

Hofmann, Annette; Peter, Richard

**Working Paper**

## Self-insurance, self-protection, and increased risk aversion: An intertemporal reinvestigation

Working Papers on Risk and Insurance, No. 26

**Provided in Cooperation with:**

University of Hamburg, Institute for Risk and Insurance

*Suggested Citation:* Hofmann, Annette; Peter, Richard (2012) : Self-insurance, self-protection, and increased risk aversion: An intertemporal reinvestigation, Working Papers on Risk and Insurance, No. 26, Hamburg University, Institute for Risk and Insurance, Hamburg

This Version is available at:

<https://hdl.handle.net/10419/85324>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



Universität Hamburg

Annette Hofmann, Richard Peter

# Self-Insurance, Self-Protection, and Increased Risk Aversion: An Intertemporal Reinvestigation

Working Papers on Risk and Insurance  
Hamburg University

No 26  
February 2012

Annette Hofmann<sup>1</sup> und Richard Peter<sup>2</sup>

**Self-Insurance, Self-Protection, and Increased Risk  
Aversion: An Intertemporal Reinvestigation**

No 26

February 2012

**ISSN 1617-8653**

---

<sup>1</sup> Annette Hofmann, Institute for Risk and Insurance, University of Hamburg, Von-Melle-Park 5, D-20146 Hamburg, Germany, Phone.: +49 40 42838-6143, Fax: +49 40 428385505, Email: [hofmann@econ.uni-hamburg.de](mailto:hofmann@econ.uni-hamburg.de).

<sup>2</sup> Richard Peter, Institute for Risk Management and Insurance, Ludwig-Maximilians-Universitaet Munich, , Phone: +49 89 2180 3882, Fax: +49 89 2180 99 3882, E-Mail: [peter@bwl.lmu.de](mailto:peter@bwl.lmu.de).

Annette Hofmann and Richard Peter

# **Self-Insurance, Self-Protection, and Increased Risk Aversion: An Intertemporal Reinvestigation**

## **Zusammenfassung / Abstract**

This paper studies the effect of increased risk aversion on self-insurance and self-protection in a two-period framework. Here risk management incentives and consumption smoothing incentives are traded off, and the monotonic relationship between self-insurance and risk aversion may no longer hold as more risk-averse agents cannot always afford spending more on self-insurance. A very similar relationship holds for self-protection making self-insurance and self-protection much more alike in a two-period model. We also extend the model to a joint analysis of self-insurance/self-protection and saving decisions.

*Keywords:* self-insurance; self-protection; risk aversion; time structure.

# Self-Insurance, Self-Protection, and Increased Risk Aversion: An Intertemporal Reinvestigation

Annette Hofmann\* and Richard Peter†

February 1, 2012

## Abstract

This paper studies the effect of increased risk aversion on self-insurance and self-protection in a two-period framework. Here risk management incentives and consumption smoothing incentives are traded off, and the monotonic relationship between self-insurance and risk aversion may no longer hold as more risk-averse agents cannot always afford spending more on self-insurance. A very similar relationship holds for self-protection making self-insurance and self-protection much more alike in a two-period model. We also extend the model to a joint analysis of self-insurance/self-protection and saving decisions.

*Keywords:* self-insurance; self-protection; risk aversion; time structure.

---

\*Corresponding author. University of Hamburg, E-Mail: hofmann@econ.uni-hamburg.de, Phone: +49 40 42838 6143, Fax: +49 40 42838 5505.

†Institute for Risk Management and Insurance, Ludwig-Maximilians-Universitaet Munich, E-Mail: peter@bwl.lmu.de, Phone: +49 89 2180 3882, Fax: +49 89 2180 99 3882.

# 1 Introduction

To mitigate risks individuals may either invest in reducing the size of a potential loss (self-insurance or loss reduction) or in reducing the probability of a hazardous event (self-protection or loss prevention).<sup>1</sup> Dionne and Eeckhoudt (1985) derive the well-known and intuitive comparative static result that more risk-averse agents invest more in self-insurance but not necessarily more in self-protection.<sup>2</sup>

The timing of prevention decisions has mostly been abstracted from in the economic literature so far. However, in many instances it makes sense to think of self-insurance or self-protection as expenditures incurred today to mitigate future risks. Indeed, as the term “prevention” literally suggests, it is to some extent sustainable in many situations. Eeckhoudt and Gollier (2005) demonstrate in a static model that a more prudent agent invests less in self-protection. In a simple two-period framework, however, Menegatti (2009) shows that a more prudent agent invests *more* in self-protection! Therefore, it is justified to ask whether the impact of risk-aversion is the same in a dynamic setting compared to a static one. This paper extends the prominent results of Dionne and Eeckhoudt (1985) and studies the impact of increased risk-aversion on self-insurance and self-protection decisions when such decisions are more naturally defined as investments in future states of the world.

## 2 The Models

### 2.1 Self-Insurance

Consider two points in time,  $t_1$  and  $t_2$ , which we call today and tomorrow. A representative individual owns initial wealth  $w_i$  in  $t_i$ . She faces the risk of losing  $l$  with probability  $p \in (0, 1)$  in the second period. She can invest today in self-insurance  $y$ , which reduces the size of the loss to  $l(y)$  ( $l' < 0, l'' > 0$ ) but comes at a cost of  $c(y)$  ( $c' > 0, c'' > 0$ ). Utility  $U$  over both periods is separable and future utility is discounted by  $\delta$  ( $0 < \delta \leq 1$ ). The individual is risk-averse and she maximizes expected utility of final wealth ( $U' > 0, U'' < 0$ ):

$$\max_y U(w_1 - c(y)) + \delta \left( pU(w_2 - l(y)) + (1 - p)U(w_2) \right).$$

The first-order condition (foc) is

$$-c'(y)U'(w_1 - c(y)) - \delta pl'(y)U'(w_2 - l(y)) = 0.$$

The individual balances marginal cost from investing in self-insurance and marginal benefits of incurring a smaller loss.<sup>3</sup>

Let us now consider an agent with utility  $V$  exhibiting greater risk-aversion than  $U$ ; due to Pratt (1964),  $V$  can be represented as a concave transformation of  $U$ , i.e.,  $V = k(U)$  with  $k' > 0, k'' < 0$ . It follows that<sup>4</sup>

<sup>1</sup>See Ehrlich and Becker (1972).

<sup>2</sup>Briys and Schlesinger (1990) rationalize this intuition by showing that investing in (actuarially fair) self-insurance can be interpreted as mean-preserving contraction, whereas the investment in (actuarially fair) self-protection is neither a mean-preserving contraction nor a mean-preserving spread: it rather consists of both at different levels of the final wealth distribution which explains the ambiguous effect of increasing risk aversion on preventive effort.

<sup>3</sup>The second-order condition is satisfied, i.e.,  $-c''(y)U'(w_1 - c(y)) + c'(y)^2U''(w_1 - c(y)) - \delta pl''(y)U'(w_2 - l(y)) + \delta pl'(y)^2U''(w_2 - l(y)) < 0$ .

<sup>4</sup>All proofs can be found in the appendix.

**Proposition 1.** *V invests more in self-insurance than U if and only if U's period-1 final wealth exceeds period-2 final wealth in the loss state, i.e.,  $w_1 - c(y_U) > w_2 - l(y_U)$ .*

As intuition suggests, increasing risk-aversion leads to more spendings on self-insurance if and only if the loss state is the worst state. In this situation, the risk management component of self-insurance dominates. However, if current consumption is too low, more risk-averse agents will *reduce* self-insurance to increase consumption today. Then the consumption smoothing component dominates. Therefore, in a two-period model, increased risk-aversion can be associated with lower self-insurance expenditures.

## 2.2 Self-Protection

Consider now the possibility of self-protection by allowing the individual to invest  $x$  today in reducing the probability of a hazardous event tomorrow (without changing the loss size). The loss probability is given by  $p(x)$  ( $p' < 0, p'' > 0$ ) and self-protection comes at a cost of  $c(x)$  ( $c' > 0, c'' > 0$ ). The individual's objective is

$$\max_x U(w_1 - c(x)) + \delta \left( p(x)U(w_2 - l) + (1 - p(x))U(w_2) \right),$$

with foc

$$-c'(x)U'(w_1 - c(x)) + \delta p'(x)(U(w_2 - l) - U(w_2)) = 0.$$

Again, the individual balances marginal cost from investing in self-protection against marginal benefit of enjoying a lower loss probability.<sup>5</sup>

Consider again a more risk-averse agent with utility  $V = k(U)$ :

**Proposition 2.** *V invests more (less) in self-protection than U if and only if  $k'$  evaluated at U's utility of wealth today is below (above) 1.*

Similar to the static model studied by Dionne and Eeckhoudt (1985), the effect of increased risk-aversion on self-protection is ambiguous and crucially depends on  $k'$ . This condition can be interpreted in the same manner: If current consumption is too low, increased risk-aversion lowers self-protection to save on consumption today.<sup>6</sup> Then the consumption smoothing incentive dominates. If consumption today is sufficiently high, more risk-aversion increases self-protection. Then the risk management incentive dominates. As a consequence, self-insurance and self-protection are more alike in a dynamic model compared to a static one.

## 3 The Models with Saving

We now extend the basic two-period self-insurance model by introducing a mechanism (i.e. a bank account) that allows the individual to transfer wealth between periods. Let  $s$  be the individual's savings in period 1 and  $r \geq 0$  the interest rate. The individual's objective then changes to

$$\max_{y,s} U(w_1 - c(y) - s) + \delta \left( pU(w_2 - l(y) + (1+r)s) + (1-p)U(w_2 + (1+r)s) \right),$$

<sup>5</sup>The second-order condition is satisfied, i.e.,  $-c''(x)U'(w_1 - c(x)) + c'(x)^2U''(w_1 - c(x)) + \delta p''(x)(U(w_2 - l) - U(w_2)) < 0$ .

<sup>6</sup>Looking into the proof, the intermediate value theorem establishes the existence of a  $\xi \in (w_2 - l, w_2)$  for which  $k'(U(\xi)) = 1$ . This is the crucial threshold for consumption today.

with associated focs

$$\begin{aligned} -c'(y)U'(w_1 - c(y) - s) - \delta pl'(y)U'(w_2 - l(y) + (1+r)s) &= 0, \\ -U'(w_1 - c(y) - s) + \delta(1+r)\left(pU'(w_2 - l(y) + (1+r)s) + (1-p)U'(w_2 + (1+r)s)\right) &= 0. \end{aligned}$$

Self-insurance is used to equate marginal cost from spending in self-insurance with marginal benefits from enjoying a lower loss; saving is used to smooth consumption (to equate (expected) marginal utility levels across different points in time). We extend the result of Menegatti and Rebessi (2011) to the case of two-period self-insurance by noting that

$$\frac{dy}{ds} = -\frac{EU_{ys}}{EU_{yy}} = -\frac{c'(y)U''(w_1 - c(y) - s) - \delta(1+r)pl'(y)U''(w_2 - l(y) + (1+r)s)}{EU_{yy}} < 0.$$

As a result, saving and self-insurance are substitutes in an intertemporal setting!

Incorporating saving into our two-period self-protection model is straightforward. However, investigating the role of increased risk-aversion is not without difficulty, as the amount of optimal savings is also influenced by properties of the third derivative of utility (Kimball (1990)). As a specific example, let us look at quadratic utility. Let  $U(w) := w - \alpha w^2$  with  $\alpha > 0$ , but sufficiently small for risk aversion. Then, it follows that

**Proposition 3.** *a) If  $w_1 - c(y) - s > w_2 - l(y) + s(1+r)$  and  $1/(1+r) < \delta$ , increased risk-aversion will lead to higher spendings on self-insurance and reduced savings. If  $w_1 - c(y) - s < w_2 - l(y) + s(1+r)$  and  $1/(1+r) > \delta$ , increased risk aversion will lower expenditures on self-insurance and increase savings.*

*b) If  $w_1 - c(x) - s > w_2 - 0.5l + s(1+r)$  and  $1/(1+r) < \delta$ , increased risk-aversion will lead to higher spendings on self-protection and reduced savings. If  $w_1 - c(x) - s < w_2 - 0.5l + s(1+r)$  and  $1/(1+r) > \delta$ , increased risk aversion will lower expenditures on self-protection and increase savings.*

In both cases, the first condition states that absolute spendings on prevention are currently modest and hence that current consumption is high enough to afford increasing preventive investments. The second condition is about the attractiveness of saving: if future utility is discounted stronger than by the risk-free rate, saving is relatively unattractive. Combined, spendings on prevention rise and savings fall with risk aversion. For the second parts of the proposition the argument is reversed. We see again that self-insurance and self-protection are very much alike here and that affordability from today's perspective is decisive for the question whether self-protection is increasing or decreasing in risk aversion.

## 4 Conclusion

Although in simple static models the relationship between risk aversion and self-insurance is monotonic, this may not hold in a dynamic context due to consumption smoothing incentives: more risk-averse individuals may want to lower self-insurance expenditures in favor of current consumption. Importantly, self-insurance and self-protection are very much alike in a two-period sense since for both techniques an endogenous threshold on current consumption is decisive on whether higher risk aversion lowers or raises risk management expenditures. This argument holds even if consumption can be smoothed through saving.



## References

- Briys, E. and Schlesinger, H. (1990). Risk aversion and the propensities for self-insurance and self-protection. *Southern Economic Journal*, 57:458–467.
- Dionne, G. and Eeckhoudt, L. (1985). Self-insurance, self-protection and increased risk aversion. *Economics Letters*, 17:39–42.
- Eeckhoudt, L. and Gollier, C. (2005). The impact of prudence on optimal prevention. *Economic Theory*, 26(4):989–994.
- Ehrlich, I. and Becker, G. S. (1972). Market insurance, self-insurance, and self-protection. *Journal of Political Economy*, 80:623–648.
- Kimball, M. (1990). Precautionary saving in the small and in the large. *Econometrica: Journal of the Econometric Society*, pages 53–73.
- Menegatti, M. (2009). Optimal prevention and prudence in a two-period model. *Mathematical Social Sciences*, 58(3):393–397.
- Menegatti, M. and Rebessi, F. (2011). On the substitution between saving and prevention. *Mathematical Social Sciences*, 62(3):176–182.
- Pratt, J. W. (1964). Risk aversion in the small and in the large. *Econometrica*, 32:122–136.

## Appendix

**Proof of Proposition 1:** We evaluate the foc of  $V$  at  $U$ 's optimal level of self-insurance  $y_U$ :

$$-c'(y_U)k'(U(w_1 - c(y)))U'(w_1 - c(y)) - \delta pl'(y_U)k'(U(w_2 - l(y)))U'(w_2 - l(y))$$

which is positive, yielding a higher level of self-insurance for agent  $V$ , if and only if  $k'(U(w_1 - c(y))) < k'(U(w_2 - l(y)))$ . This is equivalent to having  $w_1 - c(y_U) > w_2 - l(y_U)$ .  $\square$

**Proof of Proposition 2:** By an affine transformation, we can pick  $V$  such that  $V(w_2 - l) = U(w_2 - l)$  and  $V(w_2) = U(w_2)$  without changing preferences. Now we evaluate the foc of agent  $V$  at the optimal level of self-protection,  $x_U$ , of agent  $U$  to obtain

$$-c'(x_U)k'(U(w_1 - c(x_U)))U'(w_1 - c(x_U)) + \delta p'(x_U)(U(w_2 - l) - U(w_2)).$$

By substituting in the foc of  $U$  this becomes

$$-c'(x_U)U'(w_1 - c(x_U))(k'(U(w_1 - c(x_U))) - 1),$$

which is positive if and only if  $k'(U(w_1 - c(x_U)))$  is below 1.  $\square$

**Proof of Proposition 3:** The two-dimensional version of the implicit function theorem yields

$$\begin{pmatrix} \frac{dy}{ds} \\ \frac{d\alpha}{ds} \end{pmatrix} = -\frac{1}{D} \begin{pmatrix} EU_{ss} & -EU_{ys} \\ -EU_{ys} & EU_{yy} \end{pmatrix} \cdot \begin{pmatrix} EU_{y\alpha} \\ EU_{s\alpha} \end{pmatrix},$$

where  $D$  denotes the determinant of the Hessian of  $EU$ . All the signs can be unambiguously determined except the signs of the entries of the last vector. Now

$$\begin{aligned} EU_{y\alpha} &= 2\left(c'(y)(w_1 - c(y) - s) + \delta pl'(y)(w_2 - l(y) + s(1 + r))\right) \\ &= \frac{1}{\alpha}(c'(y) + \delta pl'(y)), \end{aligned}$$

by substituting in the foc with respect to  $y$ . Exploiting the foc again this is positive if and only if

$$U'(w_1 - c(y) - s) < U'(w_2 - l(y) + s(1 + r)),$$

leading to the condition that compares consumption levels. Furthermore,

$$\begin{aligned} EU_{s\alpha} &= 2\left((w_1 - c(y) - s) - \delta(1 + r)(p(w_2 - l(y) + s(1 + r)) + (1 - p)(w_2 + s(1 + r)))\right) \\ &= \frac{1}{\alpha}(1 - \delta(1 + r)) \end{aligned}$$

by substituting in the foc for saving. This is negative if and only if the second condition holds. The proposition is obtained by resolving the matrix operation and using the sign conditions.

For self-protection, we obtain

$$\begin{aligned} EU_{x\alpha} &= 2c'(w_1 - c(x) - s) + \delta p'((w_2 + s(1 + r))^2 - (w_2 - l + s(1 + r))^2) \\ &= \frac{1}{\alpha}(c' + \delta p'l) \end{aligned}$$

by substituting in the foc. Exploiting the foc again this is positive if and only if

$$U'(w_1 - c(x) - s) < \frac{U(w_2 + s(1 + r)) - U(w_2 - l - s(1 + r))}{l},$$

which yields the consumption condition after some algebra. The procedure with respect to saving is identical to the above.

□

## Acknowledgement

We thank Louis Eeckhoudt for helpful comments.

## Working Papers on Risk and Insurance

- No 25: **Alexander Ellert, Oliver Urmann**, Competition in the Market for Supplementary Health Insurance: The Case of Competing Nonprofit Sickness Funds, Januar 2012.
- No 24: **Martin Nell, Stephan Rosenbrock**, Ein Risikoausgleichsmodell für den Wettbewerb um Bestandskunden in der PKV, May 2008, erschienen in: Zeitschrift für die gesamte Versicherungswissenschaft, Band 98, Heft 4, S. 391-409, 2009.
- No 23: **Phillip Pohl**, Einfluss der Balanced-Scorecard-Werteparameter auf den Unternehmenswert in einem Regressionsmodell am Beispiel der Versicherungsbranche, February 2008.
- No 22: **Annette Hofmann, Martin Nell**, The Impact of Intermediary Remuneration in Differentiated Insurance Markets, February 2008.
- No 21: **Bernhard Hirsch, Martin Nell**, Anreizkompatibilität von Entschädigungssystemen für Kosten und Verluste aus Tierseuchenausbrüchen in der Europäischen Union, June 2007.
- No 20: **Annette Hofmann, Martin Nell, Philipp Pohl**, The Optimal Pricing Strategy for an Insurer when Risk Preferences are Stochastically Distributed, March 2007.
- No 19: **Martin Nell, Stephan Rosenbrock**, Wettbewerb in kapitalgedeckten Krankenversicherungssystemen: Ein konsistenter Ansatz zur Übertragung von individuellen Alterungsrückstellungen in der Privaten Krankenversicherung, February 2007.
- No 18: **Martin Nell, Stephan Rosenbrock**, Das Inflationsproblem bei der Übertragung von individuellen Alterungsrückstellungen in der privaten Krankenversicherung, August 2006.
- No 17: **Uwe Focht, Andreas Richter, Jörg Schiller**, Intermediation, Compensation and Tacit Collusion in Insurance Markets, March 2006.
- No 16: **Annette Hofmann**, Internalizing Externalities of Loss-Prevention through Insurance Monopoly: An Analysis of Interdependent Consumer Risks, November 2005.
- No 15: **Martin Nell, Philipp Pohl**, Wertorientierte Steuerung von Lebensversicherungsunternehmen mittels stochastischer Prozesse, November 2005.
- No 14: **Martin Nell, Andreas Richter, Jörg Schiller**, When prices hardly matter: Incomplete insurance contracts and markets for repair goods, January 2005, erschienen in: European Economic Review, Volume 53, No. 3, S. 343-354, 2009.
- No 13: **Jörg Schiller**, Versicherungsbetrug als ökonomisches Problem: Eine vertragstheoretische Analyse, July 2004.

- No 12: **Martin Nell, Andreas Richter**, Catastrophic Events as Threats to Society: Private and Public Risk Management Strategies, January 2004, erschienen in: Frenkel, M., Hommel, U., Rudolf, M. (eds.): Risk Management: Challenge and Opportunity, 2nd ed., Berlin Heidelberg.
- No 11: **M. Martin Boyer, Jörg Schiller**, Merging Automobile Insurance Regulatory Bodies: The Case of Atlantic Canada, November 2003, erschienen in: Assurances et Gestion des Risques, 72. Jg. (2004), S. 57 – 89.
- No 10: **Martin Nell, Andreas Richter**, Improving Risk Allocation Through Cat Bonds, November 2002, erschienen in: The Geneva Papers on Risk and Insurance – Issues and Practice, 29. Jg. (2004), S. 183 – 201.
- No 9: **Klaus Bender, Andreas Richter**, Optimales Vertragsdesign bei moralischem Risiko in der Rückversicherung, October 2002, erschienen in: Zeitschrift für die gesamte Versicherungswissenschaft, 92. Jg. (2003): S. 483 – 506.
- No 8: **Jörg Schiller**, The Impact of Insurance Fraud Detection Systems, October 2002.
- No 7: **Martin Nell, Jörg Schiller**, Erklärungsansätze für vertragswidriges Verhalten von Versicherungsnehmern aus Sicht der ökonomischen Theorie, May 2002, erschienen in: Zeitschrift für die gesamte Versicherungswissenschaft, 91. Jg. (2002), S. 533 – 556.
- No 6: **Walter Karten**, Ökonomische Aspekte einer EU-Richtlinie zur Versicherungsvermittlung, January 2002, erschienen in: Zeitschrift für die gesamte Versicherungswissenschaft, 91. Jg. (2002), S. 43 – 60.
- No 5: **Andreas Richter, Jochen Ruß**, Tax Arbitrage in the German Insurance Market, December 2001, erschienen in: Blätter der Deutschen Gesellschaft für Versicherungsmathematik, 25. Jg. (2002), S. 659 – 672.
- No 4: **Martin Nell**, Staatshaftung für Terrorrisiken?, Dezember 2001, erschienen in: ifo Schnelldienst, 54. Jg. (2001), Heft 24, S. 6 – 9.
- No 3: **Andreas Richter**, Moderne Finanzinstrumente im Rahmen des Katastrophen-Risk-Managements – Basisrisiko versus Ausfallrisiko, September 2001, erschienen in: Zeitschrift für betriebswirtschaftliche Forschung, 56. Jg. (2004), S. 99 – 121.
- No 2: **Martin Nell**, Managed Claims: Zur Notwendigkeit einer vertikalen Integration von Versicherungs- und Reparaturleistungen, August 2001, erschienen in: Zeitschrift für betriebswirtschaftliche Forschung, 53. Jg. (2001), 47. Sonderheft, S. 207 – 231.
- No 1: **Martin Nell, Andreas Richter**, The Design of Liability Rules for Highly Risky Activities – Is Strict Liability the Better Solution?, June 2001, erschienen in: International Review of Law & Economics, 23. Jg. (2003), S. 31 – 47.

**For orders please contact / Kontaktadresse für Bestellungen:**

Prof. Dr. Martin Nell  
Geschäftsführender Direktor des  
Instituts für Versicherungsbetriebslehre  
Von-Melle-Park 5  
D-20146 Hamburg

Tel.: +49-(0)40-42838-4014

Fax: +49-(0)40-42838-5505

E-mail: [martin.nell@wiso.uni-hamburg.de](mailto:martin.nell@wiso.uni-hamburg.de)

[www.hzv-uhh.de](http://www.hzv-uhh.de)

Mit freundlicher Unterstützung des  
Vereins zur Förderung der Versicherungswissenschaft in Hamburg e.V.