



## Strengthening Financial Institution Resilience to Earthquake Risk in Indonesia: *The Role of Index Based Portfolio Insurance* ‡,†

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Indonesia's financial sector faces one of the highest earthquake exposures in the world. Many financial institutions (FIs) in Indonesia are particularly vulnerable, given their geographic concentration. This raises important questions. For example, *how is a lender's operation and survival impacted when an earthquake affects a large proportion of its clients? What actions do FIs take to protect their business and the wellbeing of their clients against severe earthquake risk?* GlobalAgRisk has been looking into these questions as part of a Ford Foundation Project that aims to develop innovative financial solutions to seismic hazard risk for Indonesia's financial sector. The risk management mechanisms banking institutions employ to reduce their exposure plays a key role in their capacity to withstand the next earthquake shock. Importantly, FIs that seek to proactively manage seismic risk will be in a better position to serve their communities in the aftermath of a disaster. GlobalAgRisk is developing an innovative type of parametric, index based insurance product against earthquake risk. The new product is called "EQII", or "Earthquake Index Insurance," and uses ground motion intensity (based on transparent United States Geological Survey (USGS) generated shake maps) that are paired with information about the infrastructure (housing, roads, commercial buildings, etc.). Using an index provides quick payments that deliver an important infusion of capital and liquidity to financial lenders following a severe disaster.

### How Earthquakes Impact Financial Institutions in Indonesia

Earthquakes represent a major threat to the existence and performance of financial institutions (FIs) in Indonesia, for several reasons. First, Indonesia's financial sector is dominated by institutions that have limited opportunity to diversify geographically or across different economic sectors. When disasters affect many borrowers at the same time, these institutions experience portfolio-level problems that can threaten their solvency. Second, the institutional infrastructure supporting these financial providers is sometimes limited (e.g., limited deposit insurance and lender-of-last-resort policies, underdeveloped secondary financial markets, etc.). Finally, earthquake insurance in Indonesia is largely confined to riders on general commercial and residential property insurance products, where compensation is restricted to property damage. Most of the clients of FIs do not have access to any form of earthquake insurance.

FIs face exposure to earthquake risk in at least five important areas:

- Erosion of the capital base
- Liquidity problems
- Extra business costs
- Limited access to capital after an earthquake
- Lost opportunity and income to assist in rebuilding the community

Under the best conditions, natural disasters disrupt the business operations of FIs. Expenses increase due to the administrative burden of adjusting loan terms, loss of physical infrastructure, and having to borrow on higher terms when savings are withdrawn, to name a few. The most profound impact disasters have on FIs, however, is that they can significantly reduce the value of the asset base, which depletes equity and can lead to insolvency. When the portfolio quality is reduced, the value of the asset base is eroded. Without the ability to access new capital, the FI is unable to respond at the moment that the community is in the greatest need.

**Bad loans and erosion of the capital base.** In many contexts, loan losses are the major threat as FIs adjust or write

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off loans due to the inability of borrowers to repay. This was clearly evident in the aftermath of the 2006 Yogyakarta and the 2009 Padang earthquakes. As **Table 1** shows, nonperforming loans doubled, tripled, even quadrupled. One interviewed People's Credit Bank (BPR) in Padang lost IDR 1.5 million in loans due to client deaths and/or the complete destruction of their homes and businesses. Some financial lenders interviewed were forced to temporarily shut down and reopen after the earthquake.

Nonperforming loans lower the value of the asset base, resulting in a loss of equity. Even a small decline in the value of assets has a profound impact on the institution's capital base. Erosion of the capital base can lead to bank failure but it certainly has a significant negative effect on the bank's future income streams.

Poor loan performance also leads to a reduction in interest income. Following the Padang earthquake, for example, lost interest income for the most severely affected BPRs was estimated to be only 15–35% of the income before the quake (Hiemann, 2009). The reduction of interest income can lead to liquidity shortages. It also reduces current and future profitability by lowering the capital base. It can take three years or longer for the rate of loan non-performing to return to pre-event levels.

While the conditions can vary and there may actually be an increase in demand for construction loans, the demand for the more typical loans suffers after the disaster as there is less business activity to finance. This is because people are not in a position to take on new obligations after their homes and livelihoods have been devastated. In some of the interviews, loan demand fell by 25% and took six months to a year to recover before people were in a position to restart their business. Many local FIs, however, simply do not have the capital needed to make significant lending for home reconstruction.

**Liquidity problems.** Liquidity may not always be an apparent problem right away, since third party deposits may actually increase in the aftermath. However, savings withdrawals tend to surge within a year of the disaster to finance home rebuilding and merchandise replenishing. Financial lenders we interviewed in Padang and Yogyakarta report significant savings withdrawals—as much as 40% of their client base in the most affected areas. According to one assessment, roughly 20 of the most affected BPRs in Padang would require access to some USD 4 million in additional finance to withstand the resulting liquidity shortfalls (Hiemann, 2009). Bank runs, another source of liquidity risk, are also a concern if there is a lack of confidence in the solvency of the local FI. Deposit insurance may help to mitigate this risk for individual depositors, but second-tier lenders who are not protected by deposit insurance may also withdrawal funds or refuse to lend to a local FI if they lack confidence in its survival.

**Extra business costs.** As revenues decline and the capital base shrinks, FIs are hit with extra business expenses. The need to conduct loan term adjustments adds to the administrative burden. In addition, when deposits are withdrawn, FIs may have to borrow from other banks at higher interest rates. Finally, some FIs will have to absorb costs associated with physical damages to buildings and infrastructure after the quake.

**Lost opportunity to provide critical service when it is needed.** The timing of revenue and asset value losses coincides with a swell in loan applications for rebuilding and rebounding from the quake. But when faced with significant liquidity or capital shortages, FIs are not in a position to accommodate these emerging credit needs for reconstruction. Only one FI we interviewed was able to offer emergency lending to the community.

**Limited access to second tier capital.** Declining portfolio quality affects the ability of banks to access new funds, either to satisfy short-term liquidity needs or capital for new lending. BPRs in Padang turn to Bank Nagari for loans after a disaster. Bank Nagari is their apex institution for financing. However, the FI must be sound to qualify for the loans. Again, the dilemma emerges—the earthquake reduces the rating of the BPRs and consequently restricts their access to much needed financing.

## How Financial Institutions Cope with Earthquake Risk

Financial institutions are highly sensitive to capital losses because they tend to be much more leveraged than other firms. Because liquidity and capital fall to very low levels following a widespread disaster, it is customary for some FIs to voluntarily keep larger amounts of capital (in excess of 20%, some as high as 30%) and maintain a capital ratio that goes significantly beyond the 8% that Bank Indonesia (BI) and international standards prescribe.

In some cases, the FIs we interviewed increased their capital reserves in response to the earthquakes. In fact, Hiemann (2009) encouraged BPRs in Padang to follow this practice by holding 20% capital as a way to withstand future earthquakes. His report projects that “only BPRs with capital adequacy ratio (CAR) of 20% would be able to withstand substantial losses wrought by the earthquake.” It seems that most BPRs go beyond the CAR of 8% to levels of 15% or higher. Excessive reserving ties up productive capital and therefore comes at high opportunity cost.

When the capital ratio is below its targeted amount, the FI has two possible strategies: recapitalize or stop lending. Because so few FIs have access to international markets, they compete for scarce bailouts from local investors. Often, shareholders have a limited capacity to mobilize sufficient equity to recapitalize the bank. Financial Institutions that are not recapitalised need to reduce their risky asset holdings to align with their smaller capital bases.

Table 1: FI Experience Following the 2006 and 2009 Earthquakes in Yogyakarta and Padang

Financial Institution Type	No of Clients	Loan Non-performance Before Earthquake	Loan Non-performance After Earthquake
FI Experience in Yogyakarta following the 2006 Earthquake			
BPR	3,000	2%	7%
BMT	15,000	4%	7%
KSP	6,000	10%	17%
FI Experience in Padang following the 2009 Earthquake			
BPR (A)	n/a	1.5%	4.5%
BPR (B)	n/a	5%	21%
BMT (A)	800	5%	15%
BMT (B)	2,100	4.5%	10%

Given that high reserving and capital ratios come at a high cost, more efficient solutions are needed to manage earthquake risk. An earthquake insurance that protects against the business disruptions due to this risk could enable the lender to reduce its capital ratio, which ultimately increases availability of capital for investment. Financial institutions with earthquake insurance will represent lower risk clients. This, in turn, should help them to attract new capital to maintain or expand their operations. These are the core principles for considering the advantages of blending any portfolio disaster insurance with other risk management strategies that come at potentially much higher cost than paying for insurance.

### Portfolio-level Insurance Increases Resilience

In cooperation with Pt. Asuransi MAIPARK and Aon Benfield Asia Pacific, GlobalAgRisk is developing an innovative financial product that will protect the business operations of financial lenders against earthquake risk. The insurance product, known as Earthquake Index-based Insurance (EQII), will be based on a parametric mechanism so that payments can be made quickly. The fast infusion of cash can be used to protect a FI's portfolio against non-performing loans or any other business interruption that threatens its resiliency. By protecting bank capital, EQII not only helps FIs stay solvent, but also allows them to capitalize on new business by extending loans to the community for rebuilding and recovery during times of greatest need.

### Banking Model

To help FIs in assessing the benefits of earthquake insurance, GlobalAgRisk has developed a basic banking model that demonstrates the financial impact of an earthquake event on their balance sheet and income statements. The model can provide direct indications of the cost of various strategies that might be tried to prepare for the next earthquake. It can also demonstrate what level of bad loans could put the FI out of business. The challenge will be to use the expert judg-

ment of professionals in the FI to make estimates of what will happen to bad loans with the worst earthquake. This expected set of problems must also be positioned so that the bank management is considering what actions they may take with an earthquake event (e.g., how many loans might they be able to forgive? do they have access to other sources of capital?) The model will allow the bank to consider these alternatives relative to purchasing the EQII.

The model shows how the capital base responds to different levels of post-earthquake loan delinquency with and without insurance. Using the EQII can smooth the capital base and allow for greater leveraging. The model can also aid an FI in choosing a level of sum insured appropriate for its needs. Given the tradeoff between the cost of insurance and the degree of risk reduction, it is not desirable to insure the entire portfolio but rather a small fraction.

### Conclusion

Institutional survival is clearly a priority of many small, geographically concentrated FIs in Indonesia. Their inability to diversify geographically or across many lines of business puts them at high exposure to earthquake risk. The experience with the most recent catastrophic earthquakes in Yogyakarta and Padang show a dramatic decline in portfolio quality, which leads to capital and liquidity imbalances that can threaten the very survival of these institutions.

As one mechanism for coping with high earthquake exposure, FIs tie up productive capital in reserves that are greater than required by the regulator. This strategy is quite costly, in terms of forgone productive investments, and it does not guarantee institutional survival following a severe disaster. Geographically concentrated FIs in Indonesia can now transfer part of their exposure using EQII. This index-based insurance mechanism allows FIs to maintain lower capital reserves, while also providing an infusion of funds that can meet capital, liquidity, and potentially lending needs after an earthquake crisis.