OVERCOMING BARRIERS TO MICRO-INSURANCE FOR CATASTROPHE RISK MITIGATION: LESSONS FROM MICRO-FINANCE OPERATIONS

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ABSTRACT :

A small-scale community-based micro-finance scheme in Andhra Pradesh is used to explore how a micro-insurance scheme might reach low-income households to improve their resilience to future disasters. Data from the ten years of loans administered by the Divi Seema Foundation (DSF) shows that the primary concerns for financial protection are livestock and economically-productive resources. An insurance product that covered several of these key elements would be affordable by the landless households if it were priced within about 1% of income. Estimates of claims costs based on DSF data suggests that certain components, but not everything on the wish-list, could be covered in an insurance product at this price. The economic viability of an insurance scheme in a hazard-prone area like this one would depend on the cost of catastrophe reinsurance. This would probably be too expensive for a small-scale scheme but could be defrayed in a larger scheme. The proposed micro-insurance scheme is viable if it can scale the community administration of DSF.

KEYWORDS: Micro-insurance, micro-finance, community, low-income, disasters

1. MICRO-INSURANCE

The most vulnerable communities to disaster are the low-income populations in hazard-prone areas. Increasing emphasis is being paid to whether there may be opportunities for helping these communities protect themselves through the mechanisms of insurance. Community-based micro-finance schemes show that solutions that help communities to help themselves are a much better solution than paternalistic subsidies or post-disaster aid programs. In principle, there is no reason why today's low-income communities should not benefit from the risk pooling mechanisms that insurance offers. In fact insurance as a financial mechanism was originally pioneered in low-income communities, sold in industrializing economies at the factory gates at payday to minimum-wage workers who wanted to protect their families from the economic consequences of misfortune.

Today economists are increasingly recognizing the potential 'fortunes at the bottom of the pyramid', which suggests that it may be possible to aggregate small-scale profits (the 'micro' in micro-insurance) over very large numbers of people to provide a return on capital that will satisfy financial investors. However, there are many practical obstacles to overcome. Insurance companies find it unattractive to offer very low-cost products because the transaction costs of gathering the premiums and administering the claims are disproportionately high. Finding efficient distribution channels for selling policies, collecting premium installments and administering claims payouts in a very low-income community represents a major challenge.

Micro-finance projects have been administering loans in very low-income communities for many years. Successful projects make use of existing social networks, and flexibly empower them to make decisions about loan recipients, repayment terms, and funding contributions. Costs are kept low using volunteer leaders, and default rates are low, as the community polices itself.

Credit is similar to insurance, but insurance is 'credit in reverse' requiring participants to make small scale payments in advance of the benefit – the replacement of a loss – rather than making payments to repay the benefit, after receiving a loan. In this paper we explore the potential for micro-insurance and the issues involved, using data from a real example of a successful micro-finance scheme in one cyclone-prone area of India.

There are numerous insurance schemes in India (both government and private) but their take up is patchy and does not reach the rural poor, largely because they have traditional, top-down distribution system that makes premiums too expensive and inaccessible to rural households (Ahuja and Guha-Khasnobis 2005).

2. DIVI SEEMA CASE STUDY

Divi Seema is a region in the Krishna delta, Andhra Pradesh, India with a population of 75,000 households living on an agricultural economy, based mainly on growing rice and pulses, animal husbandry and fishing. The coastline is prone to occasional devastating cyclones and floods, there are risks of crop failure and disease, and villagers face individual risks of accident and ill-health affecting their ability to earn. Following the Andhra cyclone of 1977 the region was the focus of government and NGO post-disaster aid. The recovery of the region and the issues of vulnerability reduction against future catastrophes was the subject of a detailed 10-year study in the political economy of catastrophe risk (Winchester 1992).

2.1. Divi Seema Micro Finance Scheme

In 1997, the Divi Seema Foundation (DSF), a micro-finance charity was established to provide loans to the women who manage the finances of many of the households in the community. The charity has administered several thousands of loans, supervised their successful repayment, carried out training programmes and coordinated community meetings for the past ten years. A decade of data from the activities of this charity is used here to test the hypothesis that micro-insurance would be viable in a community of this type.

Figure 1 Community meetings and training workshops for the participating women members are a regular component of the micro-finance work of the Divi Seema Foundation

The micro-finance operation consists of loans made to the women who manage the household finances, using their pooled savings and charity capital. Group leaders are elected by the members, who are trained to run the loans and savings programmes. The loans are used to buy livestock, lease land, buy seeds, and set up small businesses such as petty shops, occasionally they are used for education and medical purposes. Loans have a standard interest rate and are repaid usually within 15 months. Default rates are very low.

2.2. Income distribution

As with many rural societies there is considerable disparity of income among households in the community, ranging from the wealthy landowners, to the poor who work the land for others. The micro-finance project is

aimed predominantly at those with a total household income level of below the median income level, which is about Rs 20,000 (US$667) a year. [Rs 30 to US$1]. Typically this is likely to be an extended household of three generations farming 1-5 acres, with a small number of animals, typically a buffalo. The lowest 30 per cent of households are families with no land and precious few assets. An estimate of the income distribution of the community is shown in figure 2. The Lorenz curve for income distribution gives a Gini index of around 48%, typical of agrarian communities in developing countries, and fairly representative of the types of communities for which micro-insurance is being considered.

The membership of the Divi Seema micro-finance scheme has an annual income ranging from 5,000 to 25,000 Rs (US$167 to 833) with an average income of around 16,000 Rs (US$550) – about half those in the nearby cities. It is also worth noting, however, that incomes are increasing over time: The median income ten years ago was closer to Rs 10,000, and 20 years ago was around 6,000. In another decade, incomes could be a multiple of those today, providing opportunities for much greater insurance participation over time.

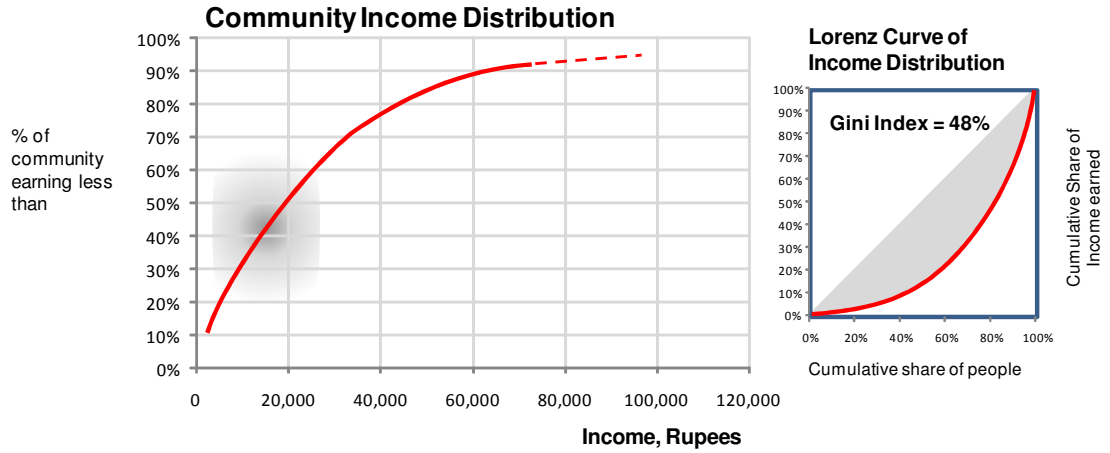

Figure 2 Income distribution in Divi Seema. The DSF micro-credit scheme is aimed at those below the median.

2.3 Priorities of insurance coverage

The assumption being made in this study is that an insurance product would be offered to cover elements of critical continuity in a household's income. This is the primary concern of most micro-insurance schemes worldwide, as outlined in a recent study (Roth et al. 2007) in which the prioritization is economic productivity, healthcare, death benefits, property damage, job loss and others. It is worth noting that the Roth study shows that the physical house is a relatively low priority for communities in a micro-insurance scheme. Physical shelter is often a priority for aid and a focus of disaster recovery and mitigation projects, but from the evidence it is clear that communities at risk place higher value on livestock and income-generating resources (Winchester 1997). In the following section we consider in more detail what the precise coverage might consist of, particularly from the point of view of the insurer and the cost of providing cover for different aspects.

The types of loans taken out in the DSF scheme shows the prioritization of need (table 1).

	Average Loan Value (Rs)	*As a multiple of average annual income (16K Rs)*	*Proportion of loans administered*
Agriculture/fishing (equipment, seed, land lease)	5,000	0.31	41%
Animal husbandry (buffalo, goat, feed)	10,000	0.63	29%
Housing	2,000	0.13	12%
Medical bills	1,000	0.06	5%
Other (e.g. education, marriage, consumption)	1,500	0.09	13%

Table 1 Loans in the Divi Seema Foundation, 2,000 loans 1999 to 2007

2.3 Affordability of Insurance Premiums

The assumption is that in a micro-insurance scheme, households would pay a premium each month as a protection against the sudden need for similar items to those borrowed for loans. In the case of a loan being made, an additional premium could be collected on top of the monthly repayments, so that, for example if the buffalo died the insurance would replace it, similar to consumer credit insurance. The scheme however would be wider than just those who are in receipt of loans, and would be applicable to all members of the community.

A critical element of the feasibility of a micro-insurance scheme is the affordability of insurance premiums. This study tried to estimate the likely take-up rate of insurance at different levels of pricing. The membership of the DSF is taken as the target customer base of the insurance. These are typically people who are able to afford loan repayments at a rate of about Rs 300-500 a month, and in repaying a typical agriculture loan over a 15 month period would spend around 25% of their income on credit repayment. Senior members of the DSF estimated the likely take-up rate of a hypothetical insurance product that would provide some attractive degree of protection for their resources of economic productivity, at different pricing points.

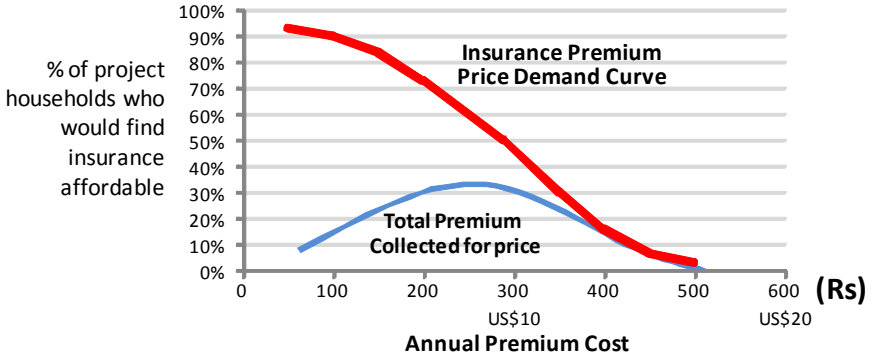

Figure 3 Price sensitivity of micro-insurance premium levels, estimated for DSF members

The median take-up rate is estimated at around Rs 300 (US$10) a year, around 2% of the average annual income of the target group. This is slightly higher than, but consistent with, personal lines insurance premium expenditure by households in US and Europe. Price exploration for an insurance product is often difficult, even in countries where insurance is well understood. The study for figure 3 assumes that households in the community would appreciate the value proposition of insurance, but this is often a very difficult concept to convey, and in a community of this type might require a considerable amount of education and explanation. It would also need a strong element of trust in the insurance entity by the householders – paying in advance for a benefit that will accrue in the future requires confidence that the entity will still be around when the benefit is due, and can be trusted to fulfill its obligations. This is considered further in later sections.

2.4 Profitability of Insurance Cover

The affordability of micro-insurance is one constraint on the viability of an insurance product. Another is whether it can be profitable for an insurer (Chu and Hazell, 2007). The records of the incidence of loss and hardship in the DSF membership, often resulting in the need for a loan or for allowance to the loan repayment, were used to estimate the likely frequency of possible claims under different potential components of coverage. The incidence of deaths in a productive buffalo, for example is derived from the known number of animals that died of disease or accident, relative to the total number of animals kept by the households, to estimate the probability per year per household, expressed as a 'return period'. The technical rate is then the premium payment required per year to cover the loss. Table 2 shows the summary of several potential categories of cover. Typically an insurance company would require the loss burden to be well below the total premium. If the target loss burden was 60% of premium, and if the pricing suggests that a premium of Rs 300 would be the optimal for penetration, then the total technical rate should not exceed Rs 180.

Table 2 Estimation of the claims values, frequencies and technical rate of different potential coverages

		Claim Value (Rs)	*Frequency (Return Period yrs per member)*	*Technical Rate (Rs)*
1	Loss of a productive buffalo	10,000	141	71
2	Accidental death of working member of household	10,000	1,000	10
3	Treatment for acute medical condition	8,000	90	89
4	Accident/Sickness Preventing Work (3-15 weeks @ Rs 250 a week)	3,000	50	60
5	House fire/destruction (replacement building materials)	30,000	300	100
6	Crop Failure (per acre)	25,000	20	1,250

From Table 2, a total technical rate ceiling of Rs 180 would allow the product to cover, for example the first three categories (total technical rate Rs 170), but not 4, 5 or 6 (total Rs 1,410). Other permutations could be developed depending on what is most important to the community. In this example we will assume that the coverage is 1, 2 and 5 – Loss of livestock, accidental death and house loss (total Rs 181) – because these are major components of disaster recovery concerns by aid agencies.

Coverages could also be made cheaper for the insurer – i.e. the technical rate reduced – by introducing a deductible. This means that the householder will pay part of the amount of a claim themselves, and may prevent small claims being made altogether. The design of the insurance product would try to optimize the priorities of coverage with the affordability and priorities of the target market.

2.5 Economics of the Divi Seema micro-insurance example

Insurers add a number of loadings to the technical rate to arrive at a typical insurance premium. They add a loading for volatility – the overall variation and uncertainty. They add loadings for their administrative costs. And they add a profit margin. Insurers need to show a return on the capital they invest. Some companies are run on not-for-profit lines (mutual insurers) and these have slightly lower margins.

Insurance works by pooling the risks, so that the amount of money required to replace losses is reduced. Rather than each householder saving the full amount of replacing their own buffalo, insurance works by keeping enough money in the pool to pay for all the buffalos that might die in any one year – which, assuming that buffalo accidents and occasional sickness is a fairly random process, means that this usually only a small proportion of all the insured buffalos. Hence the sharing of risk makes it cheaper for everyone. This diversification of the risk is a key principle.

Assuming a population of 500,000 households (i.e. the Krishna district and beyond). The target market for the insurance products consists of about 45% them, i.e. 225,000 households. By pricing the premium at around Rs 300, we hope to get an eventual take-up of around 50% - around 112,000 households. This generates a total premium income of Rs 33m. On an average year it would see an estimated 1,200 claims, which would total some Rs 20m in payouts. Administration costs and risk loadings would need to be limited to around Rs 13m for the company to be profitable. The sections below consider each of these. The most critical is catastrophe reinsurance costs. The amount of capital required to support an insurance operation of this type depends on the volatility of claims and most importantly on the probability of extreme losses.

3. CATASTROPHE RISK

The big problem for an insurance scheme comes when a large proportion of the policy-holders have a loss at the same time. Although the Indian government today will compensate those who can verify their losses, this

example will explore the possibility that the losses could be borne by the insurance scheme.

If a major cyclone were to hit the island of Divi Seema, as it did in 1977 and 1979, then the high winds and storm surge could cause many of the householders to have losses and make claims simultaneously. Earthquakes – not a specific peril in this region, but a catastrophe being addressed by this conference – have similar characteristics of causing rare but widespread destruction. Other potential catastrophes could include river floods, droughts or disease epidemics. One of the main rationales for creating micro-insurance schemes is to create resilience in a community to disasters that will improve its ability to recover with less reliance on external aid and government reconstruction assistance.

The region experiences periodic cyclones that could cause significant correlated losses in a scheme of this type. The return periods of different severities of cyclones and their impacts are used to estimate the approximate catastrophe risk profile for our hypothetical micro-insurance scheme. The frequency and severity of losses are estimated as a loss exceedance probability, as a multiple of total annual premium, shown in figure 4.

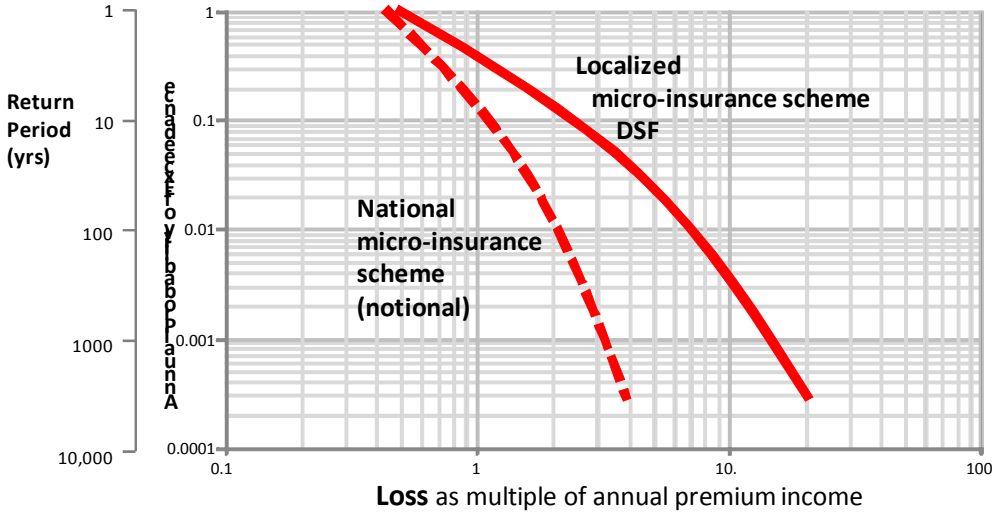

Figure 4 Catastrophe loss exceedance probability curve estimated for the hypothetical micro-insurance scheme

The scheme would clearly need to build substantial reserves to withstand the losses that could impact the region. A Rs 100m loss (about 3x annual premium income) can be expected with a return period of less than 20 years. A loss of over Rs 330m (10x the annual premium income) appears likely with a 1 in 300 chance each year. If the micro-insurance company has to find this amount of capital to hold in reserve for extreme events, it will be fairly inefficient. Most insurance companies buy reinsurance to offset their risks of insolvency from extreme events. The issue here is that reinsurance is likely to be a significant additional cost burden to the overall economics of the micro-insurance operation. Reinsurance rates for catastrophe excess of loss for cover above 100m up to a limit of 300m (Rs 200m XS of 100m) could cost the company many millions of Rs, perhaps 7 to 15m, depending on market conditions and other factors. This could potentially render the company unviable, if all its operating margins were eaten up in reinsurance costs.

The key to lowering the costs of covering extreme events is to diversify and to increase the scale of the operation of the micro-insurance scheme. The high costs of catastrophe reinsurance for this scheme are because of the chances of a high proportion of the scheme being impacted by a single disaster.

3.1 Reducing the costs of catastrophe cover

Catastrophe costs could be reduced if the scheme were pooled with a similar micro-insurance scheme in a different region of India. Consider an example of a similar sized scheme, operating along similar lines, in an area where the risk of earthquake and other perils was significant, and diseases still threatened, but away from

the cyclone risk that threatens Divi Seema. The risk of extreme loss from the two schemes combined decreases: The risk is diversified. This is effectively a risk 'swap' in insurance terms. A well-chosen risk swap for the DSF scheme might reduce catastrophe risk transfer costs by as much as 30%, and may make the scheme viable.

Diversification benefits would be increased the further away, and the less related the other schemes are. A very large national micro-insurance scheme with many millions of household members well distributed across many of the states of India could have a very different ratio of extreme loss to its premium income. Its premium income could be several orders of magnitude larger than the regional scheme of DSF. Because it embraces the whole country and a disaster occurring anywhere in the subcontinent would probably affect some of its members, the national scheme would have a higher frequency of catastrophe losses, but their impact as a proportion of the total premium income would be considerable mitigated. In figure 4, the dotted line represents a notional comparison of a how the catastrophe exceedance probability curve could potentially be reduced by operating a national micro-insurance scheme rather than a regional one.

Well managed diversification might decrease the cost of reinsurance for extreme catastrophe risk quite significantly. In the example in figure 4, the cost is illustrated as being reduced to a quarter at the hundred year return period. A reasonable expectation might be that that a national scheme could halve the cost of catastrophe risk transfer per policy-holder. Relating this back to our example of DSF, our analysis of operating costs and other margins suggests that we would need to reduce the catastrophe risk by at least 30% to make it viable.

3.2 International risk diversification

In theory it would be possible to diversify the risk of cyclone impact on the coasts of India with the risk of earthquake in the villages in China or another country. However, in practice, national regulations make it difficult to have a single insurance company managing the risk collectively in multiple countries – many developing countries regulate their insurers as national entities, and until they deregulate it may be difficult to put together international portfolios of diversified micro-insurance schemes. There may be other ways of achieving international diversification:

- It might be possible for an international reinsurance company to act as the diversifying agent – putting pools together of micro-insurance schemes that enable them to offer efficient, lower-cost reinsurance
- International development financial institutions, such as the World Bank or philanthropic foundations, could act as the clearing house for packaged risk from many regional schemes across multiple countries
- National governments could provide catastrophe cover to their micro-insurance schemes, potentially pooling their risks with other national governments

Methods of improving international pooling and diversification of micro-insurance remains the greatest challenge for improving the viability of micro-insurance schemes as a solution to catastrophe risk.

4. OPERATING A MICRO-INSURANCE SCHEME

The real-world DSF example used here is a micro-finance scheme, rather than the micro-insurance operation we have explored. It administers loans on approximately the same scale as the insurance claim size that would be needed, and manages regular monthly repayments considerably larger than the insurance premiums being considered. It has many fewer members than the number of households that would be needed to make an insurance scheme viable. However, the way it administers the scheme may have valuable lessons for the administration of a micro-insurance scheme. The scheme works through committees of trained group members themselves acting as administrators and elected community leaders, usually one of the higher-status women in each village (not necessarily higher economic or caste status). The closeness of the community ensures that membership is accountable – levels of corruption are kept manageably low – and inclusive, ensuring that even poorer households are encouraged to join. DSF retains a light management layer of professional managers who administer the funds, visit all the communities on a regular basis and carry out training for members and

mentoring for leaders. A major challenge of micro-insurance schemes is 'the last mile' – reaching the membership, administering the system, collecting premiums and managing claims on a cost-effective basis. The success of micro-finance schemes is that they have managed to achieve this.

The DSF currently operates at around 60 Rs per member household. It achieves this low cost by having volunteer community leaders, and minimal layers of middle management. The scheme pays its managers salaries that are reasonable by rural standards but would not be competitive with urban clerical salaries. It is unlikely that a commercial insurance company, with high overheads, and a sizeable administrative infrastructure could operate with this level of cost per member. Micro-insurance schemes are not very attractive to commercial insurance companies because their costs would eat up a high proportion of any premiums gathered. In the example being developed here, we have suggested that the administrative costs and risk transfer costs would need to be below 13m Rs for the scheme to be profitable. We have argued that if catastrophe risk were effectively diversified (by pooling or swapping) reinsurance costs of 7m Rs may be possible. If then the administrative costs can be kept below 6m Rs – 50 Rs per member – the scheme would be viable. The cost per member is similar to that of the DSF micro-finance operation, but would be on a larger scale and if it could gain some additional cost savings through scale then the proposed micro-insurance scheme would be viable.

5. CONCLUSIONS

Could such a scheme offer a practical solution to aiding economic development in areas like Divi Seema? And importantly, would it create resilience in a community to disasters that will improve its ability to recover with less reliance on external aid and government reconstruction assistance? One issue that would need careful consideration is how the administrative infrastructure of the micro-insurance operation would operate and provide the assistance it has been set up for in a post-catastrophe environment. If the community has been badly impacted by a cyclone or flood, for example, the scheme leaders would need considerable external assistance from the insurance managers, particularly if they themselves are personally impacted. Although community schemes of this type do not require extensive documentation to operate normally, some method of tracking entitlement and ensuring that this would be honored even in the chaos of a catastrophe, would be essential.

This analysis has sketched out how a micro-insurance scheme could potentially operate, using a micro-finance scheme as a template. It suggests that schemes can be made viable, even in the areas of relative high risk for natural catastrophes. Key to the viability of the scheme is the cost of catastrophe reinsurance. We have explored some options for reducing these costs using risk swaps and, more promisingly, pooling risk more widely through national and potentially international schemes. If such schemes were established, it would certainly be in a national governments interest to facilitate, and even possibly subsidize, the costs of catastrophe risk cover.

The potential for using private capital and premiums raised by the risk stakeholders themselves in improving disaster recovery capability is an intriguing one. There are many practical difficulties to be overcome in achieving this. Micro-finance schemes like DSF suggest that there are indeed ways to make it happen.

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