In 2015, a devastating landslide occurred in Sitka, a town with a population of approximately 8,500 in Southeast Alaska. The slide killed three people, destroyed one home, damaged another, damaged public infrastructure, and disrupted an entire community. Many Sitkans understand that the incident was not an anomaly and that landslides will recur in Sitka, as well as other parts of Southeast Alaska. As a result, they organized a citizen-led geo task force to address the risk of landslides to their lives and livelihoods. In 2018, the RAND Corporation was asked by the geo task force to support their efforts, and with funding from the National Science Foundation, set about developing an early warning system. The geo task force and community more generally were also very interested in how to reduce the impact of landslides on individual finances, property values, and the broader economy, and RAND expanded its scope to examine the cost and availability of landslide insurance.

In this Perspective, we first characterize the market for landslide insurance prior to and following the 2015 slide. We then describe several options that insur-
ance regulators, state government, or local communities might consider for making landslide coverage available. Our findings are based on review of relevant literature and detailed interviews with a variety of knowledgeable stakeholders (see Table 1). Both national and regional insurers that write policies in Alaska were interviewed. A wide variety of insurance agents and brokers were interviewed, including agents who assist Sitka homeowners in finding coverage and brokers who place policies with insurers that offer coverage in the excess and surplus lines markets. The interviews were conducted on a confidential basis either in person or via video call. Twenty-four groups were interviewed, often represented by multiple individuals and sometimes conducted over more than one session.

TABLE 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurers</td>
<td>5</td>
</tr>
<tr>
<td>Alaska insurance regulator</td>
<td>1</td>
</tr>
<tr>
<td>Insurance agents and brokers</td>
<td>6</td>
</tr>
<tr>
<td>Sitka realtors</td>
<td>2</td>
</tr>
<tr>
<td>Sitka real estate appraisers</td>
<td>2</td>
</tr>
<tr>
<td>Representatives from banks that lend in Sitka and other parts of Alaska</td>
<td>2</td>
</tr>
<tr>
<td>Sitka homeowners</td>
<td>4</td>
</tr>
<tr>
<td>Local government representatives</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
</tr>
</tbody>
</table>

State of the Landslide Insurance Market in Sitka

Homeowners insurance policies in Alaska typically exclude coverage for landslides, earthquakes, and floods. Flood coverage can be purchased from the National Flood Insurance Program (NFIP), and landslide and earthquake insurance can be available through difference-in-conditions (DIC) policies. Prior to the 2015 slides, DIC policies that covered landslides could be found for Sitka homeowners. These policies were offered by such insurers as Safehold and Great American Insurance, according to the insurers and brokers whom we interviewed. We were not able to collect detailed information on the price of these policies, but those familiar with the market reported that coverage on a home that costs $250,000 to replace could be typically
purchased for about $1,000 per year. Although coverage was available, it was not purchased by many homeowners. DIC policies with landslide coverage for residential properties in Sitka became very difficult if not impossible to find following the 2015 slide. One homeowner with whom we spoke recounted her futile efforts to find coverage. She contacted local insurance agents, agents in Juneau, the Lloyd’s insurance market, and a large national insurer but was unable to find coverage. Another homeowner did succeed in obtaining a quote but at an annual premium of nearly $15,000. An insurer approached by a third homeowner said it would consider writing coverage but only contingent on the results of a geotechnical survey. Such surveys typically cost $10,000 to $15,000, and it’s likely that the insurer would move forward with coverage only if the survey showed that the property was in a low-risk area. The situation was similar in other parts of Southeast Alaska, such as Ketchikan and Juneau, according to those interviewed.5

Supply-Side Factors Contributing to the Lack of Availability

There are several factors that reduce the willingness of insurers to offer landslide insurance. Factors on the supply side of the market include characteristics of the risk itself, lack of information about the risk, and the limited size of the market.

The characteristic of the risk itself creates challenges to offering coverage. Multiple properties can be affected by the same incident, and the structures affected are often completely destroyed as opposed to partially destroyed. Losses thus tend to be “catastrophic,” and it is more difficult and costly for insurers to obtain the sufficient capital or assets to cover such events.

Information about the probability of landslides and the magnitudes of the landsides that do occur remains incomplete. Insurers increasingly use risk models to decide whether to offer coverage and how much to charge. Such models are relied on for earthquake risk, wind risk, and increasingly for flood risk. The models characterize the average annual expected insured loss in an area, and the probability that losses will exceed various amounts can be very granular geographically. Such models allow insurers to efficiently price policies and control the accumulation of risk in high-risk areas. Absent such models, the need to inspect properties and possibly to complete detailed risk assessments increases the time and costs required to write coverage. In today’s insurance market, these models are also important in insurer efforts to buy reinsurance and to bundle and sell policies to capital markets.

Although geologists well understand the circumstances that can lead to landslides and are able to characterize the level of risk in different areas, more work needs to be done to develop the probabilistic models that would enable insurers to develop underwriting guidelines and set premiums.6 Several insurers and brokers with whom we spoke believed that the lack of probabilistic landslide models was a primary obstacle to the development of a market for landslide risk, although some cautioned that even if such models were available, there would still be no guarantee that insurers would enter the market.

Contributing to insurers’ lack of interest in offering landslide coverage is the limited size of the market. Landslides have occurred in many parts of the United States; however, insurers perceive the pool of potential insureds
An insurance market can develop only if there are consumers willing to buy the product for prices at which insurers are willing to sell it. To be limited compared with such risks as earthquake, wind, and flood. Landslide risk might be a significant risk in certain parts of Southeast Alaska and Alaska more generally, but with a population of less than 750,000 for all Alaska and approximately 75,000 in landslide-prone Southeast Alaska, the pool of potential policyholders is not large compared with those for other hazards in other states. What is more, there does not appear to be much demand for the product. As discussed above, it appears that few households in Sitka purchased coverage when it was available prior to 2015. A limited market makes it difficult to justify the substantial investment needed to develop probabilistic landslide models, pricing schedules, and underwriting protocols.

Demand-Side Factors Contributing to the Lack of Availability

An insurance market can develop only if there are consumers willing to buy the product for prices at which insurers are willing to sell it. As discussed above, a broker recalled that, prior to the 2015 slide, a typical annual premium was roughly $1,000 for $250,000 in building coverage. To provide some additional insight into how much coverage might cost in Sitka, we built and parameterized a simple premium model (see the “A Simple Model for a Landslide Insurance Premium” text box on pp. 6–7). Projected annual premiums range from $876 to $3,791 depending on assumptions made for the annual probability that a landslide occurs and the probability that a home is destroyed given that a slide does occur. Projections were made for the replacement cost of a typical home in Sitka ($400,000) with $150,000 in contents coverage and $100,000 in additional living expenses. These projections are roughly consistent with the pricing pre-2015 (the $1,000 for $250,000 in coverage pre-2015 becomes $1,600 for $400,000 in coverage using a proportional extrapolation). This exercise also confirms that the cost of landslide coverage could well be considerable in some situations.

The potential reasons for the low demand are many and have frustrated policy analysts who examine financial preparedness for disasters in multiple settings. One of the rationales for foregoing insurance that we heard during our interviews is that the Federal Emergency Management Agency (FEMA) would pay for their losses. Although such assistance is conceivable in some circumstances, it is not guaranteed and could be limited. Standard FEMA assistance is capped at $37,900 per household—hardly enough
to repair a home that has been completely destroyed—and this assistance is typically available only for presidentially declared disasters.\textsuperscript{10} 

Limited information about the risk and how to interpret it also contributes to the lack of demand. In one realtor’s experience, home buyers are often not concerned about landslide risk. Another observed that buyers might acknowledge that there is risk but believe that an incident will occur only in the distant future. In a third realtor’s view, “nobody” buys flood insurance unless they are required to by a lender, and he thought the same to be the case for landslide insurance.

Previous research has shown that when the probability of an event is low, individuals tend to ignore the risk.\textsuperscript{11} Demand-side challenges are evident in the NFIP. For homeowners in high-risk areas not subject to the NFIP’s mandatory purchase requirement (described in the following paragraph), the take-up rate is 28 percent. And this take-up rate is at premiums that on the whole have been subsidized.\textsuperscript{12} The 2015 slides undoubtedly increased the awareness of landslide risk in Sitka, but research in other settings suggests that any bump in demand for insurance erodes after a few years.\textsuperscript{13} 

Lending requirements have been an important driver of the demand for insurance in some settings. For example, the NFIP’s mandatory purchase requirement requires homes in high-risk flood zones (Special Flood Hazard Areas) with mortgages from federally regulated lenders to have flood coverage. However, lenders have generally turned a blind eye toward landslide risk in Sitka. As is the case for earthquake risk, lenders have typically not required Sitka homeowners to obtain and maintain landslide insurance over the course of the loan. An exception occurred during the period when Sitka’s landslide zoning ordinance was in place. After the 2015 slides, Sitka identified “restricted landslide areas” and required proposals for major construction in these areas either to complete a geotechnical evaluation that established that the property was not at medium or high landslide risk or to include measures to mitigate the risk. Single-family homes and duplexes (along with some other types of structures and infrastructure) were exempted from these requirements; however, they were not removed from the restricted landslide areas, and developers and subsequent owners were required to release the city from liability for landslide losses.\textsuperscript{14}

An Alaska bank representative with whom we spoke reported that, in some cases, the bank required landslide insurance for home loans in the restricted landslide areas. Because landslide coverage was not available, these loans were subsequently denied. In other cases, the bank would forgo insurance but require the ratio of the loan amount to the property value to be low, the borrower to have a high credit score, or the borrower to post collateral (such as fishing boats).\textsuperscript{15} Although local lenders thus created demand (although unfulfilled) for landslide insurance in Sitka, the same cannot be said for some national banks. For example, we were told about a homeowner who was denied a loan from a local bank but secured one from a national lender that possibly was unaware of landslide issues in Sitka.

Sitka repealed its landslide area management ordinance in August 2021.\textsuperscript{16} It remains to be seen whether lenders will no longer consider landslide risk in lending decisions on homes in areas formerly identified as medium or high risk.
A Simple Model for a Landslide Insurance Premium

A simple model for landslide insurance premiums starts with the frequency of loss, then considers the amount of loss should a loss occur, and finally adds insurers’ costs of providing the product. We used the Tongass National Forest Landslide Inventory to develop rough estimates of landslide frequency in three areas of Sitka—Gavin Hill, Harbor Mountain, and Mount Verstovia. Based on the number of slides that occurred during the 85 years covered by the database, plausible lower and upper estimates for the annual probability of a slide in each of the three areas run from 1 percent (1 in 100 years) to 7 percent (1 in approximately 15 years). Not all homes in a slide area are affected by a slide, as illustrated by the relatively few homes that were damaged in Sitka in the 2015 slide. Systematic information about the percentage of homes that have been affected by past slides is not available, and for the purposes of this exercise, we assume 5 percent are affected (see row 2 of the table).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Lower Estimate</th>
<th>Upper Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual slide probability</td>
<td>1%</td>
<td>7%</td>
</tr>
<tr>
<td>2. Probability of home being destroyed in a slide</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>3. Home replacement cost</td>
<td>$400,000</td>
<td></td>
</tr>
<tr>
<td>4. Additional living expenses</td>
<td>$100,000</td>
<td></td>
</tr>
<tr>
<td>5. Replacement of lost personal property</td>
<td>$150,000</td>
<td></td>
</tr>
<tr>
<td>6. Expected annual insured loss (1 x 2 x (3 + 4 + 5))</td>
<td>$325</td>
<td>$2,275</td>
</tr>
<tr>
<td>7. Expected annual loss adjustment expense (15% of (6))</td>
<td>$49</td>
<td>$341</td>
</tr>
<tr>
<td>8. General and selling expenses</td>
<td>$300</td>
<td></td>
</tr>
<tr>
<td>9. Cost of CPC (2% of 15 x (6 + 7 + 8))</td>
<td>$202</td>
<td>$875</td>
</tr>
<tr>
<td>10. Total premium (6 + 7 + 8 + 9)</td>
<td>$876</td>
<td>$3,791</td>
</tr>
</tbody>
</table>

An appraiser with whom we spoke put the replacement cost for a typical 2,000-square-foot structure at $200 per square foot, resulting in a $400,000 insurance payout if the home were destroyed (row 3). Adding the cost of alternative accommodations while the home is being reconstructed and the cost of replacing personal property could add $100,000 and $150,000 to the loss, respectively (rows 4 and 5). The resulting expected annual insured loss ranges from $325 in the low estimate to $2,275 in the high estimate (row 6).
Components of a Landslide Insurance Program

Given the challenges on both the supply side and the demand side of the market, it seems highly unlikely that the private sector will be interested in providing landslide coverage in Sitka for the foreseeable future. We thus turn our attention to programs that might be established to improve the availability of coverage. These programs might be based on a partnership of the public and private sectors or run solely by the public sector. In developing and evaluating such programs, it is useful to begin by reviewing the components of an insurance program.

A starting point in designing a landslide insurance program is to determine the type of insurance product that will be offered, although decisions on other program components will likely affect the choice of policy attributes. Policy limits and deductibles must be specified (Figure 1). Should coverage be offered for full home replacement costs or capped at some level? Should additional living

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A Simple Model for a Landslide Insurance Premium—continued

Costs of selling and servicing the policies and providing the CPC to make payments must be added to the expected annual loss to project the ultimate cost to the consumer. Insurer expense data reported to the National Association of Insurance Commissioners show that loss adjusting expenses are about 15 percent of paid losses (row 7). Data from the NFIP and from the California homeowners market indicate that general and selling expense average between $200 and $250 per policy, which we bump up to $300 to account for the smaller size of the landslide insurance market. Insurers must also hold sufficient assets to cover claims when events do occur, and the amount depends on the risk tolerance of the insurer. We use data from the California Earthquake Authority (CEA) to provide an initial estimate of the cost of this CPC. CEA projects that the ratio of CPC to its premium revenue needs to be roughly 16 to cover a 1-in-250-year earthquake. Its cost of borrowing in the bond market is roughly 3 percent. It can invest the bond proceeds in liquid assets until they are needed at a return of roughly 1 percent for a net borrowing cost of 2 percent. Based on these assumptions, the cost of CPC adds $202 and $875 to low and high estimates, respectively (row 9). The CEA has a very strong balance sheet, and other entities might not be able to borrow on such favorable terms. Missing from the insurer costs are taxes, licenses, and fees that an insurer might be required to pay, as well as a profit load that private insurers might require to allocate resources to this line of coverage.

Summing the cost components results in the final premium running from $876 per year in the low estimate and $3,791 in the high estimate.

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b Dixon and Morikawa, Improving the Availability and Affordability of Pandemic Insurance Risk, p. 33. Figures for the NFIP and California homeowners market are based on 2019 and 2018 data, respectively.
c See CEA, “Alternative Return Periods,” p. 14, for the CPC required to support a 1-in-250-year event. CEA direct written premium was $917 million in 2021; CEA, “Governing Board Meeting: Notice and Agenda, Including Meeting Memoranda,” p. 27.
d For the interest rate paid on CEA bonds, see CEA, Financial Report with Supplemental Information, p. 24. For investment return, see CEA, “Governing Board Meeting: Notice and Agenda, Including Meeting Memoranda,” pp. 26, 27.
expenses and coverage for personal property be provided? Should low deductibles be offered or only high deductibles? A “mini-policy” offered by the California Earthquake Authority is an example where program designers have chosen to provide only limited coverage.\(^{17}\)

Program designers must also develop underwriting criteria that specify who is eligible for coverage. For example, should landslide coverage be offered throughout Alaska, or should the program be restricted to Southeast Alaska? Also relevant to some programs is whether insurers should be required to offer coverage to all applicants or whether insurers can offer coverage at their discretion.

A rate schedule must also be developed, and program designers must determine the extent to which premiums vary with property risk or whether more-uniform rates should be set that result in policyholders in lower-risk areas subsidizing policyholders in higher-risk areas. Decisions on this issue will depend in part on the granularity of the landslide risk information that is available.

When developing the coverage options, underwriting criteria, and rate schedule, program designers should also consider whether there will be sufficient demand for the product. They should consider whether premiums are sufficiently affordable that consumers will voluntarily purchase the coverage in sufficient number for the pro-
gram to be sustainable. In previous sections, we discussed the challenges on the demand side of the market; simply designing a program that might make coverage available does not necessarily solve these demand-side challenges. It is appropriate for designers to consider whether there is the political will to make the purchase of coverage mandatory, as the NFIP has done for many, but not all, homeowners in high-risk flood areas.

A critical consideration for any insurance program is how CPC is created when the program is established and augmented as the program grows. CPC allows the program to remain solvent in the event of a landslide that affects many policyholders at the same time. As shown Figure 1, there are many potential sources of CPC, including

- investment by private investors
- accumulated revenue from premiums net of losses paid
- reinsurance
- bonds
- postevent assessments on insurers, policyholders, individuals, or businesses in specified areas.

The strategy used to develop CPC fundamentally affects that nature of the program, and a wide variety of approaches have been used in state catastrophic risk insurance programs.\(^{18}\)

Finally, decisions must be made on who staffs and runs the program. Responsibility must be assigned for creating policy forms, setting rates, developing underwriting criteria, marketing and placing policies, collecting premiums, managing the CPC, and adjusting and paying claims. Programs can be staffed in different ways, including hiring staff who will directly implement the program or subcontracting with experienced vendors.

### Options for Improving the Availability of Landslide Insurance

Using input from stakeholders and review of insurance regulations and programs in other settings, we developed four options that might be considered to improve the availability of landslide insurance for residential properties in Sitka and other parts of Alaska. Option 1 relies only on the private sector, whereas the public and private sectors share risk in the Option 2. The public sector takes the lead in Options 3 and 4. In Option 3, a public insurance program is set up at the state or federal level. In Option 4, local communities come together to pool risk. All four approaches work more effectively with improved mapping and models of landslide risk. In the following sections, we briefly describe each program, provide precedents in other settings, and identify advantages and disadvantages.\(^{19}\)

#### Option 1: Require Private Insurers to Offer Coverage

In this option, the director of the Alaska Insurance Division requires insurers selling homeowners insurance in Alaska to offer landslide insurance coverage in conjunction with their homeowners policies (see the Option 1 text box). Such has been the case in California for earthquake coverage since the 1980s.\(^{20}\) Insurers could be required to offer coverage up to the same limits as for the underlying homeowners policy or to lower limits for some components of the coverage.\(^{21}\) Insurers would set the premium for cov-
Option 1: Require Private Insurers to Offer Coverage

Overview: The Alaska insurance director requires insurers selling homeowners policies to offer landslide coverage. Homeowners could decline the coverage if they so choose.

Example: California earthquake coverage since the 1980s

CPC: The CPC is the responsibility of homeowners insurers.

Advantages
- This option does not require setting up a public insurance program.
- This option could encourage the development of landslide models.
- Insurers set rates to reflect differences in landslide risk across locations.
- Homeowners could obtain landslide coverage from the same insurer providing their homeowners coverage.

Disadvantages
- This option does not solve the challenges that insurers face in bearing risk.
- Insurers might decline to write homeowners coverage in certain areas or decide to withdraw from the state.
- High landslide premiums might result in low take-up.
- This option could result in a need to set up a residual market.

Although attractive in its simplicity, Option 1 has several disadvantages. First, it does not address the challenges that insurers face in providing landslide coverage. The type of models on which insurers rely for other catastrophic risks are not yet available and the limited size of the market might not justify their development. Losses remain potentially large and correlated, and the reinsurance critical to many insurers might not be available.

Second, it might not result in high take-up of landslide insurance and could reduce the availability of homeowners insurance. Given the challenges to providing coverage, insurers might not be willing to offer landslide coverage at any price that they could expect the Alaska Division of Insurance to approve. In that case, they might decline to offer homeowners coverage in certain areas. Such was the case in California following the 1994 Northridge earth-
quake when many insurers limited the number of homeowners policies they wrote. The lack of coverage could create pressure to establish a residual market for homeowners in Alaska who are unable to find coverage. Such markets often fund shortfalls in premium net of claim payments by assessing insurers in the state. The prospect of large assessments could then encourage some insurers to withdraw from the state altogether. If insurers do want to build a substantial buffer into prices to account for the uncertainties regarding landslide risk, take-up might be limited, restricting insurer ability to spread risk across a substantial number of properties.

Option 2: Public-Private Risk Sharing

This option addresses challenges on the supply side of the market by setting up a mechanism in which the state or federal government shares the risk of providing landslide coverage (see the Option 2 text box). In this approach, the federal or state program reimburses private insurers for claim payments that exceed a certain level. In return, insurers are required to offer landslide coverage to homeowners. As in Option 1, premiums would be set by insurers, but the backstop provided by the federal or state program would likely allow lower rates than in Option 1.

The federal Terrorism Risk Insurance Program provides an example of this approach. Private insurers are responsible for losses due to terrorism incidents on commercial properties up to a specified level, and the federal government reimburses insurers for a substantial percent-

| Overview: | State or federal government shares the risk and reimburses private insurers once claims exceed a certain level. In return, insurers must offer landslide coverage to homeowners. Insurers set homeowner premiums, and the government sets the rates that insurers must pay to transfer risk to the government. |
|---------------------------------------------------------------|
| Examples: | Federal Terrorism Risk Insurance Program Florida Hurricane Catastrophe Fund |
| CPC: | Insurers establish CPC to cover their part of the risk. The government provides CPC for its portion of the risk. |
| **Advantages** | **Disadvantages** |
| This option limits the risk to insurers, increasing their willingness to write landslide coverage. | There might be political pressure to subsidize rates. |
| This option takes advantage of the private-sector incentives to efficiently write policies and adjust claims. | The mechanism for recovering government outlays might result in lower-risk properties subsidizing higher-risk properties. |
| This option takes advantage of the wide variety of options for securing CPC that are available to the public sector. | Insurers can avoid providing landslide coverage by declining to insure the property at all or by charging a high price. |
age of losses above that level. Insurers pay nothing for what amounts to free reinsurance, but government outlays can be recovered to some extent by assessments on insurers following an incident. The Florida Hurricane Catastrophe Fund (FHCF) provides an example at the state level. The FHCF is a tax-exempt state trust fund that reimburses residential property insurers for a portion of their hurricane-related losses in Florida. Insurers purchase coverage from the FHCF at a price based on the percentage of claims that will be reimbursed and the location and other characteristics of the properties insured. Flood Re in the United Kingdom provides a foreign example. Insurers place residential insurance policies at high risk of flooding into a nonprofit pool set up by UK home insurers. The pool is funded by premiums collected from policyholders and assessments on UK home insurers. To keep premiums affordable, premiums are set below the market rate for flood insurance. The program is set to sunset in 2039, allowing homeowners in high-risk areas to put in place mitigation measures that will enable the property to be insurable in the private market at reasonable rates after Flood Re ends.

There are several advantages to this approach. This approach fills the important gap left by a very limited, or missing, market for landslide reinsurance. The risk to insurers of writing landslide coverage would be reduced, reducing their need for CPC and increasing their willingness to write coverage. The approach takes advantage of strengths of the public and private sectors. Such private-sector involvement could familiarize insurers with landslide risk and potentially increase private-sector interest in bearing risk. This approach also takes advantage of the wide variety of options available to the public sector for securing CPC—including general tax revenue, bonds, and postevent assessments.

This approach helps solve the insurability problem but, to function effectively, could require that the public sector bear a substantial portion of the risk because of limited private-sector interest in this market. To work well, it still requires more-comprehensive landslide maps and models for Alaska than are currently available. There can also be political pressure to subsidize the rates charged insurers for this publicly provided reinsurance, which can result in adequate incentives to avoid or mitigate risk as well as program deficits. In addition, the mechanisms used to fund government shortfalls can also result in cross-subsidies between lower- and higher-risk properties. For example, deficits covered by general tax revenues would raise funds from a broad range of residents in the state, even those facing little or no landslide risk. Finally, as in Option 1, insurers can avoid providing landslide coverage in this scenario by either declining to insure a property or by charging a price at which there is little demand.

**Option 3: State or Federal Landslide Insurance Program**

In contrast to the risk-sharing approach in Option 2, all risk is borne by the public sector in Option 3 (see the Option 3 text box). The government establishes a program that offers residential landslide coverage in designated areas, and the coverage need not be tied to an underlying homeowners policy. The public program collects the premium (less any compensation to private insurers for administering the program) and pays the claims. Private insurers might administer the program by placing and
Option 3: State or Federal Landslide Insurance Program

| Overview: | The state or federal government makes coverage available in designated areas. |
| Examples: | National Flood Insurance Program  
California Earthquake Authority |
| CPC: | CPC is generated from premiums, bonds, reinsurance, or postincident assessments on insurers, policyholders, or taxpayers. |

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this option, all homeowners are offered landslide coverage.</td>
<td>There might be political pressure to keep rates low.</td>
</tr>
<tr>
<td>There is no need to recover a profit.</td>
<td>Assessments can create cross-subsidies.</td>
</tr>
<tr>
<td>There might not be a need to buy large amounts of or pay high prices for reinsurance.</td>
<td>Assessments can discourage insurers from writing in the state.</td>
</tr>
<tr>
<td>This option might hinder profit-seeking firms from innovating and increasing efficiency.</td>
<td></td>
</tr>
</tbody>
</table>

Servicing policies and adjusting claims in return for a servicing fee. CPC can be built up through premiums, bonds, reinsurance, or postincident assessments on policyholders, insurers, or taxpayers.

The NFIP is an archetypal example of this approach. The NFIP was established in 1968 in response to the rising federal assistance after major floods and a lack of interest by the private sector in writing flood coverage. The federal government bears the risk, but the program is administered by private insurers who sell policies and adjust claims. Similarly, the CEA offers earthquake authority to homeowners and renters in California. The CEA was established to provide insurers with a mechanism to satisfy their obligation to offer earthquake coverage to their policyholders. There are also numerous state programs that bear risk for wind losses—examples include Florida’s Citizens Property Insurance Association and the Texas Windstorm Insurance Association. A federal program for landslide risk could in principle spread landslide risk across the United States, whereas a state program would be limited to risks in Alaska.

A potential advantage of this approach is that the public sector might offer coverage at a lower cost than the private sector. Even if premiums are based on expected annual loss, a public program might be able to charge less because it does not need to recover a profit. Also, depending on its options for financing claim payments that exceed revenues, the public program might not have to buy reinsurance that is in short supply or very expensive. Another advantage of this approach is that it does not rely on the willingness of private insurers to offer coverage; rather, the public program would make coverage available to all homeowners.
On the downside, this option puts the burden on the public sector to design and implement an insurance program. It must develop policy language and set rates—areas in which it might not have a great deal of expertise. It also might not be able to harness the drive of profit-seeking entities to increase efficiency and innovate, although it could perhaps encourage efficiency by competitively bidding contracts to sell, service, and adjust claims.

A significant concern about this approach is political pressure to keep premiums artificially low. The NFIP is a high-profile example of this downside with tens of billions of dollars in program debt forgiven by federal taxpayers over its history. As in Option 2, recovering program deficits from general tax revenue can result low-risk areas subsidizing high-risk areas. Recovering debt by assessing insurers operating in the state might encourage insurers to leave. Less than actuarial rates can reduce incentives for builders and households to avoid areas at high landslide risk. The NFIP addresses this concern in part by requiring communities where flood insurance is offered to enforce minimum land-use regulations and buildings codes. Similar provisions might be appropriate for a state or federal landslide insurance program.

Option 4: Community Joint Insurance Authority

Like Option 3, this option relies on the public sector, but this time, the community is the prime mover (see the Option 4 text box). Multiple municipalities in Southeast Alaska, and perhaps in other parts of Alaska, would come together and establish a joint insurance authority. The

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### Option 4: Community Joint Insurance Authority

**Overview:** The joint insurance authority offers landslide coverage to homeowners in member communities. Homeowners pay for policies via contribution to the authority or property taxes. The authority hires adjusters and pays claims.

**Example:** Alaska Municipal League Joint Insurance Authority

**CPC:** Several mechanisms are available, such as bonds issued by the community, policyholder assessments, or prorated claim payments.

**Advantages**
- This is a local solution.
- There is flexibility in program design.
- Member communities own any surplus that is generated.
- Communities can take advantage of taxing authority to build CPC.

**Disadvantages**
- There is a considerable administrative burden.
- There might be political pressure to subsidize rates.
- There might be less geographic diversification than in state or federal solutions.
- Communities do not have the financial resources that are available at the state level.
authority would offer landslide coverage to the homeowners in each of the participating communities.\textsuperscript{30} Premiums (referred to as \textit{contributions to the pool}) would be pooled and claims paid by the authority. Multiple communities would need to participate in the pool to diversify risk, and the authority would be governed by designees from the participating communities.

CPC could be built in several ways. Contributions net of losses would contribute to CPC, and the authority could issue bonds backed by property taxes in the participating communities. The authority could also assess policyholders or perhaps all homeowners in participating communities if funds are needed to pay claims postevent. In principle, the authority could purchase reinsurance, although only a limited amount of reinsurance is likely to be available. The authority could also consider prorating claim payments if funds run out.

The authority would have flexibility in designing the insurance program. For example, coverage might be mandatory with premiums collected through property taxes to avoid the problems associated with low take-up. Coverage might start with a mini-policy that provides lower limits and higher deductibles than in a typical homeowners policy and then be expanded as the program gains experience and builds CPC. The authority might also attempt to differentiate contributions by risk, mapping participating communities into low-, medium-, and high-risk areas; however, creating such maps would undoubtedly be challenging and contentious.

Many municipalities have already established pools to obtain more-favorable rates than are available in the private sector or to provide difficult-to-obtain coverages. For example, the Alaska Municipal League Joint Insurance Authority (AMLJIA) is a self-insurance pool owned by member cities, boroughs, and school districts. Participating entities pay contributions to the pool, receive coverage, and make claims. A wide variety of coverages are available from the pool, including property, earthquake, flood, and general liability. The AMLJIA is not formally an insurance company or subject to the same regulations as typical insurers. Representatives of pool members sit on the governing board and have control of the authority’s operations.\textsuperscript{31} The joint insurance authority envisioned in this option differs from the AMLJIA in an important way. In this option, the members of the joint insurance authority are the municipalities or boroughs, but the entities covered for landslide risk are property owners in the communities who chose to participate (or who are required to participate). In contrast, the municipalities, boroughs, and schools that are members of the AMLJIA are the ones receiving coverage.

An attractive feature of this option is that it does not rely on the actions of state or federal government. The communities affected by landslide risk would take the lead in implementing this option. The flexibility that the communities have in structuring the program is also attractive. The authority would own any surplus that was generated through its operations and could take advantage of the taxing authority of member communities to back bonds or cover deficits.

This option does come with a significant administrative burden. The authority needs to write policy forms, establish rates, obtain start-up capital, and pay claims. Rates that vary by risk level would require mapping, a time-consuming and expensive process, and to be fair, the mapping would need to be consistent across member communities.
communities. One possibility that might be considered to reduce the administrative burden is to explore whether an existing pool, such as the AMLJIA, would be willing to add residential landslide risk to its current coverage options.

As in Options 2 and 3, there might be political pressure to subsidize rates or to err on the low side in developing rates; however, the authority’s ultimate responsibility to cover its costs might mute any such tendency. Although a community joint insurance authority might attract a good number of member communities, it will not have the financial resources available on the state or federal level and could well be of limited geographic scope. This would limit its ability to diversify risk over space and make financially sustainability more difficult.

**Conclusion**

Although landslide insurance does not directly reduce the likelihood or the physical consequences of landslides in Sitka and other parts of Southeast Alaska, it can increase the financial resilience of individuals and communities. It seems unlikely that private insurers will be interested in writing residential landslide coverage for the foreseeable future.

We have developed four general approaches for making coverage available. The brief description of each approach and discussion of its main advantages and disadvantages will hopefully allow those communities and homeowners subject to landslide risk and other stakeholders to decide which approaches are most feasible and attractive. Those that are selected can then be more fully developed. All the approaches we have developed work more effectively with better mapping and modeling of landslide risk, pointing to the importance of efforts to develop these models and the incentives created by each option to do so. In addition, the approaches all focus primarily on the supply side of the market—that is, making coverage available at prices that reflect our understanding of the risk. As we have shown, the cost of full coverage will likely be considerable in some areas. In developing programs to improve the availability of coverage, it will also be important to consider the demand side of the market—a well-designed program that improves the availability of coverage will not be a success if take-up is very low.
Waldholz and Woolsey, “Sitka Building Official, Two Construction Workers, Missing in Sitka Slide”; Haugland and Hesse, “One Year Later, Sitka Remembers Lives Lost in Landslide.” The damage from the slide was not of sufficient magnitude to trigger a disaster declaration by the President of the United States or the release of federal funds associated with such declarations.

The U.S. Forest Service maintains a database of the large number of landslides that have occurred in Southeast Alaska. See U.S. Forest Service, “Tongass National Forest Landslide Areas.”

Stakeholder interviews with the authors, January–October, 2021.

The efficient proximate cause doctrine can result in coverage for landslide losses even when the policy does not provide landslide coverage. For example, losses due to an earthquake-caused landslide might be covered if the homeowner purchased earthquake coverage. The NFIP provides coverage for mudflows and land movement with sufficiently high water content. Therefore, homeowners that have purchased flood coverage from the NFIP might be covered. Also, damage due to fire or explosion caused by a landslide will typically be covered by the standard homeowners policy even if landslide coverage has not been purchased.

Although not a focus of our investigation, we were told that landslide coverage is more available for commercial and public buildings. This is due in part because these structures tend to be in flatter, less risky areas. In addition, these types of policyholders might have multiple buildings spread across a wide area, which allows for a better spread of risk.

Underwriting guidelines specify types of properties that will be eligible for coverage, including their location, construction type, local geography, and other factors.

See U.S. Geological Survey, U.S. Landslide Inventory, for a searchable inventory of U.S. landslides. Areas other than Southeast Alaska with substantial landslide activity include the coastal areas of California, Oregon, and Washington and areas in the Appalachian Mountains.

Alaska Department of Labor and Workforce Development, 2021 Population Estimates by Borough, Census Area, and Economic Region.

Low take-up can lead to a situation in which only households at highest risk purchase coverage. Such adverse selection is also not desirable for insurers.

FEMA, “Notice of Maximum Amount of Assistance Under the Individuals and Households Program.” Additional assistance could potentially be delivered through the Community Development Block Grant for Disaster Recovery (CDBG-DR) administered by the Department of Housing and Urban Development, but these programs must be approved by Congress and can take a months or years to implement. FEMA and CDBG-DR funding is typically available only for federally declared emergencies and major disasters, and the limited number of homes affected by a landslide in Southeast Alaska might not meet these thresholds.

Wharton Risk Management and Decision Processes Center, Managing Large-Scale Risks in a New Era of Catastrophes.

Homeowners in Special Flood Hazard Areas (areas with at least a 1 percent annual chance of flooding) are required to purchase flood insurance if their purchase is financed by a federally regulated lender. A high percentage of home loans are from federally regulated lenders. FEMA found that homes without mortgages in Special Flood Hazard Area have a take-up rate of 28 percent. FEMA, An Affordability Framework for the National Flood Insurance Program, p. 14.

In the flood context, see, for example, Dixon et al., The National Flood Insurance Program's Market Penetration Rate: Estimates and Policy Implications, p. 44.

The ordinance defined restricted landslide areas as areas identified as a “moderate or high-risk zone in any city geotechnical risk mapping commissioned and received by the city” or “properties damaged by previous landslides or within one hundred fifty feet of locations damaged by previous landslides.” City of Sitka Municipal Code, Section 20.01. There were two areas of Sitka that met these criteria—accounting for roughly 25 percent of the homes in the city.

Banks might also be willing to forego insurance on loans that they are able to sell to the Alaska Housing Finance Corporation (AHFC). AHFC can purchase a loan only if the borrower meets strict low-income criteria. AHFC does not evaluate landslide risk when deciding whether to purchase loans.

City and Borough of Sitka, An Ordinance of the City and Borough of Sitka Amending Title 20 “Environmentally Critical Areas” of the Sitka General Code by Repealing Chapter 20.01 “Landslide Area Management” (ORD 21-23).

The California statute establishing the CEA requires that building coverage equal that of the underlying homeowners policy, but policies are required to offer only $5,000 in personal property coverage, $1,500 in additional living expenses, and perhaps most significantly, a
15 percent deductible. Coverage of breakables or masonry veneer is not required.

18 For an overview of different approaches to developing CPC that have been employed in state catastrophic risk programs see Kousky, “Managing Natural Catastrophe Risk.”

19 Parametric insurance products are increasingly being discussed and have started to be used in various settings. Payments are contingent on a trigger as opposed to documented damage to a structure. In this case, the payments could be triggered by a landslide of a specified magnitude in a populated area. Such products might make sense for a government entity that needs resources to address the incident. However, payments to individual property owners would likely be limited and targeted at such needs as temporary housing assistance rather than replacing damaged property. Our focus in this Perspective is insurance for structure repair and replacement, and thus we do not examine options based on parametric approaches.

20 CEA, “History of the California Earthquake Authority (CEA).”

21 Such a mini-policy is allowed under California law for earthquake coverage.

22 This response was likely driven in part by an insurance regulatory environment in California that restricted freedom to set prices for earthquake coverage; consequently, it might not be relevant to Alaska.

23 Residual markets provide coverage to households that are not able to obtain coverage from the admitted insurers in the state. In some program designs, these properties are distributed across the admitted insurers, and the insurers are required to write coverage on the properties that they have been assigned. The premiums and losses on properties in the residual market are then shared by insurers. Alaska currently has a residual market for workers compensation insurance but not for the homeowners markets. See Hartwig and Wilkinson, Residual Market Property Plans: From Markets of Last Resort to Markets of First Choice.


25 Florida State Board of Administration, “Florida Hurricane Catastrophe Fund.”

26 Florida State Board of Administration, “Florida Hurricane Catastrophe Fund 2022 Rates.”

27 Association of British Insurers, “Flood Re Explained.”

28 The CEA does not offer stand-alone polices. CEA, “How to Buy a Residential Earthquake Insurance Policy.”

29 Kousky, “Managing Natural Catastrophe Risk.”

30 This option is similar to the community captive model described in Bernhardt et al., Community-Based Catastrophic Insurance.

31 AMLJIA, “What Is the AMLJIA?”
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AMLJIA—See Alaska Municipal League Joint Insurance Authority.

Association of British Insurers, “Flood Re Explained,” webpage, undated. As of February 16, 2023:


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CEA—See California Earthquake Authority.

City and Borough of Sitka, An Ordinance of the City and Borough of Sitka Amending Title 20 “Environmentally Critical Areas” of the Sitka General Code by Repealing Chapter 20.01 “Landslide Area Management,” ORD 21-23, October 2022.

City of Sitka Municipal Code, Section 20.01, Landslide Area Management, June 27, 2017.

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FEMA—See Federal Emergency Management Agency.


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About This Perspective

Landslides pose a serious risk to lives and property in Sitka and other parts of Southeast Alaska. Although landslide insurance does not directly reduce this risk, it can increase the financial resilience of individuals and communities. Following a devastating landslide that struck Sitka in 2015, what little coverage was available for residential properties prior to the slide disappeared. In this Perspective, we characterize the market for landslide insurance prior to and following the 2015 slide and conclude that it is highly unlikely that the private sector will be interested in providing landslide coverage in Sitka for the foreseeable future. We then turn our attention to programs that might be set up to improve the availability of coverage. We first describe the components of such programs and then describe four approaches that stakeholders might consider to make landslide coverage more available. Our findings are based on review of relevant literature and detailed interviews with 24 knowledgeable stakeholder groups.

Community Health and Environmental Policy Program

RAND Social and Economic Well-Being is a division of the RAND Corporation that seeks to actively improve the health and social and economic well-being of populations and communities throughout the world. This research was conducted in the Community Health and Environmental Policy Program within RAND Social and Economic Well-Being. The program focuses on such topics as infrastructure, science and technology, industrial policy, community design, community health promotion, migration and population dynamics, transportation, energy, and climate and the environment, as well as other policy concerns that are influenced by the natural and built environment, technology, and community organizations and institutions that affect well-being. For more information, email chep@rand.org.

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