At War with the Weather Managing Large-Scale Risks in a New Era of Catastrophes

Howard C. Kunreuther and Erwann O. Michel-Kerjan

with Neil A. Doherty, Martin F. Grace, Robert W. Klein, and Mark V. Pauly

The MIT Press Cambridge, Massachusetts London, England

© 2009 Massachusetts Institute of Technology

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.

For information about special quantity discounts, please email special_sales@mitpress.mit.edu.

This book was set in Times Roman on 3B2 by Asco Typesetters, Hong Kong. Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Kunreuther, Howard.

At war with the weather: managing large-scale risks in a new era of catastrophes / Howard C. Kunreuther and Erwann O. Michel-Kerjan with Neil A. Doherty . . . [et al.].

p. cm.

Includes bibliographical references and index.

ISBN: 978-0-262-01282-9 (hardcover : alk. paper)

1. Disaster insurance—United States. 2. Emergency management—United States. 3. Risk management—

United States. I. Michel-Kerjan, Erwann. II. Title. HG9979.3.K86 2009

368.1′2200973—dc22 2008043058

10 9 8 7 6 5 4 3 2 1

Actuarially fair premiums, 121, 136–138 Actuarial rates and, 84–85, 96, 258–259 Actuaries decision making and, 129, 132–135 financial soundness and, 112, 347–348 insurers' decision making and, 129–150 (see also Insurers) rate increases and, 35, 46 risk ambiguity and, 129, 132–135 Adjustable-premium contracts (APCs), 341–342 Adverse selection, 84, 131, 135, 147 Affordability, xiv, 379n17 adjustable-premium contracts (APCs) and, 341–342 all-hazards insurance and, 343–346 American Housing Survey (AHS) and, 235–236, 238–239, 242, 246 definition of, 237, 241–243 employment status and, 238 equity and, 235–237, 243–244 fixed-price contracts (FPCs) and, 341–342 food stamps program and, 336–337 homeowners' insurance and, 235–246 household income and, 237–246, 238 innovations for, 333–336 Low-Income Home Energy Assistance Program and, 337–338 national catastrophe fund and, 348–349 policy implications for, 244–246 poverty and, 235–246, 336–337 purchasing power and, 235 RECAP method and, 342 risk reduction measures and, 265–266 uninsured homeowners and, 235–241 Universal Service Fund (USF) and, 337	features of, 343 National Flood Insurance Program (NFIP) and, 343–345 Allstate Group, 35–37 correlated risks and, 136 discount premiums and, 254 exposure reduction by, 62 homeowners' insurance and, 218 Hurricane Andrew and, 136 legal issues of, 39, 41–42, 371n15 market concentration and, 62 wind-water controversy and, 41–42 Alquist-Priolo Act, 13 Alternative risk transfer (ART) instruments innovations for, 333 insurance-linked securities (ILS) and, 173–191 status quo analysis and, 278–280 A.M. Best, 22, 381n15 competitive market analysis and, 295, 297–299 decision making and, 139 homeowners' insurance and, 206, 214 policy analysis and, 217, 274, 278–279, 306 Ambiguity of risk, 129, 132–135 American Association of State Climatologists, 12 American Housing Survey (AHS) affordability issues and, 235–236, 238–239, 242, 246 policy analysis and, 276, 278 status quo analysis and, 276, 278 American International Group (AIG), 182, 354, 373n26 Anxiety reduction, 124–126 Army Corps of Engineers, 262 Auctioned reinsurance contracts, 333 Auto insurance, 100 Average annual loss (AAL), 156–158, 228–229, 274,
	Average annual loss (AAL), 156–158, 228–229, 274, 286, 303
value judgments and, 235, 243–244 vouchers and, 338 AIR Worldwide Corporation, 9, 21, 141 All-hazards insurance advantages of, 343–345 disadvantages of, 345–346	Banks homeowners and, 124 innovation and, 339–340 insurance-linked securities (ILS) and, 184, 188 catastrophes and, 4, 13, 16–17, 23 Base Flood Elevations, 113–115

Blanco, Governor Kathleen, 123–124	supply and demand framework and, 193–201
Bolivar Peninsula, 260	weather derivatives and, 184–185
Brokers, xx, 13, 21. See also specific business	Caribbean, 12
capital allocation and, 137, 152–153	Catastrophe bonds, 174, 176–181, 186–188, 191, 377nn9,17
policy analysis and, 304 regulation and, 30–31	Catastrophe models, 147–148
reinsurance capacity and, 165, 167	average annual loss (AAL) and, 156–158, 228–229,
Broward county, 64, 93, 105	274, 286, 303
Building Code Effectiveness Grading Schedule	computers and, 141
(BCEGS), 251–253	exceedance probability curves and, 129, 143–144,
Building codes, 17, 381n13	146, 157, 353–354
commercial, 251	expected loss and, 155–159
Community Rating System (CRS) and, 252–253	Florida and, 144–146, 155–159
Florida and, 253	history of, 141
grandfathered structures and, 254	hurricane risks and, 144–146
Hurricane Charley and, 253	information technology and, 141
importance of, 247, 251–255	nature of, 142–143
improvment of, 264–265	reinsurers' decision making and, 155–159
International Code Council (ICC) and, 251	standard deviation and, 145–146
Omnibus Coastal Property Insurance Reform Act	U.S. Hurricane Model and, 156, 274, 277
and, 264	Catastrophe Reserve Trust Fund (CRTF), 286–288
politician's dilemma and, 263–264	Catastrophes. See also specific type
premium discounts and, 254–255	bond issuances and, 21
residential, 251	choice heuristics and, 355
social norms and, 261	death tolls from, 352
Bush, President George W., 124	developing countries and, 352
	five-pillar strategy for, 352–356
California, 18, 155	Global Risk Network and, 357–359
industry loss warranties and, 176	impact of extreme events and, 111-112
National Flood Insurance Program (NFIP) and, 91	increase of, xiii–xv, 3–4, 351
natural disaster syndrome and, 263	infrequency of major, 132–135
Northridge earthquake and, 5–6, 21, 347	innovations for, 333–349
risk reduction measures and, 263-264	insurance-linked securities (ILS) and, 173-191
tax incentives and, 264	insurers' decision making and, 129-150
California Earthquake Authority (CEA), 54–55	long-term insurance (LTI) contracts and, 338–342
Capacity constraint model, 160, 194–197	national catastrophe fund and, 348–349
Capital, 13, 21	need for bold initiatives, 357–359
actuarially fair premiums and, 136–138	percentage of weather-related, 6–7
broker allocation and, 137, 152–153	policy analysis and, 269-329 (see also Policy
constraint model for, 194–197	analysis)
derivatives and, 173, 183–184, 187–191	presidential declaration of disaster and, 19, 122–124
equilibrium price and, 194–197	375n12
expected liability and, 138	recent changes in impact of, 4–7
fair rate of return and, 77, 136–138, 147, 303,	super-cats and, 6
372n12	sustainable recovery from, xiv (see also Policy)
hurricane risk analysis and, 59–81	twenty most costly, 6
importance of cost of, 136–138	winning the war against, 351–360
Insurance Capital Build-Up Incentive Program and,	worldwide data for, 23
284	Center for Sustainable Communities, 16
insurance-linked securities (ILS) and, 173–191	C-4 Basin Project, 266–267
investors' concerns and, 186–187 (see also Investors) issuers' concerns and, 185–186	Chicago Board of Trade, 188, 354 Chicago Mercantile Exchange (CME), 173, 184, 188
loading factor and, 138 recent trends in reinsurance market and, 161–171	Churchill, Winston, 4 Citizens Property Insurance Corporation, 18, 26, 62
reinsurers' decision making and, 151–171	catastrophe models and, 144
shocks and, 194–197	Commercial Lines Account (CLA) policies and, 48–
Solvency II and, 185–186	49
surplus, 20 (see also Surplus)	discount premiums and, 254
* · · · · · · · · · · · · · · · · · · ·	* · · · · · · · · · · · · · · · · · · ·

homeowners' insurance and, 208, 210, 215-216, 218, building codes and, 17, 247, 251–255, 261–265 222, 231 C-4 Basin Project and, 266–267 market concentration and, 65-66, 275-276 contents damage and, 98, 248-249 flood insurance rate maps (FIRMs) and, 84-85 Mission Task Force and, 46 Personal Lines Account (PLA) policies and, 48–49 floodplain resettlement and, 260, 262 policy analysis and, 271, 275-276 grandfathered structures and, 254 reinsurance market and, 167 homeowners and, 247 (see also Homeowners) residual market regulation and, 44-50 levee effect and, 259 status quo analysis and, 280, 288, 291 Miami Children's Hospital (MCH) and, 267–268 unit elastic demand and, 203 mitigation grants and, 247, 250-251, 253, 267 Clearing prices, 198–201 National Institute of Building Science and, 250 Climate change, 3, 11–13, 85, 357 natural disaster syndrome and, 262-263 Coastal hurricane zones, 333, 347–348 panel systems and, 267-268 Coastal residents, 8-9, 27, 132, 153, 369n8 risk reduction measures and, 247-268 seawalls and, 260 all-hazards insurance and, 343–346 catastrophe models and, 155–159 special flood hazard areas and, 86, 103-105 Citizens Property Insurance Corporation and, 44structural damage and, 248-249 wind damage and, 249-250 (see also Wind) Contents damage, 98, 248-249 coastal hurricane zones and, 333, 347–348 Cooling degree days (CDDs), 377n17 correlated risks and, 136 increased insurance rates and, 59 Corporate bonds, 186 information-sharing equity and, 346 Cost functions, 60–61 nonrenewing policies and, 39-40 Coverage Omnibus Coastal Property Insurance Reform Act "acts of God," 42 and, 264 affordability and, 336–338 (see also Affordability) special flood hazard areas (SFHAs) and, 86 all-hazards insurance and, 343-346 Texas Windstorm Insurance Association and, 271, availability of, 74-76, 161-171 276, 284–288 catastrophe bonds and, 176–181 undiversifiable catastrophe risk and, 199-200 competitive market analysis and, 271, 295-303 Coinsurance contents, 98, 248-249 moral hazard and, 135-136 cost-benefit analysis and, 119 pro rata, 152, 174 decision making theory and, 119-127 quota-share, 152, 174, 182 deductibles and, 76–77 (see also Deductibles) Collateralized debt obligation (CDO), 184 determining whether to provide, 130-131, 153-154 Commissioners distribution of provisions, 76-77 fines and, 28-29 Florida flood insurance, 96–101 homeowners' insurance and, 206 homeowners' insurance and, 217-218, 221-231 nonrenewal notices and, 39-40 industry loss warranties and, 174-176 National Association of Insurance Commissioners insurability concept and, 130-131 (NAIC), 28, 31, 78, 206, 372n13 insurance-linked securities (ILS) and, 173-191 regulation and, 28-30 (see also Regulation) insurers' decision making and, 129–150 Committee on Financial Markets, 359 limitation by reinsurers and, 161–165 Community rating system (CRS), 92, 95–96, 252–253 long-term insurance (LTI) contracts and, 338-343 Competitive market analysis, 271 loss capacity and, 165-166, 317-329 assumptions for, 295-299 market performance/conduct issues and, 70-74 company comparison data for, 313-316 maximum limits of, 97–99 databases for, 295, 297 moral hazard and, 135-136 direct premiums written (DPW) and, 295, 297 National Flood Insurance Program (NFIP) statistics, insurance calculation and, 297-298 87 - 91methodology for, 295-299 recent reinsurance market trends and, 161-171 no reinsurance, 299, 301 reinsurers' decision making and, 151-171 rating agencies and, 295, 297-299 sidecars and, 174, 181-183 reinsurance in place, 302-303 state differences in, 269 reinsurer surplus and, 298-299 status quo analysis and, 276-295 Competitive rating (CR), 32–34 structural damage and, 248-249 Consorcio de Compensation de Seguros, 343 survival constraint and, 130-131, 153-154 Construction and real estate, 13, 16 Temporary Emergency Additional Coverage Options better zoning ordinances and, 264-265 (TEACO) and, 275, 282, 284

subjectivity and, 258-259 Coverage (cont.) Temporary Increase in Coverage Limit (TICL) and, superstitions and, 260–261 275, 282, 284 survival constraint and, 130-131, 153-154 terrorism and, 355 temporal planning biases and, 257 total insured value (TIV) and, 274 triggering effect and, 261 wind-water controversy and, 25-26, 41-43 underweighting the future and, 257–258 Credit default swap (CDS), 184 Deductibles, 374nn29,37 Credit derivatives, 173, 183–184 adverse selection and, 135 Cyclones, 11-12, 352 choice of low, 99-101 client surveys and, 100 Dade County. See Miami-Dade County flood risk and, 83, 92 Florida flood insurance, 96–101 Dams, 262 Decision making homeowners' insurance and, 120, 204-205, 217-221, adverse selection and, 84, 131, 135, 147 225-232, 246 affordability issues and, 122, 235-246 hurricane risk and, 72, 76–77 behavioral considerations and, 256, 355 impact of catastrophes and, 101–102 insurance-linked securities (ILS) and, 181 biases and, 257, 355 bonus systems and, 356 moral hazard and, 135-136 policy analysis and, 282, 288-289, 294, 299 budgeting heuristics and, 256-257 state comparison of, 25, 32, 38, 40 building codes and, 263–265 catastrophe models and, 141–148, 155–159 supply and demand framework and, 193, 197–201 choice heuristics and, 355 Derivatives, 173, 187–191 cognitive norms and, 126 Direct premiums written (DPW), 62, 295, 297 correlated risks and, 136 Disaster relief, xiii, 375n12 cost of capital and, 136-138 earthquakes and, 122-124 crime statistics and, 259 homeowners and, 119-124, 127 emotion and, 124-126, 258-261, 355 hurricane risk and, 84 exceedance probability curves and, 143–144, 146 innovations and, 340, 348 excessive optimism effects and, 258–259 new era of, 19 expected utility and, 120 risk reduction measures and, 262-265 false alarms and, 260 Dispersion curves, 189 family protection and, 125 Distribution systems, 217–218 five-pillar strategy for, 352–356 Domiciliary state, 31 flood insurance and, 124–125 floodplain resettlement and, 260, 262 Earthquakes, 4, 20 homeowners and, 119–127 (see also Homeowners) Alaska, 123 all-hazards insurance and, 343-346 insurability concept and, 130–131 interdependencies and, 261, 354-359 Alquist-Priolo Act and, 13 learning failures and, 259–261 California Earthquake Authority (CEA) and, 54-55 levee effect and, 259 catastrophe bonds and, 177, 179 loading factor and, 138 catastrophe models and, 141-146, 155-159 moral hazard and, 44, 120, 131, 135–136, 147, 198 China, 7, 352 natural disaster syndrome and, 262–263 disaster relief and, 122-124 normative model of, 120 industry loss warranties and, 176 insurance and, 18 Omnibus Coastal Property Insurance Reform Act and, 264 mitigation grants and, 247, 250 open windows during tornado and, 260-261 natural disaster syndrome and, 262-263 politician's dilemma and, 263–264 Northridge, 5–6, 21, 347 private reinsurers coverage, 151-171 reinsurance contract auctions and, 347 rating agencies and, 129, 139–141, 149–150 risk ambiguity and, 132-135 return on equity (ROE) and, 137, 153-154 undiversifiable catastrophe risk and, 199–200 Economic issues risk ambiguity and, 121, 132-135 risk reduction measures and, 247-268 affordability issues and, 235-246 role of disaster relief, 122–124 American Housing Survey (AHS) and, 235, 238–239, role of goals, 124-125 242, 246 Samaritan's dilemma and, 122 disaster increase and, 3–7 disaster relief and, xiii, 19, 84, 119-124, 127, 262setting premiums and, 131–136 social norms and, 126, 261 265, 340, 348, 375n12 standard deviation and, 130, 145-146 federal poverty line and, 236, 238-241, 246

financial institutions and, 16–17	loading factor and, 303
Great Depression and, 339	natural disaster syndrome and, 262
Herfindahl-Hirschman Index (HHI) and, 65–67	premium setting and, 154
household income and, 237–246	profits on insurance transactions (PITs) and, 78
hurricane risk assessment and, 59–81	supply and demand framework and, 194
insurance-linked securities (ILS) and, 173–191	Equity volatility dispersion, 173, 188–191
insurance rates and, 32–38 (see also Rates)	Escambia County, 102–103
insurers' decision making and, 129–150	Europe
investors and, 22 (see also Investors)	catastrophe bonds and, 179
long-term insurance (LTI) contracts and, 338–343	industry loss warranties (ILWs) and, 175
loss from hurricanes, 23, 102, 124, 132, 161, 173–	reinsurers and, 166
174, 271	Solvency II and, 185–186
man-made disasters, 7	Event loss swaps, 188
mitigation grants and, 247, 250-251, 253, 267	Exceedance probability (EP) curves, 129, 146
mortgages and, 16–17	average annual loss (AAL) and, 157
negative profits and, 59	construction of, 143–144
politician's dilemma and, 263–264	five-pillar strategy and, 353-354
profitability and, 77–79 (see also Profitability)	Excess-of-loss insurance, 175, 181
property values and, 3, 83, 97, 99, 112, 119, 220,	Expected loss, xvi, 55
261	adverse selection and, 84, 131, 135, 147
recent changes in impact of catastrophes, 4–7	average annual loss (AAL) and, 156–158, 228–229,
risk reduction measures and, 250–251, 255–256, 311	274, 286, 303
SBA disaster loans and, 19	catastrophe models and, 155–159
super-cats and, 6	coverage availability and, 161–165
surplus and, 20 (see also Surplus)	flood risk and, 100
survival constraint and, 130–131	homeowners and, 126, 208, 216-219, 225, 227, 229
wealth normalization and, 9	innovations and, 340–341
wind loss cost data and, 317-329	insurance-linked securities (ILS) and, 176
Electric power grid failure, 351, 354	insurer decision making and, 129–130, 134–138,
	145–147
Emotion, 124–126	
EQECAT, 21, 141	moral hazard and, 44, 120, 131, 135–136, 147, 198
EQE International, 141	policy analysis and, 303, 306
Equations	pure premium and, 71
competitive market analysis, 298	recent market trends and, 161–171
deductible elasticity, 227	reinsurers and, 151–171
demand, 208	supply and demand framework and, 198–199
expected utility, 120, 217	Expected utility, 119-121, 124, 127, 197, 217
fair rate of return on premium, 138	Exposure. See also Risk management
FHCF payout calculation, 281	average annual loss (AAL) and, 156–158, 228–229,
layer pricing, 153, 155	274, 286, 303
loading factor, 138	catastrophe models and, 141–146, 155–159
loss cost, 303	
	competitive market analysis and, 295–303
maximum number of policies, 131	concentrated, 155
price modeling, 217–218	diffuse, 155
reinsurer coverage, 153, 155	Florida's peak, 270
supply, 212	homeowners' insurance and, 203–232
survival constraint, 131	indicated loss cost (ILC) and, 218, 227
Equilibrium, 38	insurance-linked securities (ILS) and, 173–191
homeowners' insurance and, 204, 208, 212	National Flood Insurance Program (NFIP) and, 87-
supply and demand framework and, 193-201, 204,	88
208, 212	policy analysis and, 269-329 (see also Policy
Equity, xiv, 379n14	analysis)
affordability and, 235–237, 243–244	premiums and, 160–161 (see also Premiums)
	• '
all-hazards insurance and, 343, 349	probable maximum losses (PMLs) and, 139, 274–
homeowners' insurance and, 214, 218, 235–237	275, 278–279
information-sharing, 346	recent reinsurance market trends and, 161–171
innovations for, 182, 186, 333–336	state residential, 271, 274
insurance-linked securities (ILS) and, 182, 186–191	status quo analysis and, 276–295
insurer decision making and, 129	total insured value (TIV) and, 144, 274, 295
y ,	

FAIR Plans, 44, 51, 54	Five-pillar strategy
Fair rate of return, 77, 136–138, 147, 303, 372n12	behavioral biases and, 355
Fast Track Monitoring System, 71	bonus systems and, 356
Federal Communications Commission, 337	catastrophe risk management and, 355–356
Federal Emergency Management Agency (FEMA),	choice heuristics and, 355
19, 124	exceedance probability (EP) curves and, 353–354
awareness programs of, 87	interdependencies and, 354, 356
Base Flood Elevations and, 114	problem characterization and, 352–353
Cover America campaign and, 87	risk assessment and, 353–354
flood maps and, 85, 94–96, 114, 264	scenario construction and, 353–354, 356
FloodSmart campaign and, 87	Fixed-price contracts (FPCs), 341–342
impact of extreme events and, 111–112	Flex rating systems, 32
mitigation grants and, 247, 250–251, 267	Flood Disaster Protection Act, 86
Write-Your-Own program and, 109–110	Flood insurance
zoning ordinances and, 264	buyer characteristics, 93–96
Federal government. See also specific entity	choice changes in, 83
catastrophe bonds and, 179	claim payment factors and, 102–104
coastal hurricane zones and, 347–348	competitive market analysis and, 295–299
disaster relief and, xiii, 19, 84, 119–124, 127, 262–	cost evolution of, 104–108
265, 340, 348, 375n12	decision making theory and, 124–125
Flood Disaster Protection Act and, 86	deductible choice and, 99–101 flood zone definitions and, 94–96, 102, 105, 113–115
food stamp program and, 336–337 insurance regulation and, 19–20	Florida and, 92–108
mitigation grants and, 247, 250–251, 267	historical perspective on, 84–86
national catastrophe fund and, 348–349	impact of extreme events and, 101–102, 111–112
National Flood Insurance Program (NFIP) and, 9,	individual behavioral bias and, 85–86
16, 19, 23, 84 (<i>see also</i> National Flood Insurance	National Flood Insurance Program (NFIP) and, 87–
Program (NFIP))	108 (see also National Flood Insurance Program
poverty line of, 236, 238–241, 243–246, 336–337,	(NFIP))
379n1	premiums and, 84
presidential declaration of disaster and, 19, 122-124,	special flood hazard areas (SFHAs) and, 86, 103–105
375n12	take-up rates for, 85
reinsurance contract auctions and, 347	Write-Your-Own program and, 83–85, 108
risk reduction measures and, 264-265	Flood insurance rate maps (FIRMs), 84–85, 113
SBA disaster loans and, 19	Floods, xv, 13
special flood hazard areas (SFHAs) and, 86	"acts of God" and, 42
tax policy and, 19-20, 138, 263-264, 381n10	adverse selection and, 135
vouchers and, 338	all-hazards insurance and, 343–346
File and use systems, 33	C-4 Basin Project and, 266–267
Financial institutions	economic effects of, 4–7, 373n18
homeowners and, 124	emotional response and, 124–125
innovation and, 339–340	five-pillar strategy for, 352–356
insurance-linked securities (ILS) and, 184, 188	floodplain resettlement and, 260, 262
new era of catastrophes and, 4, 13, 16–17, 23	homeowners' insurance and, 236
Fines, 28–29 Fire 320, 277n0	levee effect and, 259
Fire, 339, 377n9 all-hazards insurance and, 343–346	mitigation grants and, 247, 250 natural disaster syndrome and, 262–263
Ben Franklin and, 339	property drainage and, 248–249
coverage of, 41, 342	risk ambiguity and, 132–135
forest, 5	risk reduction measures and, 266–268
homeowners and, 203, 238	seawalls and, 260
policy analysis and, 304	taxpayer costs and, 84
reinsurers' decision making and, 124, 133, 150, 154,	wind-water controversy and, 25–26, 41–43
160	FloodSmart campaign, 87
risk reduction measures and, 249, 251	Florida, xiii, xv, 3, 13, 57–58, 61, 81, 151
understanding contracts and, 342	affordability issues and, 238–239, 246
volatility assessment and, 154	American Housing Survey and, 235
Fitch, 22	building codes and, 253–255

C-4 Basin Project and, 266-267 Insurance Capital Build-Up Incentive Program and, catastrophe models and, 144-146, 155-159 Citizens Property Insurance Corporation and, 18, 62 payout calculation and, 281–282 (see also Citizens Property Insurance Corporation) policy analysis and, 271, 274-275 competitive market analysis and, 295-303 reinsurance market and, 166-167 status quo analysis and, 279-284, 288, 291, 293 coverage amounts in, 96–101 deductible choices in, 99-101 U.S. Hurricane Model and, 156 exceedance probability curves and, 143–144 Florida Insurance Guaranty Association (FIGA), 19, exposure patterns in, 67, 70, 260 financial regulation and, 43-44 Florida Office of Insurance Regulation (FLOIR), 35, flood insurance and, 92-108 39, 49 food stamp program and, 337 Allstate and, 371n15 grandfathered structures and, 254 homeowners' insurance and, 206 hurricane risk analysis and, 67 hazard-prone areas and, 9 homeowners' insurance and, 203-217, 220-232 policy analysis and, 275 hurricane potential of, 269–270 (see also Hurricanes) Quality Supplemental Report (QUASR) system and, impact of catastrophes on consumer choice, 101–102 67, 74 income elasticity and, 204 status quo analysis and, 281 industry loss warranties and, 176 Florida Residential Property and Casualty Joint innovations for, 333-349 Underwriting Association, 46 insurance rates in, 34-38, 59, 72, 74 Florida Windstorm Underwriting Association, 46 insurers' decision making and, 129–130 FONDEN, 179 loss comparison data for, 307-311 Food stamp program, 336–337 market analysis of, 60-67, 77-81 Forest fires, 5 metropolitan areas and, 295 French Caisse Centrale de Reassurance, 343 French minimum efficient scale (MES), 60-61 Miami-Dade County, 17, 64, 67, 105, 130, 136, 143-148, 155, 267, 271, 295 National Flood Insurance Program (NFIP) and, 88, Geographic information systems (GIS), 141 Global Agenda Councils (GACs), 358–359 policy analysis and, 271 (see also Policy analysis) Globalization, 354–359 political pressure in, 27 Global Risk Network, 357-359 population growth in, 8–9 Global Risks Report, 358 residual market mechanisms and, 26, 46-51 Global warming, 12 restructuring of property insurance markets and, 59 Grandfathered structures, 254 risk reduction measures and, 250-251, 253-255, Green Tree Mutual Assurance Company, 339 266-268 Gron-Winter model, 194 special flood hazard areas (SFHAs) and, 86, 103-105 Guaranty associations, 56–57 State Board of Adminstration (SBA) and, 282-284 Gulf Coast, 9, 12, 41-43, 161. See also Coastal state funds and, 275–276 residents status quo analysis and, 280-284, 288-293 Guy Carpenter, 160–161, 163, 167, 169–171, 188 underwriting regulation and, 39 undiversifiable catastrophe risk and, 201 Hazard-prone areas, 74, 270 unit elastic demand and, 203 affordability issues and, 122 wind loss cost and, 41, 46, 317-318 Base Flood Elevations and, 113-115 Write-Your-Own program and, 85 building codes and, 17, 247, 251-255, 261, 263-265 Florida Building Code (FBC), 253-255 catastrophe models and, 141-148, 155-159 Florida Commission on Hurricane Loss Projection coastal hurricane zones and, 333, 347–348 Methodology, 22 disaster relief and, 122-124 Florida Department of Community Affairs, 267 exceedance probability (EP) curves and, 143-144, Florida Department of Financial Services, 253 146, 157, 353-354 Florida Hurricane Catastrophe Fund (FHCF), 19, 26, five-pillar strategy and, 352–356 36, 54-56 flood zone mapping and, 84–85, 94–95, 113–115 average annual loss (AAL) and, 156-158 homeowners' insurance and, 204 (see also catastrophe models and, 144–145, 147, 155–159 Homeowners' insurance) competitive market analysis and, 297 increased development in, 8-11 funding arrangements and, 282, 284 innovations for, 333-349 homeowners' insurance and, 214 land use regulations and, 17 hurricane scenarios and, 269 levee effect and, 259

Hazard-prone areas (cont.) risk underestimation by, 258–259 NFIP flood zone definitions and, 94–96, 102, 105, role of disaster relief and, 122-124 113-115 role of goals and, 124-126 profit measurement and, 77-79 Safe Drinking Water Act and, 242–243 property values and, 3 social/cognitive norms and, 126, 261 reinsurers and, 20-21 status quo analysis and, 276–295 restructuring of property insurance markets and, 59 superstitions and, 260-261 risk management and, 20-21 (see also Risk temporal planning biases and, 257 management) underweighting the future and, 257–258 special flood hazard areas (SFHAs) and, 86, 103uninsured, 16, 235–241, 276–278 105, 112, 124, 126 uninsured home value (UHV) and, 277-278 wind-water controversy and, 25-26, 41-43 toxins and, 121 Hedge funds, 377n17 Homeowners' insurance catastrophe funds and, 187 (see also Catastrophe affordability issues and, 122, 235–246 average annual loss (AAL) and, 228-229 insurance-linked securities and, 173–176, 181, 183, commissioners and, 206 187, 189 company characteristics and, 211–216 sidecars and, 174, 181-183, 188, 191 competitive market analysis and, 295-303 Herfindahl-Hirschman Index (HHI), 65-67 contents damage and, 248-249 Homeowners, xv county-level analysis of, 206–217 all-hazards insurance and, 343-346 coverage and, 217-218, 221-231 American Housing Survey (AHS) and, 235–239, 242, cross-price elasticity and, 210, 212–213 cross-state analysis of, 217-231 246, 272, 276 budget heuristics and, 256-257 cross-subsidies and, 205-206 building codes and, 17, 247, 251–255, 261, 263–265 deductibles and, 120, 204-205, 217-221, 225-232, cost-benefit analysis and, 119 246 decision making theory and, 119-127 demand equation estimation and, 208–209 emotional consolation and, 124–126 direct premiums written (DPW) and, 295, 297 expected utility theory and, 120 distribution systems and, 217-218 factors influencing insurance purchases, 121-124 Florida and, 203-217, 220-232 federal poverty line and, 236, 238-241, 246 housing characteristics and, 210-211 financial protection and, 125 impact of premiums reflecting risk, 303–306 flood insurance and, 84-85 (see also Flood income elasticity and, 203-204 indicated loss cost (ILC) and, 218, 227, 229-230 insurance) floodplain resettlement and, 260, 262 innovations for, 333-349 grandfathered structures and, 254 insured home value (IHV) and, 278 household income and, 237-246 lack of, 16, 235-241, 276-278 impact of insurance status on welfare of, 235-246 long run perspective and, 372n12 information-sharing equity and, 346 long-term insurance (LTI) contracts and, 338–343 interdependencies and, 261 Louisiana, 18, 42, 51, 88, 91 learning failures and, 259–261 mortgages and, 208, 220-225, 235, 380n2 levee effect and, 259 New York and, 203–204, 220–221, 224–226, 229– long-term mortgages and, 339 Louisiana, 18, 42, 51, 88, 91 policy analysis and, 269-299 (see also Policy low-income energy assistance program and, 337 analysis) misperception of risk and, 121 postal-zone data and, 204, 206, 220 premiums and, 208-218, 221-231 mitigation grants and, 247, 250-251, 253, 267 moral hazard problems and, 120 price definition and, 217–218 natural disaster syndrome and, 262–263 price elasticity in, 221-231 nonrenewing policies and, 39-40 quantity demanded, 218–220 normative model of choice and, 120 rating agencies and, 205-206, 214 South Carolina and, 203-204, 220-221, 223, 225-Omnibus Coastal Property Insurance Reform Act and, 264 226, 230-232 structural damage and, 248-249 policy prices and, 71–74 property values and, 3, 83, 97, 99, 112, 119, 220, 261 supply and demand model for, 204-232 relationship with insurance agent and, 124 Texas and, 203–204, 216, 219–221, 232 residential exposure data and, 271, 274 total insured value (TIV) and, 274, 295, 303 risk reduction measures and, 247-268 unit elastic demand and, 203

Hood, Jim, Attorney General 42 economic impact of, 23, 102, 124, 132, 161, 173–174, HO-3 policies, 72, 76–77 Hurricane Andrew, 5-6, 17, 21, 170 five-pillar strategy for, 352-356 correlated risks and, 136 Galveston, Texas, 260 disaster relief and, 123 increased reinsurance costs and, 173 Florida and, 18-19 increase of, xiii, 4-7, 351 market effects of, 77-80 index of potential destructiveness for, 12 reinsurance contract auctions and, 347 innovations for, 333-349, 335 residual market regulation and, 48 insurer exposure patterns and, 67, 70 Hurricane Camille, 17 likelihood vs. intensity, 11-13 Hurricane Celia, 284 long-term intensity analysis of, 12–13 Hurricane Charley, 5, 23, 102, 247, 253, 266 market analysis of risk of, 59-81 Hurricane Dennis, 102 natural disaster syndrome and, 262-263 Hurricane Dolly, 287 ocean temperatures and, 11-12 Hurricane Frances, 5, 23, 102, 268 recent changes in impact of, 4–7 Hurricane Hugo, 5 risk ambiguity and, 132–135 Hurricane Ike, 5, 80, 194, 260, 284–285, 287 risk reduction measures and, 248-250, 265-268, Hurricane Ivan, 5, 23, 102 311-312 sidecars and, 181-183 Hurricane Jeanne, 5, 23, 102, 268 status quo analysis and, 271, 276-295 Hurricane Katrina, xiii, 50, 80, 167, 194 Texas Windstorm Insurance Association and, 271, all-hazards insurance and, 344–345 correlated risks and, 136 276, 284–288 cost of, 102, 124, 132, 161 total dissipation power of, 12 disaster relief and, 123-124 undiversifiable catastrophe risk and, 199-200 impact of extreme events and, 111-112 wind damage and, 249-250 (see also Wind) industry loss warranties (ILWs) and, 175-176 wind-water controversy and, 25-26, 41-43 learning failures and, 260 Miami Children's Hospital (MCH) and, 268 Index-based derivatives, 173, 188 National Flood Insurance Program (NFIP) and, 87, Indicated lost cost (ILC), 218, 227, 229-230, 379n21 97, 108 Industry loss warranties (ILWs), 174–176, 191 new era of catastrophes and, 5, 9, 19, 21-23 Inflation, 6, 9, 97, 369n13 policy claims and, 102, 108-111 Innovations prediction of, 356 adjustable-premium contracts (APCs) and, 341–342 reinsurers and, 20-21 affordability issues and, 333-338 risk ambiguity and, 132 all-hazards insurance and, 343-346 risk reduction measures and, 253 alternative risk transfer instruments (ARTs) and. sidecars and, 181-183 undiversifiable catastrophe risk and, 200 auctioned reinsurance contracts and, 333 war against weather and, 351, 356 coastal hurricane zones and, 333, 347–348 equity and, 333-336, 346 wind-water controversy and, 25–26, 41–43 Hurricane Rita, xiii, 50, 110, 136, 175 federal reinsurance contract auctions and, 347 Hurricane Wilma, xiii, 102, 110, 175, 260, 268 fixed-price contracts (FPCs) and, 341–342 Hurricanes, xv, 3, 20 food stamp program and, 336–337 all-hazards insurance and, 343-346 Global Risk Network and, 357-359 guiding principles for, 334-335 annual average of, 12 building codes and, 17, 247, 251–255, 261, 263– information-sharing platform and, 334, 346 insurance-linked securities (ILS) and, 346 265 long-term insurance (LTI) contracts and, 338–343 catastrophe bonds and, 177, 179 catastrophe models and, 141-148, 155-159 Low-Income Home Energy Assistance Program and, Category system of, 12 C-4 Basin Project and, 266-267 national catastrophe fund and, 348-349 need for bold initiatives in, 357-359 claim payment factors and, 102-104 climate change and, 11-13 premiums reflecting risk and, 333-336 coastal hurricane zones and, 333, 347-348 RECAP method and, 342 coverage lawsuits and, 25-26 Universal Service Fund (USF) and, 337 disaster relief and, 123-124 vouchers and, 338 disproportionate risk of metropolitan areas and, Institute for Business and Home Safety, 266, 277 269 Insurability, 130

Insurance. See also specific type commissioners and, 28–30 contents damage and, 98, 248-249 competitive market analysis and, 295–303, 313–316 cost-benefit analysis and, 119 correlated risks and, 136 cycle of, 194 cost conditions and, 60-61 excess-of-loss, 175, 181 cost of capital and, 136-138 factors affecting decision to buy, 119-127 decision making for coverage and, 129–150 financial protection goals and, 125 exceedance probability curves and, 143-144, 146 five-pillar strategy for, 352–356 exclusion of terrorism and, 355 Global Risk Network and, 357–359 exposure patterns and, 67, 70 (see also Exposure) innovations for, 333-349 fair rate of return and, 77, 136-138, 147, 303, lack of, 16, 235–241, 276–278 372n12 long-run perspective and, 70, 77, 80, 120, 231, 248, five-pillar strategy for, 352–356 335, 356, 372n12 guaranty associations and, 56-57 long-term insurance (LTI) contracts and, 338–343 homeowners' insurance and, 203-232 policy analysis and, 273–299 (see also Policy increased capital allocation and, 129-130 analysis) insurability concept and, 130–131 insurance-linked securities (ILS) and, 173-191 positive role of, 248 pro rata, 152, 174 investors and, 22 quota-share, 152, 174, 182 lawsuits against, 25-26 regulation and, 185 (see also Regulation) loading factor and, 138 market concentration and, 60-67 risk reduction measures and, 247-268 structural damage and, 248-249 market performance/conduct issues and, 70–74 supply and demand framework for, 193-201 minimum efficient scale and, 60-61 Insurance and Private Pensions Committee, 359 moral hazard and, 44, 120, 131, 135-136, 147, 198 Insurance Capital Build-Up Incentive Program, 284 negative profits and, 59 price trends and, 71–74 Insurance-linked securities (ILS) catastrophe bonds and, 174-181, 186-188, 191 professional relationships of, 124 credit risk and, 186 profitability and, 77–79 derivatives and, 173, 183-184, 187-191 Property Insurers Association of America (PCIAA) historical perspective on, 174–183 and, 72 increase of, 190-191 rate regulatory systems of, 32–33 industry loss warranties and, 174-176, 191 rating agencies and, 139-141, 149-150 investors' concerns and, 186-187 recent impact changes on, 4–7 issuers' concerns and, 185-186 risk ambiguity and, 132–135 (see also Risk market liquidity and, 346 management) new product innovation and, 188 setting premiums and, 131-136 pricing challenges of, 186 single-state companies and, 40 pro rata insurance and, 174 standard deviation and, 130, 145-146 rating agencies and, 187 supply and demand framework for, 193-201 regulation and, 185–187 survival constraint and, 130-131 sidecars and, 174, 181-183, 188, 191 undiversifiable catastrophe risk and, 199-201 Solvency II and, 185–186 wind-water controversy and, 25–26, 41–43 terrorism and, 179, 189 Write-Your-Own program and, 83–85, 108–110, tipping point for, 187-191 374n43 tranching and, 177, 187–188 Interdependencies volatility dispersion and, 189, 191 five-pillar strategy and, 354–359 weather derivatives and, 173, 184–185 need for bold initiatives, 357–359 Insurance Services Office (ISO), 378n25, 379n21 risk reduction and, 261, 266 Building Code Effectiveness Grading Schedule Interested parties, 23 (BCEGS) and, 251-253 brokers, 21 homeowners' insurance and, 218, 221 capital markets, 21 insurance-linked securities (ILS) and, 175 construction and real estate, 13, 16 market analysis and, 71, 77 federal government, 19-20 Insured home value (IHV), 278 financial institutions, 16–17 Insurers, xvi, 20-21. See also Reinsurers homeowners, 16 actuarially fair premiums and, 136-138 insurers, 20 adverse selection and, 84, 131, 135, 147 investors, 22 catastrophe models and, 141-148, 155-159 modeling firms, 21-22

rating agencies, 22 risk ambiguity and, 132-135 survival constraint and, 130-131, 153-154 reinsurers, 20-21 state government, 17–19 Loading factor, 138, 303-304 Internal Revenue Service (IRS), 334, 346 Long-term insurance (LTI) contracts, 382n14 International Building Code, 251 fixed-price contracts (FPCs) and, 341–342 International Code Council (ICC), 251 institutional details and, 342-343 International Residential Code, 251 nature of program, 338-341 Investors open issues in, 341 catastrophe bonds and, 176-181 protection against catastrophic losses and, 341-342 derivatives and, 173, 183-184, 187-191 risk reduction measures and, 339-341 enhanced market capital solutions and, 186-187 understanding, 342 executive officers and, 353 Losses. See Exposure; Risk management fair rate of return and, 77, 136-138, 147, 303, Loss on line (LOL), 164-165, 167 372n12 Louisiana, 18, 80, 263 five-pillar strategy for, 352–356 catastrophe bonds and, 179 Global Risk Network and, 357–359 Hurricane Katrina and, 87, 108 (see also Hurricane innovations for, 333–349 insurance-linked securities (ILS) and, 173-191 National Flood Insurance Program (NFIP) and, 88, return on equity (ROE) and, 22, 78, 129, 136-138, 153–154, 167, 170, 304 property insurance and, 25-26, 34, 42 risk reduction measures and, 247-268 (see also Risk wind-water coverage controversy and, 25–26, 42 management) Louisiana Citizens Property Insurance Corporation, Sharpe ratio and, 186, 378n23 supply and demand framework and, 193-201 Low-Income Home Energy Assistance Program, 337survival constraint and, 130-131, 153-154 tipping points and, 187–191 tranching and, 177, 187–188 McCarran-Ferguson Act, 370n2 volatility dispersion and, 173, 188-191 Man-made disasters weather derivatives and, 184-185 building codes and, 17, 247, 251-255, 261, 263-265 increased development in hazard-prone areas, 8-11 Joint underwriting associations, 18 losses from, 7 Market regulation, 199 Kamp Re, 182 Citizens Property Insurance Corporation and, 26 financial regulation and, 43-44 Katrina Canal Breaches Consolidated Litigation, 42 government intervention framework, 27-31 Layered pricing, 154–155 policy terms/provisions, 40–41 loss on line (LOL), 164-165 rates and, 32-38 rate on line (ROL), 161-165 residual market mechanisms and, 44-56 state differences in, 25 recent reinsurance market trends and, 161-171 Learning failures, 259-261 stringency and, 33-34, 37-38 Lee County, 93 underwriting, 38–40 Legal issues wind-water controversy, 41–43 Allstate and, 39, 41-42, 371n15 Markets Safe Drinking Water Act and, 242-243 actuarially fair premiums and, 136-138 alternative risk transfer (ART) instruments and, 174 State Farm and, 39, 42 wind-water controversy and, 25-26, 41-43 bubbles and, 196 Lenders. See Financial institutions capital constraint model and, 194-197 Levee effect, 259 catastrophe bonds and, 186 Levees, 262 competitive market analysis and, 271, 295-303 Licensing, 17, 28, 31, 39, 44, 181, 253, 385, 370n6 concentration and, 61-67, 80 conduct and, 70-79 Likelihood. See also Probability; Risk management cyclical nature of, 194 catastrophe models and, 141-148 exceedance probability (EP) curves and, 129, 143derivatives and, 173, 183-184, 187-191 144, 146, 157, 353–354 distribution systems and, 76-77, 217-218 expected loss and, 151-159 electric power grid failure and, 351, 354 insurability concept and, 130 entry and, 61-67 insurers' decision making and, 129–150 exits and, 61-67 reinsurers' decision making and, 151-171 firm distribution factors and, 59

Markets (cont.) decision making and, 119, 123-127, 134 federally insured, 16 food crisis and, 354 globalization effects and, 354, 356-359 homeowners' insurance and, 208, 220-225, 235, hardening of, 155, 170–171, 194, 196 Herfindahl-Hirschman Index (HHI) and, 65–67 innovations and, 333, 339-343 homeowners' insurance and, 203-232 required flood insurance and, 86 housing prices and, 356 subprime crisis and, 183, 356 hurricane risk analysis and, 59-81 wind exclusions and, 41 increased liquidity for, 346 Multihazard Mitigation Council (MMC), 250 insurance-linked securities (ILS) and, 173-191, 346 Mutual funds, 186–187 insurer cost conditions and, 60-61 Myanmar, 7, 352 insurer exposure patterns and, 67–70 insurers' decision making and, 129-150 National Association of Insurance Commissioners investors' concerns and, 186-187 (NAIC), 28, 31, 78, 206, 372n13 issuers' concerns and, 185-186 National catastrophe fund, 348-349 minimum efficient scale and, 60-61 National Flood Insurance Program (NFIP), xv, 9, 16, National Flood Insurance Program (NFIP) and, 19, 23, 373n26, 374n39 108-111 adverse selection and, 135 over-the-counter (OTC), 184-185 all-hazards insurance and, 343-345 performance and, 70-79 average premium per policy, 91 price and, 71-74 buyer demographics, 93–96 profitability and, 77–79 (see also Profitability) claim payment factors and, 102–104 recent trends in reinsurance, 161-171 community rating system (CRS) and, 95-96 restructuring of property insurance, 59 coverage statistics for, 87–91 retrocession, 173-174 creation of, 369n10 softening of, 194, 196 current deficit of, 111 status quo analysis and, 276–295 exposure rates and, 87–88 sticker-shock effect and, 371n12 financial performance of, 108-111 supply and demand framework for, 193-201 flood insurance rate maps (FIRMs) and, 84–85 surplus assumption and, 298-299 floodplain management regulation and, 84 tipping points and, 187–191 flood zone definitions of, 94–96, 102, 105, 113–115 tranching and, 177, 187-188 flood zone mapping of, 94–96, 113–115 Florida and, 88, 92–108 weather derivatives and, 184-185 Miami Children's Hospital (MCH), 267–268 growth of, 83, 87–88 Miami-Dade County, 17, 155, 271, 295 Hurricane Katrina and, 87 catastrophe models and, 148, 155 impact of catastrophes on consumer choice and. C-4 Basin Project and, 266-267 101-102 correlated risks and, 136 impact of extreme events and, 111-112 exceedance probability curves and, 143-144 long-term insurance (LTI) contracts and, 339 flood risk and, 105 low participation rates in, 85–86 hurricane risk and, 64, 67 national-level statistics for, 87–88 insurers' decision making and, 130, 136, 143–148 number of policies in place, 91 National Flood Insurance Program (NFIP) and, 93 operating expenses and, 110 standard deviation and, 145-146 operational changes in, 83 Mississippi, 17, 111 policy analysis and, 274 catastrophe risk and, 25-26 premiums and, 95-96 hurricane risk and, 80 price adjustment and, 105, 108 National Flood Insurance Program (NFIP) and, 88 private insurance limitations and, 84 wind-water controversy and, 26, 41–42 quantity of insurance in place and, 91 Mitigation. See Risk reduction measures risk pooling of, 84 Modeling firms, 21–22, 138, 141–148, 155–159, 163, state-level statistics and, 88-91 186 total premiums collection and, 91 Monroe County, 74 U.S. Congress and, 84 Moody's, 22, 139 wind-water coverage controversy and, 25, 41-43 Moral hazard, 44, 120, 131, 135-136, 147, 198 Write-Your-Own program and, 83–85, 108–110 Mortgages National Geographic, 356 affordability and, 235, 237-246 National Homebuilders Association, 265 coverage limits and, 97 Nationwide, 35-36, 218

Natural disasters, 360 Palm Beach, 50, 64, 93, 105 Pan Am 103 crash, 356 "acts of God" and, 42 catastrophe models and, 141-148, 155-159 Panel systems, 267-268 choice heuristics and, 355 Paragon, 275 climate change and, 11-13 Parametric index, 177 death tolls from, 352 Pennsylvania, 16, 85, 339, 382n10 developing countries and, 352 Pennypack Creek Watershed, 16, 85 economic issues of, 4-7 (see also Economic issues) Penusco Wetlands, 267 federal disaster relief and, xiii, 19, 84, 119-124, 127, Philadelphia Contributionship for the Insuring of 262-265, 340, 348, 375n12 Houses from Fire, 339, 382n10 five-pillar strategy for, 352–356 Poe Financial Group, 19, 56, 62, 64 food crisis and, 354 Policies, insurance Global Risk Network and, 357-359 "acts of God" and, 42 historical perspective on, 261 ambiguous language and, 42 coverage, 74-76 (see also Coverage) increase of, xiii-xv, 3-4, 351 measuring exposure to, 141–146 deductibles and, 197–198 (see also Deductibles) new era of, xiii-xv homeowners' insurance and, 203-232 presidential declarations and, 19, 122-124, 375n12 insurability concept and, 130 risk ambiguity and, 132-135 insurers' decision making and, 129-150 price trends in, 71-74 (see also Premiums) New Orleans. See Louisiana New Orleans Times Picayune, 356 regulation of, 38-41 New York, xv, 13, 58, 81, 155 survival constraint and, 130-131 affordability issues and, 238-240, 246 undiversifiable catastrophe risk and, 199-201 competitive market analysis and, 295-303 vouchers and, 338 FAIR Plans and, 54 wind-water controversy and, 25-26, 41-43 food stamp program and, 337 Policy. See also Federal government; State homeowners' insurance and, 203-204, 220-221, 224government 226, 229-232 affordability issues and, 244–246 hurricane potential of, 269–270 Alquist-Priolo Act and, 13 industry loss warranties and, 175 conventional wisdom and, 352 innovations for, 333–349 coastal hurricane zones and, 347–348 insurance rates in, 37 disaster relief and, xiii, 19, 84, 119-124, 127, 262loss comparison data for, 307-311 265, 340, 348, 375n12 market concentration and, 66 electric power grid failure and, 351 metropolitan areas and, 295 FAIR Plans and, 44 National Flood Insurance Program (NFIP) and, federal poverty line and, 236, 238-241, 243-246, 336-337, 379n1 nonrenewing policies and, 39-40 five-pillar strategy for, 352-356 policy analysis and, 271 (see also Policy analysis) Flood Disaster Protection Act and, 86 price trends in, 72 government intervention framework and, 27–31 residual market mechanisms and, 26, 54 information-sharing platform and, 334 restructuring of property insurance markets and, 59 innovations for, 333–349 local/international dimension of, 13 status quo analysis and, 288-293 undiversifiable catastrophe risk and, 201 McCarran-Ferguson Act and, 370n2 wind loss cost and, 319-320 mitigation grants and, 247, 250-251, 267 New York Insurance Department, 40 National Flood Insurance Program (NFIP) and, 84 need for bold initiatives and, 357-359 New York Mercantile Exchange, 173, 188 Omnibus Coastal Property Insurance Reform Act No file systems, 33 Noncompetitive rating (NCR), 32–34 and, 264 Nonrenewal notices, 39-40 presidential declarations and, 19, 122-124, 375n12 Northridge earthquake, 5–6, 21, 347 regulation and, 17–19, 25–28 (see also Regulation) residual market mechanisms and, 44-56 Ordinary-least-squares (OLS) regression, 103 Safe Drinking Water Act and, 242–243 Solvency II and, 185-186 Organization for Economic Cooperation and Development (OECD), 359 supply and demand framework and, 193-201 Organization of Petroleum Exporting Countries Telecommunications Act and, 337 (OPEC), 337 wind-water coverage controversy and, 25-26, 41-43 Over-the-counter (OTC) market, 184-185 Write-Your-Own program and, 83-85, 108-110

Policy analysis, 269–270	layered pricing and, 154–155, 161–165
American Housing Survey (AHS) and, 276	loading factor and, 138, 303–304
average annual loss (AAL) and, 274	long-term insurance (LTI) contracts and, 338–343
competitive market analysis and, 271, 295-303, 313-	loss cost and, 303–304, 317–329
316	loss on line (LOL), 164–165, 167
data sources for, 271–276	moral hazard and, 135–136
(Florida Office of Insurance Regulation (FLOIR)	national catastrophe fund and, 348–349
and, 275	National Flood Insurance Program (NFIP) and, 83,
impact of premiums reflecting risk, 303–306	- · · · · · · · · · · · · · · · · · · ·
	91, 95–96, 108–111
insurance company data, 274–275	policy prices and, 71–74 (see also Rates)
objectives of, 271	profit measurement and, 77–79
rating agencies and, 271, 274–275	pure, 71
standard deviation and, 274	rate on line (ROL), 161–165, 169
state exposure data, 271, 274	RECAP method and, 342
state funds and, 275–276	recent reinsurance market trends and, 161–171
status quo analysis and, 271, 276–295	reflecting risk, xiv, 303–306, 333–336, 349
Politician's dilemma, 263–264	reinsurers' decision making and, 152–155
Politics	risk ambiguity and, 132–135
commissioners and, 28–30	setting, 131–136
electric power grid failure and, 351	status quo analysis and, 293
regulation and, 25–27 (see also Regulation)	subsidy, xiv, 84–85, 235, 244–246, 334–338
risk reduction measures and, 263-264	survival constraint and, 130-131
Pollution, 242–243	trend analysis of, 71–74
Population, 8–11	unfair increases in, 235–236
Poverty	use of future, 293
absolute, 354	Presidential declarations, 19, 122-124, 375n12
affordability and, 235-246, 336-337	Private insurance. See also specific insurer
federal poverty line and, 236, 238–241, 243–246,	adverse selection issues and, 84
336–337, 379n1	inability to cover floods, 84
food crisis and, 354	national catastrophe fund and, 348–349
Power dissipation, 12	public insurance rates and, 105, 108
Premiums	status quo analysis and, 276–295
actuarially fair, 136–138	Write-Your-Own program and, 83–85
adjustable-premium contracts (APCs) and, 341–342	Probability, 129
adverse selection and, 135	bonus systems and, 356
affordability and, 122, 235–246, 336–338 (see also	catastrophe models and, 141–148
Affordability)	conventional wisdom and, 352
all-hazards insurance and, 343–346	exceedance probability (EP) curves and, 129, 143–
building code discounts and, 254–255	144, 146, 157, 353–354
community rating system (CRS) and, 95–96	insurers' decision making and, 129–150
contract analysis of, 160–161	rating agencies and, 139–141, 149–150
correlated risks and, 136	
cross-price elasticity and, 210, 212–213	risk ambiguity and, 132–135
1	survival constraint and, 130–131, 153–154
deductibles and, 76–77 (see also Deductibles)	Probable maximum loss (PML), 139, 278, 274–275,
direct premiums written (DPW), 62, 295, 297	278–279 D. G. Lilli, 70, 272, 12
elasticity of, 221–231	Profitability, 79, 372n13
equity and, 235–237, 243–244	expected utility and, 119–121, 124, 127, 197, 217
fair rate of return and, 137–138	fair rate of return and, 77, 136–138, 147, 303,
Fast Track Monitoring System and, 71	372n12
federal poverty line and, 236, 238–241	impact of reinsurers' losses and, 161–165
fixed-price contracts (FPCs) and, 341–342	insurers' decision making and, 129–150
flood insurance and, 84	recent reinsurance market trends and, 161-171
flood zone mapping and, 94–95, 113–115	Profits on insurance transactions (PIT), 78
Froot-O'Connell studies and, 160–161	D 1 C 1 (D0 C) 11 10 C
C 11	Property and Casualty (P&C) lines, 186
full price, 71	Property Casualty Insurers Association of America
homeowners' insurance and, 208-218, 221-231	Property Casualty Insurers Association of America (PCIAA), 71–72
homeowners' insurance and, 208–218, 221–231 innovations for, 333–336	Property Casualty Insurers Association of America (PCIAA), 71–72 Property insurance
homeowners' insurance and, 208-218, 221-231	Property Casualty Insurers Association of America (PCIAA), 71–72

availability of coverage and, 74–76	Florida and, 34–35, 37–38
Citizens Property Insurance Corporation, 18, 26 (see	increase of, 59
also Citizens Property Insurance Corporation)	insurance-linked securities (ILS) and, 186
coverage amounts and, 20	layered pricing and, 154–155
federal government and, 19–20	loss variance and, 193
Florida and, 9, 18–19	market clearing prices and, 198–201
	National Electric prices and, 196–201
homeowners' insurance and, 203–232 (see also	National Flood Insurance Program (NFIP) and, 91
Homeowners' insurance)	negative profit effects and, 59
hurricane risk analysis and, 59–81	New York and, 37
impact of premiums reflecting risk, 303–306	noncompetitive rating (NCR) and, 32–34
innovations for, 333–349	private vs. public insurance, 105, 108
insurer exposure patterns and, 67–70	regulation of, 32–38
international dimension of, 13	South Carolina and, 37
investors and, 22	stabilization instruments for, 178–181
joint underwriting associations and, 18	sticker-shock effect and, 371n12
lack of, 235–241	stringency and, 33–34, 37–38
market performance/conduct and, 70-79	supply and demand framework for, 193–201
market structure of, 59–70	suppression and, 33
modeling firms and, 21–22	Texas and, 36–37
National Flood Insurance Program (NFIP) and, 9,	types of systems for, 32–33
16	unit elastic demand and, 203
penetration rates and, 7	Rating agencies, 22, 149–150, 379n15, 381n15
policy analysis and, 269–299 (see also Policy	competitive market analysis and, 295, 297–299
	decision making and, 129, 139–141
analysis)	
prices and, 71–74	homeowners' insurance and, 206, 214
profitability and, 77–79	insurance-linked securities (ILS) and, 187
rate and policy form regulation and, 17	policy analysis data and, 271, 274–275
rating agencies and, 22	probability distribution and, 129
regulation of, 17–20, 25–58	reinsurers' decision making and, 161
solvency regulation and, 17	role of, 139–141
state government and, 17–19	status quo analysis and, 278–279, 306
tax policy and, 19–20	Supplemental Rating Questionnaires and, 275
wind-water controversy and, 25–26, 41–43	RECAP (record, evaluate and compare alternative
Property values, 3, 83, 97, 99, 112, 119, 220, 261	prices), 342
Pro rata insurance, 152, 174	Recoupment process, 293
Protected tranche, 177	Regression analysis, 103
Public insurance	Regulation, 64, 81, 248, 379n13
National Flood Insurance Program (NFIP) and,	availability/affordability issues and, 43
108–111 (see also National Flood Insurance	better zoning ordinances and, 264–265
Program (NFIP))	building codes and, 17, 247, 251–255, 261, 263–264
private insurance rates and, 105, 108	catastrophe bonds and, 178–181
Write-Your-Own program and, 83–85, 108–110	Citizens Property Insurance Corporation and, 26
1 2,	domiciliary state and, 31
Quality Neighborhood Improvement Program, 267	Europe and, 185–186
Quarterly Supplemental Report (QUASR), 67, 74,	financial, 43–44
275, 281	fines and, 28–29
Quota-share insurance, 152, 174, 182	floodplain management and, 84
	government intervention framework and, 27–31
Rate and policy form regulation, 17	guaranty associations and, 56–57
Rate on line (ROL), 161–165, 169	innovations for, 336
Rates, 151	insurance-linked securities (ILS) and, 185–187
affordability and, 122, 235-246, 336-338	insurance policy terms/provisions and, 38–41
all-hazards insurance and, 343–346	insurance rates and, 32–38
catastrophe bonds and, 178–181	insurer cost conditions and, 60–61
competitive rating (CR) and, 32–34	interdependencies and, 356
compression and, 33, 35	licensing and, 28, 31, 44
equilibrium and, 194–201	McCarran-Ferguson Act and, 370n2
flood insurance and, 84–85, 104–108	market, 25–56, 199

Regulation (cont.)	Residual market mechanisms
maximum deductibles and, 40-41	artificial depressing effect and, 45
National Association of Insurance Commissioners	available coverage and, 45
and, 28	Citizens Property Insurance Corporation and, 44–50
nonrenewal notices and, 39-40	eligibility requirements and, 45
politics and, 25–27	exposure growth and, 45
premiums and, 32–38, 243–244	FAIR Plans and, 44, 51
price constraints and, 25	Florida and, 46–51
property insurance, 25–58	New York and, 54
residual market mechanisms and, 44–56	regulation of, 44–56
responsibilities of, 30–31	self-reinforcement and, 45–46
Solvency II and, 185–186	South Carolina and, 54
solvency requirements and, 43	Texas and, 51, 54
state insurance mechanisms and, 25–27, 44–57	Retrocession market, 173–174
stringency and, 33–34, 37–38, 271n8	Return on equity (ROE), 137, 153–154, 167
supply and demand framework and, 199	Risk management, 4
underwriting and, 38–40	adverse selection and, 84, 131, 135, 147
unfair business practices and, 25	ambiguity and, 129, 132–135
wind-water controversy and, 25–26, 41–43	behavioral biases and, 355
Reinsurers, xvi, 20–21	building codes and, 17, 247, 251–255, 261, 263–264
auctioned contracts and, 333	catastrophe models and, 141–148, 155–159
average annual loss (AAL) and, 156–158	choice heuristics and, 355
capacity of handling losses by, 165–166	competitive market analysis and, 295–303
capital allocation and, 129–130, 152–153 catastrophe models and, 155–159	correlated risks and, 136 cost of capital and, 136–138
competitive market analysis and, 295–303	decision making theory and, 119–127
coverage determination and, 152–155	emotional effects and, 124–126
decision making and, 151–171	exceedance probability (EP) curves and, 129, 143–
empirical contract data and, 160–161	144, 146, 157, 353–354
excess-of-loss and, 174	executive officers and, 353
Europe and, 166	financial institutions and, 16–17
expected loss and, 151–171	five-pillar strategy for, 352–356
five-pillar strategy for, 352–356	flood insurance and, 83–115
Florida and, 166–167	Global Risk Network and, 357–359
Froot-O'Connell studies and, 160–161	government intervention framework and, 27–31
hazard-prone areas and, 20–21	guaranty associations and, 56–57
increased prices of, 173–174	homeowners' insurance and, 203–232
insurance-linked securities (ILS) and, 173–191	hurricane risk analysis and, 59–81
investors and, 22	indicated loss cost (ILC) and, 218, 227
Japan and, 166	innovations for, 333–349
layered pricing and, 154–155, 161–165	insurability concept and, 130
loss variance and, 151	insurance-linked securities (ILS) and, 173–191
market conditions for, 151, 161–171	insurers' decision making and, 129–150
mitigation grants and, 267	loading factor and, 138
modeling firms and, 21–22	maximum deductibles and, 40-41
nature of, 151–152	misperceptions of risk and, 121
premium setting and, 152–155	modeling firms and, 21–22
profitability impacts on, 161–165	moral hazard and, 135–136
pro rata insurance and, 152, 174	mortgages and, 16–17
rate and policy form regulation and, 17	National Flood Insurance Program (NFIP) and, 83–
rating agencies and, 22	115
retrocession market and, 173–174	natural disaster syndrome and, 262–263
return on equity (ROE) and, 167	need for bold initiatives and, 357–359
solvency regulation and, 17–18	policy analysis and, 269–329 (see also Policy
status quo analysis and, 276–295 supply and demand framework for, 193–201	analysis) reinsurers' decision making and, 151–171
supply and demand framework for, 193–201 surplus and, 298–299	residual markets and, 44–54
survival constraint and, 153–154	risk ambiguity and, 132–135
survivar constraint and, 133–134	risk amorgany and, 132–133

standard deviation and, 130, 145-146 wind and, 249-250, 255-256 stringency and, 33–34, 37–38 zoning ordinances and, 264–265 supply and demand framework and, 193-201 Safe Drinking Water Act, 242-243 survival constraint and, 130-131, 153-154 tranching and, 177, 187-188 Safer Living program, 277 Samaritan's dilemma, 122 underwriting regulation and, 38-40 undiversifiable catastrophe risk and, 199-201 Santa Rosa County, 102-103, 105 volatility dispersion and, 173, 188-191 SARS epidemic, 357 Risk Management Solutions (RMS), 352 Seawalls, 260 decision making and, 141, 144, 155-156 Senter, Judge L. T., Jr., 41-42 U.S. Hurricane Industry Exposure Database and, September 11 terrorist attacks, xiii, 6, 189, 195–196, 351, 355 271 U.S. Hurricane Model and, 156, 274, 277 Sharpe ratio, 186, 378n23 Risk reduction measures Sidecars, 174, 181–183, 188, 191 adoption factors of, 255-261 Small Business Administration (SBA), 19, 123 affordability and, 265–266 Social norms, 126, 261 behavioral considerations and, 256, 262-264 Solvency II, 185–186 budgeting heuristics and, 256-257 Solvency regulation, 17-18 building codes and, 17, 247, 251-255, 261, 264-265 South Carolina, xv, 13, 58, 80–81 California and, 263–264 competitive market analysis and, 295–303 FAIR Plans and, 54 C-4 Basin Project and, 266–267 contents damage and, 248-249 homeowners' insurance and, 203–204, 220–221, 223, cost-effectiveness of, 250-251, 255-256 225-226, 230-232 encouraging adoption of, 339-341 hurricane potential of, 269-270 excessive optimism and, 258-259 innovations for, 333–349 floods and, 266-268 insurance rates in, 37 Florida and, 250-251, 253-255, 266-268 loss comparison data for, 307-311 future challenges for, 265, 269-270 market concentration and, 66–67 hurricanes and, 248–250, 260, 265–266, 311–312 metropolitan areas and, 295 Institute for Business and Home Safety and, 266, National Flood Insurance Program (NFIP) and, 91 277 Omnibus Coastal Property Insurance Reform Act interdependencies and, 261 and, 264 learning failures and, 259-261 policy analysis and, 271 (see also Policy analysis) levee effect and, 259 price trends in, 72 long-term insurance (LTI) contracts and, 339-341 residual market mechanisms and, 26, 54 Miami Children's Hospital (MCH) and, 267–268 restructuring of property insurance markets and, 59 mitigation grants and, 247, 250–251, 253, 267 risk reduction measures and, 264 natural disaster syndrome and, 262-263 status quo analysis and, 288-293 Omnibus Coastal Property Insurance Reform Act undiversifiable catastrophe risk and, 201 and, 264 wind loss cost and, 321–322 open windows during tornado and, 260-261 South Carolina Department of Insurance, 37, 54 politician's dilemma and, 263–264 South Florida Sun-Sentinel, 275 public/private collaboration and, 247, 262–265 Special flood hazard areas (SFHAs), 86, 103-105, reduced claims from, 247, 253 112, 124, 126 role of insurance and, 248 Standard and Poor's (S&P), 22, 187, 189 savings from, 269-270, 311-312 Standard deviation, 130, 145-146, 274 seawalls and, 260 State Board of Administration (SBA), 282, 284 social norms and, 261 State Farm, 35–36 South Carolina and, 264 catastrophe bonds and, 178 status quo analysis and, 277, 293 correlated risks and, 136 structural damage and, 248-249 discount premiums and, 254 superstitions and, 260-261 homeowners' insurance and, 218 tax incentives and, 264 Hurricane Andrew and, 136 temporal planning biases and, 257 legal issues of, 39, 42 Texas and, 260, 271, 276, 284-288 market concentration and, 62 triggering effect and, 261 subpoenas of, 39 underweighting the future and, 257-258 underwriting regulation and, 39 water damage and, 249-250 wind-water controversy and, 42

State government, 19	weather derivatives and, 184–185
building codes and, 17	wind-water coverage controversy and, 25-26, 41-43
commissioners and, 28–30	Stringency, 33–34, 37–38, 271n8
fines and, 28–29	Structural damage, 248–249
guaranty associations and, 56–57	Subprime mortgage crisis, 183, 356
impact of premiums reflecting risk, 303–306	Subsidies, 29–30, 261, 379n13
insurance funds and, 54–56, 275–276	Super-cats, 6
insurance rates and, 32–38	Superstitions, 260–261
intervention framework of, 27–31	Supplemental Rating Questionnaires, 275
land use regulation and, 17	Supply and demand framework
licensing and, 28, 31	capacity constraint model and, 194
nonrenewal notices and, 39–40	capital constraint model and, 194–197
residential exposure data and, 271, 274	clearing prices and, 198–201
residual market mechanisms and, 44–56	credit quality and, 196
risk reduction measures and, 264–265	deductibles and, 197–198, 200
solvency regulation and, 17–18	demand equation estimation and, 208–209
underwriting and, 38–40	demand side, 197–198, 208–211, 217–221
vouchers and, 338	equilibrium and, 194–201
wind-water controversy and, 25–26, 41–43	homeowners' insurance and, 204–232
Status quo analysis, 271	loss variance and, 193
alternative risk transfer (ART) instruments and,	natural disaster syndrome and, 262–263
278–280	policy design and, 199–201
American Home Survey and, 276, 278	regulation and, 199
assumptions for, 276–295	supply side, 194–197, 212–215
ex post assessment and, 293	transaction costs and, 197
Florida and, 280–284, 288–293	undiversifiable catastrophe risk and, 199–201
losses and, 276, 288–293	unlimited free risk transfer and, 197
metropolitan areas and, 295	Surplus (insurers'), 20, 217, 379nn13,14
New York and, 288–293	A.M. Best and, 381n15
probable maximum losses (PMLs) and, 275, 278-279	comparative state analysis of, 31, 43, 49, 55
rating agencies and, 278–279, 306	decision making and, 131, 153–154, 160, 165–166
recoupment process and, 293	innovations and, 333, 336, 340, 344-345
reinsurance calculations and, 278–280	licensing and, 370n6
risk reduction measures and, 277, 293	market analysis of hurricane risk and, 61, 78
South Carolina and, 288–293	policy analysis and, 270, 274–275, 281, 285–286,
state comparison of, 288–293	291, 298–299, 306
state funds and, 291, 293	Survival constraint, 130–131, 153–154
take-up rate and, 277	Survivar constraint, 130 131, 133 131
Temporary Emergency Additional Coverage Options	Take-up rate (TUR), 277
(TEACO) and, 282, 284	Taxes, 261, 381n10
Temporary Increase in Coverage Limit (TICL) and,	insurance and, 19–20
282, 284	loading factor and, 138
Texas and, 284–293	politician's dilemma and, 263–264
total insured value (TIV) and, 295	risk reduction measures and, 263–264
uninsured losses projection and, 277–278	vouchers and, 338
use of future premiums and, 293	Telecommunications Act, 337
Storms	Temporal planning, 257
catastrophe models and, 141–146, 155–159	Temporary Emergency Additional Coverage Options
climate change and, 11–13	(TEACO), 275, 282, 284
economic loss from, 4–7, 23 (<i>see also</i> Economic issues)	Temporary Increase in Coverage Limit (TICL), 275 Terrorism, 20, 352–354
five-pillar strategy for, 352–356	anthrax and, 357
hurricane risk analysis and, 59-81	catastrophe bonds and, 179
insurance regulation and, 17-19	choice heuristics and, 355
land use regulations and, 17	insurer exclusion of, 355
risk ambiguity and, 132–135	Pan Am 103 crash and, 356
Texas Windstorm Insurance Association and, 76,	September 11 attacks and, xiii, 6, 189, 195–196, 351,
271, 284–288	355

Texas, xiii, xv, 13, 58, 80–81, 152	Underwriting
affordability issues and, 238–240, 244–246	actuarially fair premiums and, 136–138
American Housing Survey and, 235	catastrophe models and, 141–148
catastrophe bonds and, 179	decision making and, 129–150
coastal hurricane zones and, 347–348	insurers' decision making and, 129–150
competitive market analysis and, 295–303	premiums and, 160–161 (see also Premiums)
FAIR Plans and, 51	regulation of, 38–40
food stamp program and, 337	risk ambiguity and, 129, 132–135
homeowners' insurance and, 203–204, 216, 219–221,	survival constraint and, 130–131
232	Uninsured home value (UHV), 277–278
hurricane potential of, 269–270	United Nations, 8
indicated loss cost determination and, 379n21	Unit elastic demand, 203
innovations for, 333–349	Universal Service Fund (USF), 337
insurance rates in, 36–37	Unprotected tranche, 177
insurance regulation and, 25-58	Urbanization, 8–11
loss comparison data for, 307–311	USAA, 35–36
market concentration and, 66-67	U.S. Census Bureau, 9
metropolitan areas and, 295	American Housing Survey (AHS) and, 235-239, 242,
National Flood Insurance Program (NFIP) and, 88,	246, 272, 276
91	county demographics and, 92-93
policy analysis and, 271 (see also Policy analysis)	flood risk and, 113
price trends in, 72	homeowners and, 97, 99, 206, 208, 220
residual market mechanisms and, 26, 51, 54	property values and, 97, 99
restructuring of property insurance markets and, 59	U.S. Congress, xiv, 84, 122–123
risk reduction measures and, 260	U.S. Congressional Budget Office, 85
state funds and, 275–276	U.S. Department of Housing and Urban Development
status quo analysis and, 284–293	(HUD), 16, 242, 276
undiversifiable catastrophe risk and, 201	Use and file systems, 33
wind loss cost and, 323–329	U.S. Environmental Protection Agency (EPA), 242–
Texas Catastrophe Property Insurance Association,	243
284	U.S. Government Accountability Office (GAO), 110,
Texas General Reserve Fund, 287	252, 265, 344
Texas Lloyds, 51	U.S. Hurricane Industry Exposure Database, 271
Texas Windstorm Insurance Association (TWIA),	U.S. Hurricane Model, 156, 274, 277
271, 276	U.S. National Institute of Building Science, 250
average annual losses (AAL) of, 286	U.S. National Institute of Building Science, 250 U.S. Treasury, 19, 108, 111, 347–348
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–	U.S. Treasury, 19, 108, 111, 347–348
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286– 288	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286– 288 funding arrangements of, 286–288	U.S. Treasury, 19, 108, 111, 347–348
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. <i>See also</i> Floods C-4 Basin Project and, 266–267
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286– 288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303 Tower Hill, 62	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12 winning the war against, 351–360
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303 Tower Hill, 62 Tranching, 177, 187–188	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12 winning the war against, 351–360 Weather derivatives, 173, 184–185
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303 Tower Hill, 62 Tranching, 177, 187–188 Triggers, 177, 261	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12 winning the war against, 351–360 Weather derivatives, 173, 184–185 Weather Risk Management Association (WRMA),
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303 Tower Hill, 62 Tranching, 177, 187–188 Triggers, 177, 261 Tropical Cyclone Nargis, 7 Tropical Storm Agnes, 85–86, 123 Tropical Storm Allison, 111	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12 winning the war against, 351–360 Weather derivatives, 173, 184–185 Weather Risk Management Association (WRMA), 184 Wind, 7, 9. See also Hurricanes all-hazards insurance and, 343–346
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303 Tower Hill, 62 Tranching, 177, 187–188 Triggers, 177, 261 Tropical Cyclone Nargis, 7 Tropical Storm Agnes, 85–86, 123 Tropical Storm Allison, 111 Tsunamis, 352	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12 winning the war against, 351–360 Weather derivatives, 173, 184–185 Weather Risk Management Association (WRMA), 184 Wind, 7, 9. See also Hurricanes all-hazards insurance and, 343–346 anemometer and, 141
average annual losses (AAL) of, 286 Catastrophe Reserve Trust Fund (CRTF) and, 286–288 funding arrangements of, 286–288 insured property and, 284–285 market share of, 286 operations of, 285–286 risk reduction measures and, 286–288 status quo analysis and, 284–288, 291 Tipping points, 187–191 Tornadoes all-hazards insurance and, 343–346 open windows and, 260–261 Total insured value (TIV), 144, 274, 295, 303 Tower Hill, 62 Tranching, 177, 187–188 Triggers, 177, 261 Tropical Cyclone Nargis, 7 Tropical Storm Agnes, 85–86, 123 Tropical Storm Allison, 111	U.S. Treasury, 19, 108, 111, 347–348 Volatility dispersion, 173, 188–191 Vouchers, 338 Water. See also Floods C-4 Basin Project and, 266–267 damage from, 19, 42, 92, 111, 120, 249–250, 344–345 wind-water coverage controversy and, 25–26, 41–43 Weather, xvi climate change and, 11–13, 85, 357, 369n15 cooling degree days (CDDs) and, 377n17 global warming and, 12 winning the war against, 351–360 Weather derivatives, 173, 184–185 Weather Risk Management Association (WRMA), 184 Wind, 7, 9. See also Hurricanes all-hazards insurance and, 343–346

Wind (cont.) Citizens Property Insurance Corporation and, 26, 44-45 coastal hurricane zones and, 347–348 deductibles and, 204 five-pillar strategy for, 352-356 Florida Windstorm Underwriting Association and, homeowners' insurance and, 204 industry loss warranties and, 175-176 innovations for, 335 loss cost data and, 317-329 Miami Children's Hospital (MCH) and, 267-268 mitigation grants and, 247, 250 open windows and, 260-261 policy analysis and, 271, 274, 276 policy exclusions of, 41 risk ambiguity and, 132-135 risk reduction measures and, 249, 255-256 Texas Windstorm Insurance Association and, 76, 271, 284-288 weather derivatives and, 184-185 wind-water coverage controversy and, 25-26, 41-43 Wind-water coverage controversy, 25–26, 41–43 World Economic Forum (WEF), 357-359 World Trade Center, xiii, 355 Write-Your-Own (WYO) program, 83-85, 108-110, 374n43

Zoning, 264-265