an increase in the amount, quality or speed of these interventions.

Cash transfers

Evidence on impact

The literature on the impact of cash transfers is large and shows strong impacts. Some of this evidence is from assessing the impact of cash transfers on populations that are vulnerable to shocks, including refugees (for example Battistin, 2016; Lehmann and Masterson, 2014) and populations in protracted crises (for example Aker, 2013; Schwab *et al.*, 2019). Our key focus though is the evidence base on whether cash transfers help households when shocks strike.

There is considerable evidence that cash transfers do help households to manage shocks. However, the evidence is predominantly for the impact of regular cash transfers, not cash transfers that have been provided in response to a disaster. A review of systematic reviews of cash transfers shows the following.

- The **additional regular income from cash transfers protects a household's standard of living when risks materialise**, protecting consumption and assets (Knippenberg and Hoddinott, 2017; Pega *et al.*, 2017; de Janvry *et al.*, 2006a). Recent evidence from covid-19 programmes also confirms this (Abay *et al.*, 2020; Arndt *et al.*, 2020; Bottan *et al.*, 2020).
- Cash transfer programmes **increase savings and access to credit that help households smooth their consumption** (Bowen *et al.*, 2020; Premand and Stoeffler, 2020; Bastagli *et al.*, 2016).
- Cash transfers, **when adequate and timely, can limit the use of costly coping mechanisms by cushioning the negative income effect of shocks** (Duque *et al.*, 2019; Andrews *et al.*, 2018; Dammert *et al.*, 2017; Bastagli *et al.*, 2016; Adhvaryu *et al.*, 2015; De Hoop and Rosati, 2014; de Janvry *et al.*, 2006). Studies suggest that cash transfers limit, but do not fully eliminate, the use of negative coping mechanism during shocks (Merttens *et al.* (2013) find this in Kenya; Stoeffler *et al.* (2020) find this in Niger), and there was little impact on child labour.

Rigorous evidence on the impact of cash transfers provided in response to a disaster is much more limited, but also shows significant long-run welfare benefits. In Fiji, an impact assessment conducted three months after a tropical cyclone, found that households that received cash transfers recovered more quickly. For example, they were between 8% and 10% more likely to have recovered from housing damage than non-beneficiaries (Mansur *et al.*, 2017). Assessing the same cash transfer programme, Ivaschenko *et al.* (2020) use a sharp regression discontinuity design to show that beneficiaries that received cash transfers recovered much more quickly than those that did not. Del Carpio and Macours (2009) and Macours *et al.* (2012) use a cluster RCT to evaluate a conditional cash transfer (consisting of a transfer paid every two months) implemented by the Nicaraguan government in the aftermath of a drought. The evaluations documented positive persistent impacts on height-for-age scores, cognitive and psycho-social development, and child labour (particularly for boys).

One paper rigorously examines the impact of anticipatory cash transfers—cash transfers provided before the full impacts of a disaster materialise—and similarly find strongly positive impacts. Pople *et al.* (2021) exploit administrative constraints experienced during the rollout of anticipatory cash transfers in Bangladesh to compare treated households with otherwise comparable households who did not receive the cash transfer. The results of this paper were summarised above in the section on money in. Households receiving

the transfer were less likely to go without eating during the flood and reported higher child and adult food consumption (4% and 7% respectively) after the flood. Asset losses and costly borrowing were lower and earning activity was higher for those receiving the transfers.

Other programme evaluations have also found that cash transfers provided in response to disasters facilitate coping, and that anticipatory transfers bring considerable impacts. Qualitative evaluations covering cash transfers provided in disaster response in northern Kenya, northern Uganda, southern Somalia, southern Niger, and Indonesia find that, if cash transfers are provided after a shock occurs and they are large enough, they may be spent on recovery activities, such as rebuilding houses, investing in productive assets, paying school fees, and accessing health care services (Carpenter *et al.*, 2012). However, these evaluations have not employed the rigorous quantitative impact evaluation techniques that are the norm in evaluations of the impact of regular cash transfer assistance. Anticipatory action pilots have often been accompanied by a strong commitment to learning, and this is reflected in the number of programme evaluations that accompany them. Two published papers use propensity score matching to evaluate forecast based cash transfers, although face challenges from small sample size and unbalanced comparison groups. In Bangladesh, a cash transfer triggered by a flood forecast in 2017 resulted in beneficiaries being three times less likely to have skipped meals or reduced meal sizes, and 80% less likely to report feeling more miserable or unhappy than those not receiving the transfer (Gros *et al.*, 2019). In Mongolia in 2017, the Red Cross provided unconditional anticipatory cash grants triggered by the forecast of a severe winter (dzud) to 2,000 herder households. Beneficiaries used nearly the full transfer amount to purchase hay or feed for their animals, increasing livestock survival when compared to non-beneficiaries (Gros *et al.*, forthcoming). There was no impact on food security, consumption or psychological stress of household members. Weingärtner and Wilkinson (2019) reviewed the evidence for anticipatory humanitarian action and found that little rigorous evidence of impact was available.

There is one paper showing that the way cash transfers are provided post-crisis affects their impact on women. Aker *et al.* (2016) found that cash transfers delivered by mobile phone to women in Niger after a drought provided sustained benefits for food security and diet diversity compared to cash transfers delivered in person. This was as a result of women spending less time travelling to get the transfer.

Evidence on the 7 habits

Focuses on poverty

Cash transfer programmes have been shown to target poor households, but there is less evidence on whether they capture transitory needs generated by shocks.

Given households that are poorer are often severely affected by disasters, it is likely that they do, but more information on this would be useful. Analysis of targeting in food aid shows that it can be challenging to target the neediest in a crisis based on objective criteria (Broussard *et al.*, 2014). There is more evidence on exclusion errors than there is on inclusion errors. Evidence suggests exclusion errors vary depending on the country and disaster. As examples of exclusion errors, in Ecuador after the 2016 earthquake, it was estimated that cash transfers only reached 15% of affected households. In Mozambique after the 2016 drought, the government estimated that around 15% of the population needed assistance in affected districts, yet only 9% received cash transfers (Bowen *et al.*, 2020). However, this reflects the overall size of the response, as much as the quality of targeting.

Offers good value

The evidence highlights some ways in which costs for cash transfers in disasters can be higher than regular costing for cash transfers, however the evidence points to cash transfers being lower cost than other forms of assistance. There is a considerable body of evidence comparing the cost of cash transfers to other types of assistance, particularly food, during emergencies. There is a consensus in the reviews of this literature that cash transfers are more cost-effective than in-kind assistance in emergencies (Mikulak, 2018; Doocy and Tappis, 2017; Gentilini, 2014). Across the humanitarian sector, cash transfers are found to be at least twice more efficient than food-based interventions, although this varies with local market conditions (Gentilini, 2014).

Is timely

Cash transfers can be provided quickly to households when they are made through existing programmes.

Developing and rolling out new shock-response public works programmes can take a long time (McCord, 2013) but when countries have invested in systems before a shock, response can be fast. In Kenya for example, the number of beneficiaries receiving cash more than doubled in two months in response to a drought in early 2015. In Ethiopia in 2011, the PNSP provided additional support to 3.1 million people over a three-month period.

During the covid-19 crises cash transfers were provided to households quickly, in many cases through new

programmes being established. Within the first six months of the crisis, 1,179 social protection measures were put in place across 212 countries, half of which were various forms of cash transfers (Gentilini *et al.*, 2020). As a result of this, many households not in existing social transfer programs were provided with transfers (a 217% increase in beneficiaries globally), and those already in social transfer programmes saw the value of their transfers almost double (Almenfi *et al.*, 2020). 68% of the transfers made in the first six months after the crisis were made through new programmes put in place to respond to covid-19 (Almenfi *et al.*, 2020).

Analysing the covid-19 response will offer lessons on the important determinants of speed. At the time of writing there has been no comprehensive analysis on what allowed countries to scale up quickly, although this analysis is forthcoming. In low- and lower-middle-income countries, external financing has been the main source of financing for cash-transfer scale-ups (Almenfi *et al.*, 2020). In some countries financing was pre-agreed, but there were many cash transfer scale-ups that were undertaken without pre-agreed financing in place.

Evidence on the impact of timely transfers is limited to one paper but suggests that speed is important.

The benefits from an anticipatory cash transfer documented in Pople *et al.* (2021) occurred before a traditional humanitarian response would normally arrive, highlighting the benefits of being early—especially considering some of the coping mechanisms averted (reducing child consumption and costly borrowing) have been shown to have long-run scarring impacts. They also find that small changes in timing matter: receiving the cash a day earlier resulted in a small and marginally significant increase in welfare.

Provides a trusted guarantee

There are no studies that have looked at any ex-ante benefits of adaptive social protection schemes. While there is a body of evidence showing that cash transfers form an important part of the social contract (Banerji and Gentilini, 2013; Carpenter *et al.*, 2012), there is less evidence on this issue for cash transfers scaled to respond to shocks. Humanitarian assistance tends to be provided in parallel to national structures with between only 1% and 2.5% of global humanitarian flows channelled through host governments (Bowen *et al.*, 2020). The qualitative evaluation of HSNP highlighted that the infrequency and unpredictability of payments made as part of a safety net scale-up limited the impact of these transfers compared to regular programming (Farhat *et al.*, 2017).

Creates power for people facing risk

There are a number of papers and systematic reviews highlighting that giving people cash during emergencies provides people greater choice to buy the goods and services they need through local markets (Mikulak, 2018; Alderman, 2015; Venton *et al.*, 2015). However, communities often do not have choice over the implementation characteristics of cash transfers (for example, targeting eligibility, amount, timing and frequency, or payment modality) and there is little evidence on how participation in this can be meaningfully increased. The existing examples of increasing participation and accountability are considered in a separate review on accountability in DRF (Swithern, 2021).

Rebuilding assets

There is only one paper looking at the evidence of the impacts of using pre-agreed finance for disaster reconstruction, FONDEN in Mexico, cited above in the money in section (del Valle *et al.*, 2020). Local governments make applications for the use of FONDEN funds. They can be spent on the reconstruction of low-income housing or on public infrastructure, including federal and state roads, and hydraulic, health, and educational infrastructure. The authors estimated the impact of the funds after a year of a disaster between 2004 and 2011, when road expenditure accounted for 56% of overall expenditure, and find that local economic activity is as about 2.6% higher in areas with access to disaster funding. This suggests that providing financing to rebuild roads is particularly beneficial for local economic activity. In the following paragraphs we review relevant evidence but do not separately go through the 7 habits given the limited evidence base.

Many reports and studies evaluate post-disaster recovery programmes, but most focus on process evaluations (Jayasuriya *et al.*, 2005) or on monitoring programme outputs, and do not report on the long-term construction quality or the social and economic impacts. We found three papers that look into impacts. Buttenheim (2010) present the results of an impact evaluation of recovery programmes following the 2005 Pakistan earthquake. The Government of Pakistan established the Earthquake Reconstruction and Rehabilitation Authority (ERRA) with the mission to coordinate reconstruction and recovery efforts. Buttenheim (2010) and the Global Facility for Disaster Risk Reduction (GFDRR) (2014) report outcomes including improved quality of house construction, improved access to water and sanitation, and increased access to transportation. They also document social impacts such as education and access to healthcare. Jordan *et al.* (2015) examine long-term outcomes related

to the shelter reconstruction programme in the Nagapattinam district in Tamil Nadu, India, following the 2004 Indian Ocean tsunami. The paper examines housing quality, community infrastructure, and livelihoods and shows the quality of houses was good, and acceptance of the new housing was high, but progress on the supply of water and constructed toilets was more limited.

Although there may be few impact analyses of reconstruction programmes, the literature highlighting the relationship between infrastructure investments and economic growth and poverty reduction is large. See Hallegatte *et al.* 2019 for a broad review, Pueyo (2013), Terrapon-Pfaff *et al.* (2018), and Bos *et al.* (2018) for systematic reviews on the impact of electricity investments, and Raitzer *et al.* (2019) for a review on road investments. This literature indicates that building back infrastructure brings gains.

Simulations highlight the potential benefits of building back faster. Hallegatte *et al.* (2017) and Hallegatte and Vogt Schilb (2016) show that when average reconstruction speed is increased by one third globally (for the same quality of reconstruction), wellbeing losses from disasters are reduced by 6%. The gains are highest in absolute terms for richer countries as the value of infrastructure lost is higher in a disaster. However, the relative gain is highest for the poorest countries. However, Hallegatte and Vogt Schilb also highlight that the length of reconstruction period depends on many factors other than the availability of public finance. For example, the capacity of construction sectors, ability for workers and capital to move to the construction sector, and the ability to source materials for construction.

Reconstruction is also an opportunity to build back better. Evidence of this is cited in Hallegatte *et al.* (2017): Mannakkara *et al.* (2014) document this was the case after the Australian bush fires and Hoflinger *et al.* (2012) provide evidence that FONDEN in Mexico is enabling housing to reallocate to better areas. When financing is limited, realising these benefits becomes more challenging, highlighting the potential for pre-arranging finance through DRF instruments (Hallegatte and Dumas, 2009; Benson and Clay, 2004). However, equally, the experience of Haiti after the 2010 earthquake highlights that building back better can be constrained by limited technical capacity and availability of resources. Harriss *et al.* (2020) evaluate current knowledge at the overlap between supporting shelter self-recovery and building back safer. According to their findings, the evidence available for their review was ‘of poor quality and any findings need to be interpreted with caution’. For this reason, they are not included here.

Providing public services during crisis

With the exception of nutrition, there is limited evidence on the impact of maintaining or re-establishing provision of public services quickly after a disaster. This is the conclusion of a series of recently conducted comprehensive literature reviews on the evidence by Maintains (Karki, 2020; Levin-Russell and Witter, 2019; Seal *et al.*, 2019). These reviews point to some evidence in health: Shin *et al.* (2018) found that the development of health infrastructures and the delivery and provision of medical supplies by international NGOs in response to the 2014 Ebola outbreak in Sierra Leone significantly decreased the severity of the crisis. Witter and Levin-Russell (2019) confirm that there are significant gaps in the literature analysing how best to mobilise and deploy financial and technical resources for the health sector to respond to shocks. While they found good evidence that nutrition services in emergencies mitigates the impacts of disasters, they noted there is still limited evidence on what specific services should be maintained or deployed and under what conditions, and what type of resources are needed to ensure adequate level of delivery. In the following paragraphs we review relevant evidence on nutrition, but again do not separately go through the 7 habits.

Evidence on the impact of nutrition interventions in emergencies points to significant impacts. As with cash transfers, there is a considerable literature assessing the impact of nutritional services (school feeding, food distribution, and nutritional supplements) among populations that are vulnerable to shocks and have poor nutrition outcomes. Some studies document impacts of nutrition interventions in situations of protracted conflict or emerging from protracted conflict (see for example Adelman *et al.* (2019), and Alderman *et al.* (2012)). There are fewer papers that have rigorously tested the impact of nutrition interventions in emergencies (Webb, 2015; Webb *et al.*, 2014). However, from those that do, the broad consensus is that: ‘supplementary feeding using nutritionally appropriate products that are targeted to already wasted or at-risk individuals is generally effective at reduction GAM and SAM [global acute malnutrition and severe acute malnutrition] rates and related mortality, on a large scale in very challenging settings’ (Webb *et al.*, 2014). There is also evidence on broader benefits, as follows.

- School feeding increased enrolment by 11 percentage points in conflict-affected Mali, with larger impacts for girls, while food distribution increased child labour (Aurino *et al.*, 2019). Food security increased but impacts on height-for-age were only seen among those receiving both school feeding and general food distribution (Tranchant *et al.*, 2018).
- Kaul *et al.* (2018) synthesise the findings and lessons from Mali and three other WFP-funded impact evaluations of nutrition and food security interventions in Chad, Niger, and Sudan. The evaluation for Chad found a positive effect on the incidence of moderate acute malnutrition during the lean season due to a prevention programme (blanket supplementary feeding). In Sudan, the evaluation found a significant decrease in the prevalence of children at risk of malnutrition when food-based interventions for preventing moderate acute malnutrition were added to the treatment programme (targeted supplementary feeding). In Niger, the evaluation concluded that continued provision of food assistance for assets in combination with treatment and/or prevention programmes reduced the incidence of moderate acute malnutrition. The evaluation in Mali found that access to food distribution increased non-food and food expenditures, and the supply of micronutrients.
- In Nepal, the emergency nutrition response programme implemented after the 2015 earthquake was found to be effective in delivering a package of nutrition services to most vulnerable children and mothers reaching more than intended coverage in most of the interventions (Aguayo *et al.*, 2015).

There is a body of literature looking at the impacts of water delivery, either by quantifying the benefits relative to the costs of improvements to water delivery (at the individual or household level, Jeuland *et al.*, 2016; Jessoe, 2013; Pattanayak *et al.*, 2010) or linking public investment to individual valuations and economic growth (Whittington and Pattanayak, 2015). **One paper looks at this in the context of emergency response.** Burrows (2018) considers the long-term efficacy of efforts to restore water services to areas impacted by the 2004 Indian Ocean tsunami. His findings suggest that recovery efforts did not lead to extending equitable water access to the whole population.

● MESO TOOLS

Meso level insurance refers to insurance products created for ‘risk aggregators’ such as microfinance institutions, banks that might offer agricultural loans, and other firms exposed to weather or natural hazard risk.⁷ The impact of meso level insurance could be expected to be high given that the challenge of basis risk highlighted in the household level insurance section is much lower at an aggregated level and also, the costs of not having insurance can be quite high (in terms of labour and food market effects) if a few aggregators, such as financial institutions, large firms or community organisations, get disrupted badly. In this section we examine evidence on the welfare benefits of insurance to aggregators, also examining the evidence on the impact of insurance on firms more broadly.

There is a strong body of evidence of the causal links between the development of general insurance markets in a country and economic development. Lester (2014) conducts a comprehensive literature review of the links between insurance and inclusive growth, examining evidence that insurance development causes inclusive economic growth and the role of insurance in sustaining growth after the macro economic shocks caused by rapid onset disasters. His overall finding is that the insurance sector contributes to inclusive economic growth and the effectiveness of credit markets. He refers to two overview papers on the links between insurance and growth

(Outreville, 2013; Richtervoka and Jorab, 2013) that identify 19 papers written between 2000 and 2013 that study the impact of insurance development on economic development. Of these, seven are country-specific, four focus on OECD/EU or industrialised countries, and six are cross-country. Most of these studies find evidence of a causal link.⁸

Evidence specifically on the development of disaster insurance and economic development is more mixed. Beilharz *et al.* (2013) review the literature on the macroeconomic consequences of natural catastrophes and analyse the extent to which risk transfer to insurance markets facilitates economic recovery. They conclude that there is little evidence that insurance cover has a preventative effect and limits indirect losses arising from natural catastrophes by providing prompt financial relief. However, Melecky and Radatz (2011) use panel data for multiple countries and conclude that while financially developed countries suffer less in terms of output declines after disasters because of their ability to raise funds from capital markets, countries with high insurance penetration also suffer less and do not experience a material fiscal expansion. Von Peter *et al.* (2012) study another panel of countries and conclude that the uninsured part of catastrophe-related losses drives macroeconomic costs. Well-insured losses can be inconsequential or even positive for economic activity, with the strongest growth

7 See InsuResilience for a fuller definition: <https://www.insuresilience.org/glossary/>

8 Summarising the papers since 2010: Avram *et al.* (2010) carry out a multi-country study (93 countries) between 1980 and 2006 using cross-sectional estimations and dynamic panel data techniques. Their findings suggest a significant positive relationship between economic growth and overall insurance, and weak evidence that a country’s stage of development may influence this relationship. Han *et al.* (2010) employ Gaussian mixture models (GMM) on a dynamic panel data set of 77 countries for the period 1994–2005. According to their findings, insurance plays a more important role in developing than developed economies. Ege and Sarac (2011) use data for 29 countries between 1999 and 2008, and also find a link between insurance and economic growth but no clear evidence of causality. Chen *et al.* (2012) also find a positive relationship between insurance and economic growth for a panel of 60 countries between 1976 and 2005. Chang *et al.* (2013) (10 OECD countries between 1979 and 2006) and Hu *et al.* (2013) (31 provinces in China) find that the relationship varies according to country or province conditions. Akinlo (2013) finds evidence that insurance contributes to economic growth in Nigeria. Two papers examine the same link in Malaysia (Ching *et al.*, 2010) and the former Yugoslavia (Njegomir at Stojic, 2010) and find evidence to support a relationship between life insurance and GDP.

enhancing effects appearing in the three years following a catastrophe (i.e. the reconstruction stage). Insurance was found to help firms rebound after the 2011 earthquake in New Zealand: a firm with business interruption insurance had a 15 percentage point higher likelihood of higher productivity and performance (Poontirakul *et al.*, 2016).

A few papers have been published showing that specifically insuring financial intermediaries and service providers improves financial performance and helps them better manage their risk with benefits to customers. Perez-Gonzales and Yun (2010) examine the effect of introducing weather derivatives on electric and gas utilities in the United States, businesses highly exposed to weather-related risk. They find that weather derivatives help firms manage their weather-related exposure, leading to higher market valuations, investments, and leverage. There is a strong theoretical case for linking credit with insurance as there are in

principle real and strong synergies between the two financial services (Carter *et al.*, 2016; Skees and Barnett, 2006). Collier and Skees (2012) model microfinance intermediaries exposed to severe El Niño that can get access to disaster risk insurance in Peru, and find that insurance allows them to manage this risk more efficiently and effectively (including better financial performance, expansion of banking service outreach, lower interest rates, and reduced volatility in access to credit).

Experiments that have combined insurance and credit show the impact on households depends on context. Insured credit has substantial demand among farmers in Ethiopia (McIntosh *et al.*, 2013) and among lenders in Ghana (Mishra *et al.*, 2019). However, in Malawi, demand for more-expensive insured credit was lower as farmers already had implicit insurance from the limited liability clause in the loan contract (Giné and Yang, 2009).

● CONCLUSION

Despite a significant body of evidence emerging in these areas, there is a need to work on filling significant evidence gaps.

Regarding interventions that strengthen the ability of individuals to pre-arrange finance for disasters, there were two areas where more evidence on impact is needed. First, more evaluations on when savings interventions can be impactful in helping households manage disasters, second, further studies on contingent credit. The one study on contingent credit is promising but much greater experimentation and evidence is needed in this area.

However, the main evidence gaps are less about the impact of interventions, and more about the costs and inclusivity of approaches focused on individuals pre-arranging finance. First on inclusion: the interventions that are shown to have most impact are less inclusive of poorer households. A key evidence gap is the degree to which market-based instruments can be inclusive of poorer households and of women. The limited evidence available highlights their different needs in accessing market instruments. In what contexts are interventions to increase financial inclusion a more effective way of supporting the poorest and women in a disaster than strengthening public support in disasters. There is only one study that has looked at this (Jensen *et al.*, 2017).

Secondly, on costs, more evidence is needed on the cost of interventions and how to limit the shortcomings of the most impactful approaches. In general, more information on costs across interventions would be useful. While more studies on costs may be available than those that were reviewed here, it does seem to be a significant gap. Additionally, a key evidence question is whether some of the negative aspects of insurance and risk-sharing networks can be reduced: the costs of informal taxation

in the case of informal networks, and the cost of basis risk in the case of index insurance.

When it comes to evidence on pre-arranged finance for governments, humanitarian organisations, and NGOs, more evidence is needed that examines the impact of support provided with pre-arranged finance. Too few studies that focus on pre-arranged finance follow the money through to impact on households or local economies, and show how the support provided to households is different owing to pre-arranging financing. While some of this may be challenging methodologically, it is very possible to do more with existing data. For example, evidence on the timing of support provided to households could be provided (not just the timing of payouts to sovereigns), even if proving impact of that support proves challenging.

More evidence on the impact of public support provided to households in disasters would also be beneficial. It would be good to see more evaluations of post-disaster cash transfers to complement the evaluations of regular transfers. The evidence is promising but thin, and cannot answer questions on the appropriate size, timing of transfers, nor the differential impacts across women. A higher bar for the quality of nutrition evaluations in emergency settings is needed to allow an evidence base to emerge on the most cost-effective combination of interventions, and the effectiveness of interventions to prevent children becoming acutely malnourished. Much more evidence on the value of more timely infrastructure reconstruction is needed—it is currently limited.

However, the largest evidence gap in this area is on the non-financial constraints to effective disaster response that also need to be addressed for pre-arranged finance to be impactful. This includes, for example, access to information (who to target, where to rebuild), political

leadership, and the nature of the social contract. Tennant and Gilmore (2020) find that higher levels of government effectiveness are associated with lower cyclone impacts. More studies that examine how best to address these constraints are needed, as well as more evidence on what public support is most impactful.

The current evidence does not strongly support a clearly preferred approach across settings. For example, although the welfare impacts of insurance are strong and it provides a trusted guarantee more than all other interventions, it may be very costly to support, may not include the poorest, and at its worst may not provide much welfare benefit for purchasers. Strengthening informal insurance markets appears relatively cheap from a policy point of view (and the interventions that strengthen

them—mobile money and migration—bring many other benefits) but the support provided through them may be much weaker for poorer households and can result in *ad hoc* taxation of other network members, which brings its own risk. Cash transfers have a proven impact but are not reliable enough to provide a trusted guarantee and are also expensive to provide to a large share of the population. **Much more evidence is emerging in this space, much more is needed to get to the point of being able to prescribe policy recommendations that are relevant in specific contexts.** The evidence that is available highlights that these different approaches to strengthening disaster preparedness carry different benefits and costs that are likely to vary with the nature of the disaster, pre-existing levels of financial market development, and the capacity of the state and other actors to act.

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● ANNEX: MAPPING OF STUDIES

			Characteristics of pre-agreed finance that would make it impactful					
	Reviews	Welfare impact	Focuses on poverty	Is timely	Creates power for those facing risk	Provides a trusted guarantee	Offers good value	Aligns with the bigger picture
Interventions that strengthen the ability of individuals to pre-arrange finance for disasters								
Savings	Clarke <i>et al.</i> (2015)	Karlan <i>et al.</i> (2017), Demont (2020), Jans-Harms (2017), Danai Manyumwa <i>et al.</i> (2018), Guo and Narita (2018)	Dupas and Robinson (2013), Banerjee <i>et al.</i> (2015), Nikoloski <i>et al.</i> (2018)		Bass <i>et al.</i> (2016)			
Networks	Suri <i>et al.</i> (2021)	Meghir <i>et al.</i> (2020), Millan (2019), Batista and Vicente (2018), Riley (2018), Abiona and Foureaux Koppensteiner (2018), Gröger and Zylberberg (2016), Jack and Suri (2014), Morawczynski and Pickens (2009)	Demircuc-Kunt <i>et al.</i> (2015a), Grimard (1997), Harrower and Hoddinott (2005), Ambrus and Ellicott (forthcoming)				Jakiela and Ozier (2015), Brune <i>et al.</i> (2016), Fafchamps and Hill (2015), Baland <i>et al.</i> (2011), Dercon <i>et al.</i> (2014), Kaziango and Wahhaj (2020)	
Contingent credit		Lane (2018)	Lane (2018)				Lane (2018)	
Insurance	Miranda and Farrin (2012), Jensen and Barrett (2017), Tadesse <i>et al.</i> (2015), Carter <i>et al.</i> (2017), Cole <i>et al.</i> (2012), Carter and Chiu (2020)	Welfare after shocks: Jensen <i>et al.</i> (2017), Janzen and Carter (2019), Bertram-Huemmer and Kraehnert (2018) Increased expenditure on investments after shocks: de Janvry <i>et al.</i> (2016), Hill <i>et al.</i> (2019), Boucher <i>et al.</i> (2019) Welfare through ex-ante investment: Mobarak and Rosenzweig (2013), Elabed and Carter (2014), Karlan <i>et al.</i> (2014), Cai <i>et al.</i> (2015), Fuchs and Wolff (2016), Cai (2016), Jensen, <i>et al.</i> (2017), Hill <i>et al.</i> (2019), Bulte <i>et al.</i> (2020), Stoeffler <i>et al.</i> (2020)	Giné <i>et al.</i> (2008), Cole <i>et al.</i> (2013); Jensen <i>et al.</i> (2018), Delavallade <i>et al.</i> (2015), Bageant and Barrett (2017), and Hobbs (2019)	Basis risk: Clarke <i>et al.</i> (2012), Jensen <i>et al.</i> (2018), Mobarak and Rosenzweig, (2013), Hill <i>et al.</i> (2016) Fast enough: Stoeffler <i>et al.</i> (2020), Ghosh <i>et al.</i> (2021)	Hill and Robles (2011), Ceballos and Robles (2020)	Peace of mind: Tafere <i>et al.</i> (2018), Encourages investment: Mobarak and Rosenzweig (2013), Elabed and Carter (2014), Karlan <i>et al.</i> (2014), Cai <i>et al.</i> (2015), Fuchs and Wolff (2016), Cai (2016), Jensen, <i>et al.</i> (2017), Tafere <i>et al.</i> (2018), Hill <i>et al.</i> (2019), Bulte <i>et al.</i> (2020), Stoeffler <i>et al.</i> (2020)	Jensen <i>et al.</i> (2017), Cai <i>et al.</i> (2020), Cole <i>et al.</i> (2013), Hill <i>et al.</i> (2016), McIntosh <i>et al.</i> (2013), Karlan <i>et al.</i> (2014), Hill <i>et al.</i> (2019)	

			Characteristics of pre-agreed finance that would make it impactful					
	Reviews	Welfare impact	Focuses on poverty	Is timely	Creates power for those facing risk	Provides a trusted guarantee	Offers good value	Aligns with the bigger picture
Interventions that pre-arrange finance for governments, humanitarian agencies and NGOs to provide support and services in a disaster								
Money in: financial instruments	Weingärtner and Wilkinson (2019), GRIF (2021)	Impact evaluation: del Valle <i>et al.</i> (2020), Pople <i>et al.</i> (2021), OPM (2017) Ex-ante simulations: Mechler (2004), Cantelmo <i>et al.</i> (2019), Cebotari and Youssef (2020), Adam and Bevan (2020) Volatility in budget revenues: Nishizawa <i>et al.</i> (2019), Nakatani (2019), Cardenas <i>et al.</i> (2007), Clarke and Mahul (2011)	Cubas <i>et al.</i> (2020), Gros <i>et al.</i> 2019, Gros <i>et al.</i> (forthcoming)	OPM (2017), Schäfer and Waters (2016), Vyas <i>et al.</i> (2019), Dana and von Dahlen (2014), Hill <i>et al.</i> (2020), Martinez-Diaz <i>et al.</i> (2019), Muir-Wood (2017), Gros <i>et al.</i> 2019, Pople <i>et al.</i> (2021) Gros <i>et al.</i> (forthcoming)	Swithern (2021)		GRIF (2021), Martinez-Diaz <i>et al.</i> (2019), Clarke <i>et al.</i> (2017), Clarke and Hill (2013)	Schäfer and Waters (2016), GRIF (2021), OPM (2017), Martinez-Diaz <i>et al.</i> (2019)
Cash transfers		Regular transfers provided in a crisis (focusing on systematic reviews): Duque <i>et al.</i> (2019), Andrews <i>et al.</i> (2018), Dammert <i>et al.</i> (2017), Bastagli <i>et al.</i> (2016), Adhvaryu <i>et al.</i> (2015), De Hoop and Rosati (2014), de Janvry <i>et al.</i> (2006) Transfers provided as a result of a crisis: Mansur <i>et al.</i> (2017), Ivaschenko <i>et al.</i> (2020), Del Carpio and Macours (2009), Macours <i>et al.</i> (2012), Aker <i>et al.</i> (2016) Pople <i>et al.</i> (2021)	Bowen <i>et al.</i> (2020)	McCord (2013), Almenfi <i>et al.</i> (2020), Gentilini <i>et al.</i> (2020)	Mikulak (2018), Alderman (2016), Venton <i>et al.</i> (2015), Swithern (2021)	Bowen <i>et al.</i> (2020)	Doocy and Tappis (2017), Mikulak (2018), Gentilini (2014)	
Rebuilding		Impact of rebuilding: del Valle <i>et al.</i> (2020), Buttenheim (2010), GFDRR (2014), Jordan <i>et al.</i> (2015) Simulations on rebuilding faster: Hallegatte and Vogt-Schilb (2016), Hallegatte <i>et al.</i> (2017)						
Public services	Karki (2020), Levin-Russell and Witter (2019), Seal <i>et al.</i> (2019), Webb <i>et al.</i> (2014), Webb (2015)	Health services: Shin <i>et al.</i> (2018), Nutrition support: Adelman <i>et al.</i> (2019), Alderman <i>et al.</i> (2012), Aurino <i>et al.</i> (2019), Tranchant <i>et al.</i> (2018), Kaul <i>et al.</i> (2018), Aguayo <i>et al.</i> (2015) WASH: Burrows (2018)						
Interventions that strengthen the ability of firms and financial institutions to pre-arrange finance for disasters								
Meso level insurance		Perez-Gonzalez and Yun (2010), Collier and Skees (2012), McIntosh <i>et al.</i> (2013), Mishra <i>et al.</i> (2019), Giné and Yang (2009)						

Contact information

Centre for Disaster Protection
60 Cheapside
London
EC2V 6AX
United Kingdom

info@disasterprotection.org
 [CentreForDP](#)
disasterprotection.org

