Equity Risk, Conversion Risk, and the Demand for Insurance

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1 Introduction

When property is destroyed it is typically not replaced by a replica of itself but by something different – something more up-to-date, more efficient, or more suitable. This general observation applies with greatest force when the destruction is the result of a disaster and conversion extends over the whole vicinity. For instance, each of the disastrous fires and earthquakes in San Francisco led to a significant rearrangement of business and residential districts. The area of the Oakland fire has been rebuilt in far grander residential structures than the ones destroyed. In some of the areas stricken by the Northridge earthquake, new building is already being remarked as an improvement on what was lost. Such examples show the prevalence of conversion over replacement. The facts of disaster and rebuilding are familiar, and efforts are underway to accommodate them in the theory of demand for insurance.

A previous paper (Garratt and Marshall, 1996) addresses some of the issues in an environment in which the values of property and of conversions are deterministic. This paper, in contrast, explores the additional issues raised by risks of change in the economic environment, briefly, externality risks. Disaster is one source of externality risk. After disaster, the neighborhood rebuilds. If it becomes a retail furniture district, the value of apartments is compromised. If it gentrifies, converting a property to low-income housing is unwise. If it is taken for a stadium, a parking lot may become the best land use.

Externality risk has sources other than disaster. In the normal course of events, a neighborhood may upgrade, deteriorate, or simply change, altering the surroundings of an insured structure and thus the values attached to the current structures and to ones that might replace them. Moreover, values can fluctuate as the result of economy-wide variations, creating risk that is analytically like externality risk and, for purposes of this paper, lumped together with it. The obvious part of the risk is a change in the values of the existing property. The hidden risk is in the values of possible conversions. These possibilities are encompassed formally in the derivations, but the discussion focuses on externalities from disaster and rebuilding.

In case of disaster, neighborhood conversion can help or hurt the individual landowner, depending on circumstances. Predominantly, it helps. The reason is a reduction in constraints. When only a single property is converted, choice is constrained by the age and character of the existing neighborhood. That constraint vanishes when all properties are converted together, and owners can attain higher values. Certainly failures of coordination and costs of bargaining may also affect conversion, but in most cases the reduction of constraints leads to conversions that soften the impact of disaster losses.

Externality risk has two dimensions: equity risk and conversion risk. Equity risk is variability in the value of the currently existing property. Property values vary
continually and are a greater source of risk to most property owners than are the risks that are covered by conventional insurance. Demand for insurance is obviously dependent upon property values, but in ways that require some analysis. The further factor of risk in property values should also have an effect on insurance demand.

Conversion risk is uncertainty about the value of the alternatives that will replace the current structure if it is badly damaged. While equity risk is continually and obviously present, conversion risk is hidden until a loss occurs. Although the owner of a property always has opportunities to convert the currently existing structures to more valuable ones, she does not do so because the cost is too great. The risk inherent in the values of these potential conversions is hidden as long as the structure is undamaged or damaged not too seriously. When damage occurs at a critical level, the owner exercises the best conversion option and replaces the old structure by a different one. Damage beyond the critical level is then irrelevant because the same conversion occurs. Thus the critical level of damage puts a floor under the possible loss of wealth. Clearly the height of the floor influences the demand for insurance.

2 Upper limits and conversion

Among existing models of insurance, one seems well suited to study externality risks. It has two characteristics: The insurance contract is written in terms of the damage and the choice variable for the consumer is the upper limit on the amount of damage insured. As in other models, insurance is demanded for the purpose of limiting variations in the consumer’s wealth. The difference is that variations in wealth are connected more explicitly to the properties of the things insured and to the opportunities that the clients have in case of loss. Otherwise, the model inherits the insights from studies that focus directly on wealth variations.

Because damage is insured, its definition is important. Damage from an event is the cost to restore the property to its pre-event condition. The definition must be interpreted carefully because of the difficulty in restoring property without simultaneously renewing or improving it. Restoration with new materials and fresh paint is normally cheaper than restoration with used materials and weathered paint, if the latter restoration were even possible. Therefore, in many practical circumstances, damage is understood as the least cost to return the property to a state no worse than its pre-damage state. In other cases, damage is interpreted strictly, as when insurers refuse to bear costs of complying with current building and zoning codes when the damaged property met older, less onerous ones. The problem of how to make the contract really pay for damage, and not for something else, is inherent in the idea of property insurance. A contract in damage as defined here is the ideal that actual contracts resemble more or less closely.
Notation is needed. Look at the situation that exists when an event has caused damage. The realization of the random variable for damage is \( t \). The property in undamaged condition would have a value of \( v \), which is also the realization of a random variable. When the owner of damaged property restores it, he attains wealth \( v - t \). On the other hand, there is some best option for converting the property. The conversion chosen by the property owner is the one that maximizes net value. Let the value of the land and improvements in the highest valued use be \( v^* \), and let the cost of building the best improvements be \( c \). Among the conversion options, the greatest attainable net value is \( v^* - c \), which is also the value of the land. The decision to restore or convert is the decision to select the greater of \( v - t \) and \( v^* - c \). At the critical level of damage, \( q = v - (v^* - c) \), the options are equally valuable. After some rewriting, the option to convert becomes the option to possess \( \max[v - t, v - q] \) or, equivalently, \( v - \min[t, q] \). Thus, \( v - q \) is a floor beneath which wealth cannot fall, no matter the extent of damage. The second expression is convenient and equally intuitive. It says that the loss of wealth is no more than \( q \).

In choosing an insurance contract, the consumer selects the upper limit, which is denoted by \( b \) and thought of as “bound.” There is no coinsurance or deductible. Under these conditions, the insurance payment is \( \min[b, t] \), and its expected value is the fair premium \( P(b) \). Combining the pre-insurance wealth with the insurance variables, insured wealth is the random variable

\[
v - \min[q, t] + \min[b, t] - P(b).
\] (1)

The expression is unfamiliar, perhaps, but it depicts accurately the roles of the upper limit and the option to convert.

**Expected utility.** The consumer of insurance is a risk averse maximizer of expected utility with utility function \( u \). Some results depend on the assumptions that absolute risk aversion and absolute prudence are decreasing in wealth. The goal is to choose \( b \) to maximize

\[
Eu(v - \min[q, t] + \min[b, t] - P(b))
\] (2)

The function being optimized has some unusual features. The presence of the convex function \(-P(b)\) in the objective suggests that the objective might not be globally concave in \( b \), and that is in fact correct. Lack of global concavity is characteristic of insurance having upper limits. The prevalence of upper limits in real contracts suggests that markets are unconcerned about non-concavity and that insurance theory should deal with it. Therefore, some further discussion is given here.
2.1 Characteristics of upper-limit style insurance

The insurable variable $t$ has a probability density function $h(t)$. The premium paid for the insurance is fair and is given by

$$P(b) = \int_{0}^{b} t h(t) dt + b \int_{b}^{\infty} h(t) dt$$

and from that its derivative is

$$P'(b) = \int_{b}^{\infty} h(t) dt$$

If there is loading, it is represented by the parameter $\lambda \geq 0$ and the whole premium paid is $(1 + \lambda)P(b)$. The conditional wealth is then

$$v - \min[q, t] + \min[b, t] - (1 + \lambda)P(b)$$

The interesting case is that of a contract with a single upper bound that applies regardless of the realization of $v$ and $q$. The unconditional probability density of damage is $h(t)$, the conditional probability density of $v$ and $q$ is $g(v, q|t)$, and the density of $v, q$ and $t$ is $g(v, q|t)h(t)$. The support of $g$ is $[v_0, v_1] \times [q_0, q_1]$. The goal of the consumer is to choose $b$ to maximize the objective

$$T(\lambda, b) = \int_{t=0}^{\infty} \left[ \int_{v=v_0}^{v_1} \int_{q=q_0}^{q_1} u(v - \min[t, q] + \min[b, t] - (1 + \lambda)P(b))g(v, q|t)vdq \right] h(t)dt$$

The idea behind the maximization is this: An increase in $b$ has differential effects. For $t \leq b$ it lowers wealth uniformly in all states by increasing the premium. For $t > b$ it raises wealth uniformly in all states by raising indemnity more than the premium. In the case of fair pricing, raising $b$ is beneficial if the marginal utility in the wealth-receiving states is above that in the wealth-losing states. If premia are loaded, the relation is altered to include a factor dependent on loading. Thus it is sensible to look at the conditional marginal utility of wealth in these two events, $[0, b)$ and $[b, \infty)$. Let the conditional expectations of marginal utility of wealth be denoted

$$E[u'\cdot|t \leq b] = \int_{t=0}^{b} \int_{v=v_0}^{v_1} \int_{q=q_0}^{q_1} u'(v - \min[t, q] + \min[b, t] - (1 + \lambda)P(b))g(v, q|t)vdq \left[ \frac{h(t)}{\int_{0}^{b} h(t')dt'} \right] dt$$

(7)
and

$$ E[u'(\cdot)|t > b] = $$

$$ \left[ \int_{t=b}^{\infty} \int_{v=0}^{q_1} \int_{q=0}^{q_1} u'(v - \min[t, q] + \min[b, t] - (1 + \lambda)P(b))g(v, q|t)dv dq \right] \frac{h(t)}{\int_{0}^{\infty} h(t')dt'} dt $$

(8)

**Lemma 1** Let $E[u'(\cdot)|t \leq b]$ and $E[u'(\cdot)|t > b]$ be the conditional expectations of marginal utility of wealth in the intervals $[0, b]$ and $[b, \infty]$, respectively. Let $T(\lambda, b)$ be expected utility and assume that $\int_{b}^{\infty} h(t)dt < 1/(1 + \lambda)$. Then

$$ \text{sign}[T_b(\lambda, b)] = \text{sign}[E[u'(\cdot)|t > b] - \left(1 + \frac{\lambda}{1 - (1 + \lambda)P'(b)}\right)E[u'(\cdot)|t \leq b]] $$

(9)

The condition $\int_{b}^{\infty} h(t)dt < 1/(1 + \lambda)$ requires that the upper limit $b$ should not be too close to zero. Behavior of $T(\lambda, b)$ at low $b$ is discussed below.

**Proof.** The derivative is

$$ T_b(\lambda, b) = P'(b) \cdot $$

$$ \left[ \int_{t=b}^{\infty} \int_{v=0}^{q_1} \int_{q=0}^{q_1} u'(v - \min[t, q] + \min[b, t] - (1 + \lambda)P(b))g(v, q|t)dv dq \right] \frac{h(t)}{P'(b)} dt $$

$$ - (1 + \lambda) \int_{t=0}^{\infty} \int_{v=0}^{q_1} \int_{q=0}^{q_1} u'(v - \min[t, q] + \min[b, t] - (1 + \lambda)P(b))g(v, q|t)dv dq h(t)dt $$

$$ = P'(b) \left[ (1 - P'(b))(1 + \lambda)E[u'(\cdot)|t \leq b] - (1 + \lambda)P'(b)E[u'(\cdot)|t > b] \right] $$

(10)

Factor in a convenient way to yield,

$$ T_b(\lambda, b) = P'(b)(1 - (1 + \lambda)P'(b)) \cdot $$

$$ \left[ E[u'(\cdot)|t > b] - \left(1 + \frac{\lambda}{1 - (1 + \lambda)P'(b)}\right)E[u'(\cdot)|t \leq b] \right] $$

(11)

Under the hypothesis that, given the loading $\lambda$, $b$ is not too near to zero, the first two terms are always positive, implying that the sign of the derivative is that of the term in square brackets. ■
In fair pricing, $\lambda = 0$, and the sign of the objective $T(0, b)$ is the same as the sign of
\[ E[u'(\cdot)|t > b] - E[u'(\cdot)|t \leq b]. \] (12)
The condition is interpreted as saying that expected utility is rising as the limit increases when the expected marginal utility in the states above the limit is the greater than the expected marginal utility in those below it. At an optimum, the expression must be zero, and away from an optimum, it is an indicator of the slope of the objective.

As an application, consider the case of fair pricing and no externality risk, that is, $\lambda = 0$, $q = \overline{q}$ and $v = \overline{v}$. Expected utility is
\[ T(0, b) = \int_{t=0}^{\infty} u(\overline{v} - \min[\overline{q}, t] + \min[b, t] - P(b))h(t)dt \] (13)
Because the premium is fair, choice of $b$ does not change expected wealth, and that can be confirmed by integrating $\overline{v} - \min[\overline{q}, t] + \min[b, t] - P(b)$ over $h(t)$.

At the point $b = \overline{q}$, the consumer is fully insured. There are two ways of seeing that it is the optimum. First, from numerous studies, the full-insurance point is known to be the maximum of utility available at fair premiums when the consumer is free to insure in markets for contingent claims to each state of nature individually. The full-insurance point is, a fortiori, the maximum under the upper-limit style of insurance, which allows much less freedom of choice.

Second, the lemma supplies an alternative, self-contained proof. Look at any value of $b \in (0, \overline{q})$. Wealth has a profile like that of the decreasing function in Figure 1. Wealth is constant at $v - P(b)$ on the interval $t \in [0, b]$, it falls at a 45 degree angle on $t \in (b, \overline{q})$, and it is again flat on $t \in [\overline{q}, \infty)$.

Since marginal utility falls as wealth rises, the profile of marginal utility is a mirror image, high for high values of damage and low for low values of damage, with a monotone (but not linear) segment connecting the two plateaus. Splitting the graph at $t = b$, clearly all marginal utilities to the right of $b$ are higher than all marginal utilities to the left. Taking conditional expectations, expected marginal utility is greater on the right. From the lemma, the objective is increasing in this range.

Turning to the domain $b \in (\overline{q}, \infty)$, wealth has a profile like that of the increasing function in Figure 1 and through arguments like those above, expected marginal utility on the left is greater than on the right. In this domain, the objective is decreasing. Clearly $b = \overline{q}$ must be the optimum.

Expected utility has another critical point at $b = 0$. From equation (4), $P'(0) = 1$, and hence from equation (11) it follows that
\[ T_b(0, 0) = 0 \] (14)
Figure 1: Insured wealth with two upper limits.

The critical point at \( b = 0 \) is a minimum. As such, it is a point of convexity and demonstrates that the expected utility function is not globally concave in \( b \). It is, however, strictly quasi-concave on \((0, \infty)\).\(^1\)

**Loading** As a second application of the lemma in the absence of externality risk, consider the case of a loaded premium. To avoid trivial cases, assume that

\[
P'(\overline{q}) < \frac{1}{(1 + \lambda)}
\]

From equation (4) this is a requirement that the \( \overline{q} \) is not too close to zero. Substituting \( \overline{q} \) in the optimality condition for loaded premiums yields

\[
sign[T_b(\lambda, \overline{q})] = \text{sign} \left[ E[u'(\cdot)|t > \overline{q}] - \left(1 + \frac{\lambda}{1 - (1 + \lambda)P'(\overline{q})}\right)E[u'(\cdot)|t \leq \overline{q}]\right]
\]

At the point \( b = \overline{q} \), the observations in the previous section assure that,

\[
E[u'(\cdot)|t > \overline{q}] = E[u'(\cdot)|t \leq \overline{q}].
\]

\(^1\)A function \( f(b) \) is strictly quasi-concave if for any \( b_1 \) and \( b_2 \neq b_1 \) in the domain of the function, and for any \( \alpha \in [0, 1] \),

\[
f(\alpha b_1 + (1 - \alpha)b_2) > \min[f(b_1), f(b_2)]
\]

Given differentiability, strict quasi-concavity on an open interval \((0, \infty)\) will imply that the maximum of \( f(b) \) is unique and occurs where \( f'(b) = 0 \).
Hence, it follows that $T_b(\lambda, \overline{\sigma}) < 0$, which means that at loaded premia, the maximum is somewhere to the left, at a value $b < \overline{\sigma}$. Therefore optimum upper-limit insurance is less than full, as expected. A fully optimum insurance contract for this case would have a deductible (Raviv 1979), after which insurance would be full up to $\overline{\sigma}$, a reduction of coverage in the low end of the loss spectrum. When a deductible is not available, the consumer instead reduces coverage at the high end.

A perhaps surprising fact is that when the upper limit is near zero, the marginal value of raising it is negative. At $b = 0$, using equation (11),

$$T_b(\lambda, 0) = -\lambda E[u'(\cdot)|t > 0] < 0,$$

so the objective is falling in the vicinity of $b = 0$. At such low values of the upper limit, additional insurance does more harm by raising premiums than it does good by reducing risk.

2.1.1 A comparison model of insurance

In some other insurance models, the objective is globally concave. For instance, consider the copayment style of insurance. In that type of insurance, a fairly priced contract has no upper limit and pays $\phi t$ when damage is $t$. The choice variable for the consumer is $\phi$. Define expected loss as

$$Et = \int_{t=0}^{\infty} th(t)dt$$

The fair premium is $\phi Et$, a linear function of $\phi$, and the consumer maximizes

$$K(\phi) = \int_{t=0}^{\infty} u(\overline{\sigma} - t + \phi t - \phi Et)h(t)dt$$

(19)

One readily computes that

$$K'(\phi) = \int_{t=0}^{\infty} (t - Et)u'(\overline{\sigma} - t + \phi t - \phi Et)h(t)dt$$

(20)

The expression is the marginal expected utility of $\phi$, and at $\phi = 0$ it is a strictly positive number. The second derivative

$$K''(\phi) = \int_{t=0}^{\infty} (t - Et)^2 u''(\overline{\sigma} - t + \phi t - \phi Et)h(t)dt$$

(21)

is always negative. The objective function is globally concave.
Lessons from the comparison. The first lesson is that insurance markets are no respecters of concavity. In property-insurance markets, the copayment style without an upper limit is rare but the upper-limit style is common. Copayments are of considerable importance in health insurance, but that’s not relevant here because, as numerous papers have shown, the proper model of health insurance involves utility functions that vary with the state of health.

It is interesting to compare the copayment contract with the upper limit contract. Near the point of full insurance, the policies are similar, for both are locally concave. The differences are at the extremes. At very high values of the choice variables, the consumer is over-insured. Here the copayment policy is a poor choice because, as the choice variable increases, utility decreases without bound. The upper-limit policy is better in this range because utility is bounded from below. If the consumer must err on the side of too-high insurance, the upper limit policy is a better choice. At very low values of the choice variable $-b$ or $\phi$ – the consumer is underinsured. In these conditions the upper-limit policy has, as shown in the derivations, vanishingly low marginal benefit while the copayment policy has, because of concavity, positive marginal benefit. Thus for a person who must remain extremely under-insured for some reason, the upper-limit style is the worse choice.

3 Equity risk is background risk

Of the two pure types of externality risk, equity risk is the more transparent. The purpose of this section is to examine equity risk when there is no conversion risk. The situation is reasonable empirically, as may be judged by an example: Consider a neighborhood of single-story homes for which the highest-valued conversion is to two-story homes. Either type of home becomes more valuable as its neighborhood is increasingly made up of two-story homes. Suppose in addition that the increase in value as the neighborhood improves is exactly the same for both types of homes. In notation, the conversion point is $q = v - (v^* - c)$, and the cost of conversion $c$ is constant. The value of an existing, one-story home is $v$, and that of a new two-story home is $v^*$. The assumption is that the difference $v - v^*$ is invariant as both values vary randomly. When these assumptions are not too violently disobeyed, the situation is very nearly one of pure equity risk.

Return to the consumer who purchased full insurance when $q = \bar{q}$ and $v = \bar{v}$ were deterministic. Now in addition to the insurable risk of physical damage, she faces an uninsurable risk to equity in her home. Her uninsured wealth is

$$v - \min[\bar{q}, \bar{t}]$$

The substitution of the random $v$ for the fixed $\bar{v}$ is very much like the addition of
a second, uninsurable property to her holdings. Wealth is the sum of two random components, only one of which is insurable. Such situations are studied by Kimball (1990), who calls the uninsurable component a background risk. Applications to insurance, using other types of insurance contracts are examined by Kimball and Eekhoudt (1992).

In this situation, the existing theory of background risk creates expectations. Kimball and Eekhoudt found that at loaded prices, a background risk that is independent of the insurable risk boosts demand for insurance as measured by the consumers choice of deductible or rate of copayment. The new contributions here are (1) to consider such risks when the measure of demand is the choice of upper limit on insurance, and (2) to reconsider the association between greater equity risk (i.e., background risk) and higher insurance.

The probability density function of value \( v \) is \( g(v) \), which is independent of \( t \). The absence of equity risk means that the random \( v \) is replaced by its mean \( \bar{v} \). The consumer has utility \( u \). The fair premium is \( P(b) \), as specified in (3) and it is loaded by a factor \( (1+\lambda) \). State-contingent wealth of the consumer after choosing insurance is

\[
    v - \min[\bar{v}, t] + \min[b, t] - (1 + \lambda)P(b)
\]

(23)

Because of the loading, the optimum is no longer \( b = \bar{v} \). The objective of the consumer is to choose \( b \) in order to maximize

\[
    \int_{t=0}^{\infty} \left( \int_{v=\bar{v}_0}^{v_1} u(v - \min[\bar{v}, t] + \min[b, t] - (1 + \lambda)P(b))g(v)dv \right) h(t)dt
\]

(24)

Analysis progresses by considering a surrogate consumer who behaves in the absence of equity risk just as the original would in its presence. The surrogate has utility

\[
    \hat{U}(w) = \int_{v=\bar{v}_0}^{v_1} u(w + (v - \bar{v}))g(v)dv
\]

(25)

It is clear that \( \hat{U}(w) \) is increasing and concave in \( w \). Substitute the expression

\[
    w = \bar{v} - \min[\bar{v}, t] + \min[b, t] - (1 + \lambda)P(b)
\]

into equation (25). The result is

\[
    \hat{U}(\bar{v} - \min[\bar{v}, t] + \min[b, t] - (1 + \lambda)P(b)) = \int_{v=\bar{v}_0}^{v_1} u(v - \min[\bar{v}, t] + \min[b, t] - (1 + \lambda)P(b))g(v)dv.
\]

(26)
The right hand side is the same as the inner term in the objective function in equation (24). Therefore equation (24) can be rewritten

$$
\hat{T}(\lambda, b; \overline{\pi}, \overline{\eta}) =
\int_0^\infty \hat{U}(\overline{\pi} - \min[\overline{\theta}, t] + \min[b, t] - (1 + \lambda)P(b))h(t)dt.
$$

(27)

In other words, substituting the independent equity risk for a fixed value is the same as replacing the consumer with another, slightly different consumer, who solves a fixed value problem.

The new consumer is risk-averse, like the previous one. Consequently, she chooses less than full insurance when prices are loaded. The question is whether the new consumer chooses an upper limit that is greater than before her utility function was transformed. The question is answered through the use of an interesting lemma by Kimball showing the consumer represented by $\hat{U}(w)$ is, under reasonable conditions, more risk averse than the old one who had $u(w)$.

**Lemma 2** (Kimball) Suppose the utility function $u$ exhibits decreasing absolute risk aversion and decreasing absolute prudence. Then $\hat{U}$ is absolutely more risk averse than $u$ at all points $w$.

**Proof.** (From Kimball and Eckhoudt (1992), who credit Gollier for improvements in the proof.) Unavoidably the concepts of risk premium $\pi(v, w)$ and precautionary premium $\psi(v, w)$ are needed. They are defined by

$$
u(w - \pi(v, w)) \equiv E[u(w + (v - \overline{\pi}))]
$$

and

$$
u'(w - \psi(v, w)) \equiv E[u'(w + (v - \overline{\pi}))].
$$

The assumption of decreasing absolute risk aversion is equivalent to $\partial \pi(v, w)/\partial w < 0$, and the assumption of decreasing absolute prudence is equivalent to $\partial \psi(v, w)/\partial w < 0$. See Kimball 1990 and Kimball and Eckhoudt 1992 for discussion of the equivalence.

The risk premium is positive because the random variable $v - \overline{\pi}$ has mean zero and utility is risk averse. The precautionary premium is also positive because given decreasing absolute risk aversion, it is greater than the risk premium (Kimball and Eckhoudt, 1992). Now write

$$
\hat{U}'(w) = E[u'(w + (v - \overline{\pi}))] = u'(w - \psi(v, w)).
$$
It follows that
\[
\hat{U}''(w) = (1 - \frac{\partial \psi(v, w)}{\partial w}) u''(w - \psi(v, w)),
\]
and hence,
\[
\frac{\hat{U}''(w)}{U'(w)} = \left( 1 - \frac{\partial \psi(v, w)}{\partial w} \right) \left[ \frac{u''(w - \psi(v, w))}{u'(w - \psi(v, w))} \right].
\]
The term in round parentheses is greater than unity because absolute prudence is decreasing. Absolute risk aversion falls when wealth rises by the amount \( \psi(v, w) \). Hence, for all \( w \)
\[
\frac{\hat{U}''(w)}{U'(w)} \geq \frac{u''(w)}{u'(w)}.
\]

Lemma 2 is used to prove that the introduction of equity risk raises the optimum upper limit. The logical sequence is clear: Introducing equity risk makes the consumer more risk averse, and a consumer who is more risk averse should demand a higher upper limit. The process of proving it leads, however, to additional insights. The proposition is limited to situations (i.e., a mathematical neighborhood) in which the consumer buys insurance in spite of loading and, moreover, the objective function is quasi concave. Those situations might be few if the consumer is very risk-tolerant or the conversion-point is very near to zero, because in such cases the consumer leaves the market at low levels of loading. For any given level of risk aversion and conversion point, an increase in loading will at first reduce the optimum upper limit and finally drive the consumer from the market. The proposition applies to situations in which the consumer is not liable to be driven from the market. It uses the notation
\[
T(\lambda, b; \overline{\pi}, \overline{q}) = \int_{t=0}^{\infty} u(\overline{\pi} - \min[\overline{q}, t] + \min[b, t] - (1 + \lambda)P(b))h(t)dt \quad (28)
\]

**Proposition 3** Suppose the risk-averse utility function \( u \) exhibits decreasing absolute risk aversion and decreasing absolute prudence. The conversion point \( \overline{q} \) is deterministic. The premium is loaded by a factor \((1 + \lambda)\). Equity risk \( v \) is independent of the insurable risk \( t \). Let the optimum upper limit under equity risk be \( b^v(\lambda) \). When the equity risk is replaced by a certainty value \( \overline{\pi} = Ev \), the optimum upper limit is \( b^u(\lambda) \). Assume that \( T_{b,0}(0, \overline{q}; \overline{\pi}, \overline{q}) < 0 \). Then there is a neighborhood in \( b, \lambda \)-space containing the point \( (b, \lambda) = (\overline{q}, 0) \) such that for \( \lambda, b \) in that neighborhood, the functions \( b^v(\lambda) \) and \( b^u(\lambda) \) exist, and \( b^u(\lambda) < b^v(\lambda) < \overline{q} \).
The assumption that $T_{bb}(0, b^u(0); \bar{v}, \bar{q}) < 0$ is made for convenience only. Because $b = b^u(0)$ is an optimum, the objective is necessarily concave in that point. Because of risk aversion, concavity is strict. That means that the first non-zero derivative of the form $T_{bb}(0, b^u(0); \bar{v}, \bar{q})$ must be negative. If that first non-zero derivative is not the second derivative, the second derivative is nevertheless negative in a neighborhood of $(0, b^u(0))$, with the exception of the point itself. The argument then involves taking limits, complicating the proof with a minimum increase in generality. 

**Proof.** For a given $\lambda$, and fixed values $\bar{v}$ and $\bar{q}$, a critical point of $b$ is one for which

$$T_b(\lambda, b; \bar{v}, \bar{q}) = 0$$

The equation defines a solution function $b^u(\lambda)$. Note that the defining function is twice continuously differentiable in $b$ and $\lambda$ and that there is a solution $b^u(0) = \bar{q}$ at $\lambda = 0$. By assumption, $T_{bb}(0, \bar{q}; \bar{v}, \bar{q}) < 0$. Existence of the implicit function depends upon the quantity $T_{bb}(\lambda, b; \bar{v}, \bar{q})$ remaining nonzero. By continuity, there is a neighborhood $N_1$ of $(\lambda, b) = (0, \bar{q})$ in which variations in $\lambda$ and $b$ preserve concavity for the objective, that is, on $N_1$,

$$T_{bb}(\lambda, b; \bar{v}, \bar{q}) < 0$$

Hence, the solution function $b^u(\lambda)$ is well-defined in the neighborhood $N_1$ of $(\lambda, b) = (0, \bar{q})$. In this neighborhood, incidentally, $\text{sign}[\frac{\partial^2}{\partial b^2} b^u(\lambda)] = \text{sign}[T_{bb}(\lambda, b; \bar{v}, \bar{q})] < 0$.

By continuity of the objective $T(\lambda, b; \bar{v}, \bar{q})$, there is a neighborhood $N_2$ of $(\lambda, b) = (0, \bar{q})$ in which variations in $\lambda$ and $b$ preserve the superiority of near-full insurance over no-insurance, i.e.,

$$T(\lambda, b^u; \bar{v}, \bar{q}) > T(\lambda, 0; \bar{v}, \bar{q})$$

Let $N^u = N_1 \cap N_2$. In the neighborhood $N^u$ of $(\lambda, b) = (0, \bar{q})$, $b^u(\lambda)$ exists and is a global maximizer over $b$ of the objective function $T(b)$.

Likewise, there exists a neighborhood $N^v$ of the point $(\lambda, b) = (0, \bar{q})$ in which $b^v(\lambda)$ exists and is for each $\lambda$ a global maximizer over $b$ of the objective function $\hat{T}(\lambda, b; \bar{v}, \bar{q})$ found in equation (27), namely

$$\hat{T}(\lambda, b; \bar{v}, \bar{q}) =$$

$$\int_{t=0}^{\infty} \left[ \hat{U}(\bar{v} - \min[\bar{q}, t] + \min[\bar{b}, t] - (1 + \lambda) P(b)) \right] h(t)dt$$

In the neighborhood $N = N^u \cap N^v$ of the point $(\lambda, b) = (0, \bar{q})$, the comparison of $b^v(\lambda)$ and $b^u(\lambda)$ can be made because in $N$, both solution functions are concave.
Look at the situation for a fixed value of \( \lambda \). The first order condition for the optimum upper limit is

\[
E[u'(\cdot; \bar{v}, \bar{q})|t > b] - \left( 1 + \frac{\lambda}{1 - (1 + \lambda)P(b^u)} \right) E[u'(\cdot; \bar{v}, \bar{q})|t \leq b] = 0 \tag{32}
\]

The solution is denoted by \( b^u = b^u(\lambda) \). The task is to show that the derivative of the objective using \( \bar{U} \) is still positive evaluated at \( b^u \)– the optimum for the risk-tolerant \( u \). That is, show that

\[
E[\bar{U}'(\cdot; \bar{v}, \bar{q})|t > b^u] - \left( 1 + \frac{\lambda}{1 - (1 + \lambda)P(b^u)} \right) E[\bar{U}'(\cdot; \bar{v}, \bar{q})|t \leq b^u] > 0. \tag{33}
\]

The first step is to make \( u \) and \( \bar{U} \) agree in value and in slope at the point where \( t = b^u \). At that point, \( \bar{v} = \min[\bar{q}, t] + \min[b^u, t] - (1 + \lambda)P(b^u) = \bar{v} - (1 + \lambda)P(b^u) \).

Without loss of generality, \( \bar{U} \) may be multiplied by an appropriate positive number so that

\[
\bar{U}'[\bar{v} - (1 + \lambda)P(b^u)] = u'[\bar{v} - (1 + \lambda)P(b^u)]
\]

and an appropriate constant can also be added so that

\[
\bar{U}[\bar{v} - (1 + \lambda)P(b^u)] = u[\bar{v} - (1 + \lambda)P(b^u)]
\]

holds true. Now the more risk averse function \( \bar{U} \) lies everywhere below the less risk averse \( u \), with a tangency at the point \( \bar{v} - (1 + \lambda)P(b^u) \).

Looking at the tangency point \( \bar{v} - (1 + \lambda)P(b^u) \), it is graphically apparent and easy to prove that for any \( w < \bar{v} - (1 + \lambda)P(b^u) \) – at a point below the tangency – the more risk averse utility has a higher marginal utility, i.e., \( \bar{U}'(w) > u'(w) \). For all \( t > b^u \), damage is more than the upper limit of insurance and consequently

\[
\bar{v} - \min[\bar{q}, t] + \min[b^u, t] - (1 + \lambda)P(b^u) < \bar{v} - (1 + \lambda)P(b^u)
\]

It follows that the first terms in equations (32) and (33) satisfy

\[
E[\bar{U}'(\cdot; \bar{v}, \bar{q})|t > b^u] > E[u'(\cdot; \bar{v}, \bar{q})|t > b^u] \tag{34}
\]

That takes care of \( t \in (b^u, \infty) \).

Look at \( t \in [0, b^u] \). When \( t \leq b^u \), damage is less than the conversion point and also less than the upper limit. Thus wealth reduces to \( \bar{v} - (1 + \lambda)P(b^u) \), the wealth at the tangency point. Then the second terms in equations (32) and (33) bear the relation

\[
E[\bar{U}'(\cdot; \bar{v}, \bar{q})|t \leq b^u] = E[u'(\cdot; \bar{v}, \bar{q})|t \leq b^u] \tag{35}
\]

\[14\]
Use the results from equations (34) and (35) to compare equations (33) and (32). Clearly the expression in equation (33) is positive. By Lemma 1 the objective is increasing, and hence that the optimum upper limit is greater for the consumer who is more risk averse. This holds for each value of $\lambda$ in $N$. Therefore $b^*(\lambda) < b^*(\lambda) < \bar{q}$.

This is the result that was expected from parallels in the literature. At unfair prices, a greater equity risk induces a higher upper limit. It should be interpreted with caution, because it does not say that a person who has higher equity risk necessarily chooses a higher degree of insurance. The conclusion holds if the higher equity risk is a given, and as such is unavoidable.

The person who chooses to have more equity risk is not considered in the theorem. Such people are interesting, however, because in practice the equity risk is to a greater or lesser extent a choice variable. A property owner can choose less equity risk by owning less property, building less expensive structures, moving to a different location, engaging in another type of land use, or participating in markets that hedge the equity risk in the chosen structure, location, and use.

### 3.1 Markets in equity insurance

Markets in equity risk have in fact been proposed by Case, Shiller and Weiss (1993).\footnote{In addition, see Shiller and Weiss (1998).} They would involve exchange of futures contracts on indexes that estimate average property values in each mail delivery (zip code) district. The home-owner hedges by, in essence, selling futures in his local index, profiting on the hedge when the index and his property value fall, losing on the hedge in the contrary case. He could in principle speculate by buying futures in his local index or trading futures in either direction in other indexes. The homeowner is prevented from speculating if the product is ultimately retailed by the same agencies that market homeowners insurance. The details are immaterial for present purposes because in the model the only incentive is for hedging. The market in equity risk is a clear instance of choice of equity risk.

In hedging the equity risk, owners face some unfairness of prices, just as in the insurance market they face loaded premia. Otherwise, as risk averse maximizers of expected utility, they would fully insure all risks. Given the costs of hedges and insurance, owners follow diverse strategies. Some choose high equity risk, whether because of higher wealth or greater risk-tolerance. The motives for higher equity risk are also motives for less insurance. It stands to reason that the owner who chooses to bear some risk would diversify risks by carrying some risk to equity and some risk of uninsured damage. Those who bear higher risk would still diversify, bearing more or each type of risk. Thus there is an argument suggesting that when higher equity
risk is chosen, less insurance will also be chosen. The argument is not completely watertight for several reasons. In the first place, the motives for choosing higher equity risk would need to be examined separately, and the differences are somewhat unclear. Moreover, any tight analysis would depend upon distributional assumptions, and here the nature of the problem is clearer. Suppose that the equity risk tends to magnify the losses. That is, the value of undamaged property tends to fall when the property is damaged. Then the consumer who selects higher equity risk might also select more insurance. Nevertheless, when hedges on equity risk are available, the expected association is that between higher equity risk and less insurance, the opposite of the result when the higher equity risk is unavoidable.

When markets in equity risk are lacking, the logic carries over somewhat imperfectly. More examples occur to show that the relation of equity risk and underinsurance could fall either way. For instance, consider the person who chooses high equity risk because of a consumption preference of a particular type of home. In other words, for reasons outside the present model. Such a person could well be more interested in insurance, rather than less. The same logic applies to a job seeker who accepts work in an area in which equity risks are higher. The upshot is that insurance and hedging can be positively or negatively associated in real-world data.

3.2 Disasters and equity risk

The equity risk that everyone thinks about is unrelated to disaster. Represent it by $v_\perp$ – read $v$ orthogonal – and consider it to be probabilistically independent of $t$. Another part of equity risk is associated with neighborhood change following a disaster. Represent the disaster-related component by $v_d$. It is jointly distributed with $t$. Now pre-insurance wealth is

$$v_\perp + v_d - \min[\mathcal{I}, t]$$

(36)

The independent orthogonal risk has the effects attributed to it in the preceding sections. To the extent that it is unavoidable, it increases demand for loaded insurance, and to the extent that it is a choice variable, it plays the more complex role described immediately above.

The significant question concerns the additional role of the disaster-related component. The response of $v_d$ to severity of the disaster is probably J-shaped – mild losses depress values, severe ones raise them again to levels higher than in the no-damage state. In a disaster with mild losses, most properties experience some damage and few are entirely destroyed. The slightly damaged properties are restored and by their numbers prevent any change of character of the neighborhood. Destroyed properties are rebuilt, if at all, in accordance with the status quo. Only in the more extreme disaster does the reduction of constraints lead to an increase in neighborhood values, the
tall stem of the J. Overall, the association of \( v_d \) and \( t \) is probably positive, meaning that the equity risk is a natural insurance of the risk of damage. That should reduce the demand for insurance. However, it is possible that \( v_d \) is negatively correlated with \( t \) because mild disasters are more probable than severe ones, and in that case the implication is reversed. The effects of \( v_d \) on demand for disaster insurance are surely more significant than the effects on demand for a homeowners policy that also covers the disaster and may be very significant in an absolute sense. Thus the possibility of appreciation may in part explain the very large deductibles that are prevalent in earthquake insurance.

4 Conversion risk

Conversion risk is the second dimension of externality risk. It stems from the uncertainty about the values of the alternative structures that could be built in place of the current one. Because these values are uncertain, the conversion point of the consumer, which is the level of damage at which she abandons the current structure in favor of a new one, becomes a random variable. The conversion point places a bound on the consumer’s loss of wealth. Consequently, variations in it are important. Predicting conversion options and values is the most interesting and challenging part of writing a property insurance contract.

In studying pure conversion risk, the conversion point \( q \) is random, and the value of property with existing structures is fixed. Such situations arise under plausible, interesting conditions. In one scenario, the consumer who has both types of risk has hedged the equity risk in some manner, perhaps in a market like the one proposed by Case, Shiller and Weiss. That done, she confronts the risk in the conversion point.

Alternatively, think of the cement plants located near the waterfront in Santa Barbara. No single owner tears down his plant to build housing amid the other dusty workplaces. However, if the neighborhood is devastated by an earthquake and rebuilt entirely as residences, the value of a remaining cement factory is the same as before, but the value of converting it to housing is much higher. The general description of this situation is that the value in the existing use is not affected by the neighborhood but the highest valued conversion is to a use that does depend on it. In such cases, disaster stimulates conversion by lowering the conversion point.

Randomness of \( q \) may also arise from variations in the cost of conversion \( c \). A disaster can lead to a boom in reconstruction that raises costs and discourages conversion. The cost variation then tends to offset the variations described above, but only partially. The stimulative effects are more likely and more compelling and are the predominant ones needing study. In the absence of disaster, of course, the costs and values of alternative structures may change and thus induce a conversion risk.
4.1 Optimization:

The problem for the consumer is to select a binding upper bound on damage at fair prices, in the presence of uncertainty about $q$. The decision is easy using contracts that distinguish the payments according to the value of $q$. Such contracts make the insurance market essentially complete and allow the consumer to demand a contract having an upper bound of $q$ in every $q$-state. She is, as usual, fully insured at fair prices.

When consumers buy one contract for fire and another for earthquake, they are taking a small step toward approximating the complete-markets solution. Because disaster lowers the conversion point, less insurance is demanded in the disaster state. Some empirical confirmation of this idea may be present in the very large deductibles that effectively lower the upper limit of earthquake coverage relative to the fire coverage on the same property. The alternative idea, that the deductibles are dictated by the supply side, also contributes to explaining the phenomenon.

Markets that give different insurance for different values of $q$ are in theory complete and in practice uncommon. The interesting case is that of a contract with a single upper bound that applies regardless of the realization of $q$. In response to the conversion risk, the consumer must somehow choose an upper limit when the conversion point, which would ordinarily be the target, varies randomly. The general principle still applies: given fair premiums, the expected marginal utility in the zone below the upper limit should equal the expected marginal utility in the zone above it. In the course of further describing this optimization, interesting applications arise.

Intuitively the optimum $b$ should lie between $q_0$ and $q_1$, but some derivations are needed to confirm the intuition. The significant assumption is that variation in $v$ is nil and thus $v = \bar{v}$. As before the variation of $q$ is limited to a finite interval $[q_0, q_1]$. The unconditional probability of insurable loss $t$ is $h(t)$. The probability distribution of conversion risk depends in some way on $t$, and is denoted $g(q|t)$. The lower conversion points are associated with disaster and the higher ones with a solitary loss. Other notation is as before: The option to convert is the option to achieve $\bar{v} - \min[t, q]$. Insurance of damage has neither deductible nor copayment, but it does have an upper limit $b$ selected by the consumer. The indemnity is $\min[b, t]$, and as before a fair premium $P(b)$ is paid for it.

The consumer’s wealth is

$$\bar{v} - \min[t, q] + \min[b, t] - P(b)$$

The goal of the consumer is to choose $b$ to maximize the objective

$$T(0, b; \bar{v}) = \int_{t=0}^{\infty} \left| \int_{q_0}^{q_1} u(\bar{v} - \min[t, q] + \min[b, t] - P(b))g(q|t)dq \right| h(t)dt$$

(37)
As before, the optimum is found by choosing $b$ to equate the conditional marginal utility of wealth in the two events, $[0, b)$ and $[b, \infty)$. The conditional expectations of marginal utility of wealth are given in equations (7) and (8). The result $b \in [q_0, q_1]$ would be easy to demonstrate if the usual second-order conditions were satisfied. One would check the slope of the objective at $q_0$ and $q_1$, but once again, concavity is lacking. Hence, the proof involves checking the slope of the objective throughout the domain of $b$.

**Proposition 4** Let $u$ be risk averse and $\bar{v}$ deterministic. For all $t$, let the generalized probability distribution function $g(q|t)$ of $q$ have support contained in $[q_0, q_1]$ and mean contained in $(q_0, q_1)$. Then the optimum upper limit on insurance, $b^*$, satisfies $q_0 < b^* < q_1$. In the limit as $q_0 \to q_1$, $b^*$ approaches $q_0 = q_1$.

**Proof.** Consider $b \in [0, q_0]$. On $t < b$, expected marginal utility is constant at

$$u'(\bar{v} - P(b)) = \int_{q=q_0}^\infty u'(\bar{v} - P(b))g(q|t) dq$$

(38)

and rises to higher levels on $t > b$ because losses in excess of the upper limit will reduce wealth and raise marginal utility. In this range

$$E[u'(\cdot; \bar{v})|t > b] - E[u'(\cdot; \bar{v})|t \leq b] > 0$$

(39)

By Lemma 1, that means the slope of the objective is positive for all $b < q_0$.

Consider $b \in [q_1, \infty)$. On $t < q_0$, expected marginal utility is constant at $u'(\bar{v} - P(b))$ as before. On $t \in [q_0, q_1]$, marginal utility as a function of $t$ is

$$\int_{q=q_0}^\infty u'(\bar{v} - \min[t, q] + t - P(b))g(q|t) dq$$

(40)

The argument of $u'(\cdot; \bar{v})$ on this domain is an equal or smaller quantity because wealth is rising in at least some of the realizations of $q$. On $t \in (q_1, b)$, marginal utility is falling because for all values of $q$, wealth is rising. On $t \in [b, \infty)$, wealth is constant and so is marginal utility, at the minimum level achieved at $t = b$. Conditional marginal utilities therefore satisfy

$$E[u'(\cdot; \bar{v})|t > b] - E[u'(\cdot; \bar{v})|t \leq b] < 0$$

(41)

By Lemma 1, that means the slope of the objective is negative for all $b > q_1$.

It is clear that $b^*$ must be somewhere in the interval $[q_0, q_1]$. The behavior in the limit as $q_0 \to q_1$ is obvious. ■
4.2 Underinsurance in disasters

The proposition has practical significance. Consider the evaluation made in the wake of disaster to determine whether the victims were properly insured. The usual finding is that most of them were not. A model of the situation can be made. Disaster normally encourages conversion, for reasons discussed previously, and so it corresponds to the lower value, \( q = q_0 \). The conversion point \( q = q_1 \) applies to non-disaster losses. The conventional basis for judging the adequacy of insurance is the non-disaster state, \( q = q_1 \), and the conventional standard of full insurance is \( b^* = q_1 \). However, the consumer chooses optimally an upper bound less than \( q_1 \), and thus is under-insured by conventional standards. Even after a disaster occurs, the insurance still appears inadequate because the available market data are from before the disaster and the disaster-induced values of land and improvements are unobservable until sometime in the future. The optimizing consumer is paradoxically over-insured in the disaster state because \( b^* > q_0 \).

4.3 Does demand increase?

A major property of an independent equity risk is that it leaves unchanged the demand for insurance at fair prices. In contrast, an independent conversion risk can either raise or lower demand, depending upon the distribution of losses. This fact is best illustrated through an example.

Look at the following comparison of two situations. In the initial situation, the conversion point is deterministic at \( \bar{q} = 1 \). The optimum upper limit is \( b = \bar{q} = 1 \). Compare that to the situation in which the conversion risk is \( q = 0 \) or \( q = 2 \) with equal probability, a distribution with a mean of 1, the same as in the initial situation. The distribution of damage in both cases is the negative exponential \( h(t) = e^{-t} \). Consequently, \( P(b) = 1 - e^{-b} \). Utility is the time-honored \( u(\cdot) = \ln(\cdot) \), and \( \bar{\sigma} = 4 \). The goal of the consumer in the second case is to choose \( b \) to maximize

\[
T(0, b; 4, 1) =
\]

\[
.5 \left[ \int_0^b \ln[3 + e^{-b} + t]e^{-t}dt + \int_b^2 \ln[3 + e^{-b} + b]e^{-t}dt + \ln[3 + e^{-b} + b]e^{-2} \right]
\]

\[
+ .5 \left[ \int_0^b \ln[3 + e^{-b}]e^{-t}dt + \int_b^2 \ln[3 + e^{-b} - t + b]e^{-t}dt + \ln[3 + e^{-b} - 2 + b]e^{-2} \right]
\]

\( (42) \)
The optimum is achieved at the point $b = 1.401$. That demonstrates the possibility that an independent conversion risk can raise the demand for insurance, here by a forty percent increase in the upper limit.

Alternatively, the same example may be run using a distribution of damage equal to $h(t) = 4e^{-4t}$, which has the effect of shifting probability weight from higher to lower levels of damage. In that case, the optimum upper limit is $b = .515$, a decrease in demand of 48 percent.

Figure 2 illustrates the examples, showing expected utility as a function of $b$. One of the curves is an affine transformation of expected utility in order to allow both to appear in the same figure. The curves show the optima and the lack of concavity of the objective functions in each optimization problem.

![Figure 2. Expected utility as a function of $b$. Two cases. Expected $q$ is 1.](image)

In constructing the examples, only the most primitive elements were used. In particular, dependence between damage and conversion value is not exploited. The negative exponential is not a perfect model for the distribution of real-world damage, of course, and the shift inward of probability mass is extreme. Nevertheless, the examples illustrate the possibilities and show that conversion risk can either raise or lower the demand for insurance.

5 Concluding remarks

Equity risk and conversion risk have different manifestations and different impacts. Conversion values show themselves only when damage is severe, but equity values are seen continually in real estate markets. Of course the conversion point is supposed to be observable from the difference between property value and land value, but in
practice, it is obscured because markets in vacant land are thin and prices in them are not ordinarily publicized. Variations in conversions values are mostly hidden.

The obscurity of conversion risk belies its importance to insurance. Although instances of severe damage are numerically rare, they account for a large fraction of losses paid in most lines of property insurance, and they supply the sharpest incentive to insure. In spite of its obscurity, conversion risk is central to the insurance decision. In contrast, the obvious risks to equity value affect demand for insurance mainly by raising the risk aversion of the consumer. In that sense, equity risk is tangential to the main determinants of the demand for insurance.

Property insurance contracts do not address conversion. Implicitly they suggest that restoration is typically a best response to heavy damage. Because conversion is not explicit, vital issues that should be part of the agreement are left to be negotiated after the event. Certainly every major loss will end with some negotiation between the insurer and the client. Such post contractual negotiation is at best costly and at worst an invitation to abuse. In one possible gambit, heavy damage occurs and the best decision is to convert. The client makes a claim based upon an estimate of the damage – an estimate, that is, of the cost to restore the property. The insurer disputes the amount and challenges the client to prove the justice of his higher claim by actually restoring the property, a challenge both parties know is highly unappealing and wasteful. Each party has a motive to distort, leading to a conflict of the sort that contractual relations are supposed to prevent. How contracts might be changed to address conversion value is unclear and a worthwhile area for further study and innovation. Meanwhile, the one palliative is for clients to underinsure by amounts sufficient to prevent post-loss disputes.

As remarked in the introduction, conversions are typically more marked in disaster losses than in others. Thus disasters are an extreme case in which the contracts are inappropriate, and it is expected that post-event negotiation will be common. The Oakland fire is a highly publicized example. In that case, curiously, the negotiation ended in favor of the clients, and in fairness the issues never involved conversion explicitly. Although insurers could have argued that losses were less than they seemed, they did not do so, perhaps because the absence of any mention of conversion in the underlying contracts gave them no grounds.

Insurers sometimes offer a homeowner’s policy that pays “replacement cost.” The idea is that the cost to restore the property might turn out to be higher than the upper limit cited in the contract, and the insurer promises in that case to pay the higher cost. Such policies do not address conversion and therefore seem to have rather limited value to the client. Perhaps the real meaning of replacement cost promotions is to create underwriting flexibility. A lower premium is effectively offered the consumer whose property is undervalued in the insurance contract but ultimately revalued by the replacement value contract. Some of the advantage to the client is, however,
illusory, since in a conversion the “replacement cost” can never be verified. Explicit recognition of conversion would improve consumer information and reduce doubts about the eventual execution of contracts.

Recently some homeowners contracts offer a rider to cover the extra cost of meeting building codes, a cost that is reported to be substantial. The significant thing is not the rider but the exclusion in the underlying policy that makes the rider relevant. Separating the coverages has an advantage for the consumer, assuming the pricing is not abusive. By definition, the cost of meeting new building codes is not fully impounded in the market value of a property, but it is partially reflected. As a rider, the code-compliance coverage can be chosen to cover the short-fall, not the whole cost. Thus separating the coverages confers a slight theoretical advantage.

References


