

Preparing for the Effects of Global Warming:

The American Public's Perspective on Sea Level Rise

Funded by

Center for Ocean Solutions at Stanford University

Woods Institute for the Environment at Stanford University

Principal Investigators

Bo MacInnis
Jon Krosnick
Meg Caldwell
Adina Abeles

Stanford University

Contributors

Lauren Howe	Stanford University
Debbie Drake Dunne	Stanford University
Ezra Markowitz	Princeton University
Erin Prahler	Stanford University

With special thanks to

Prof. Robert H. Socolow

Professor of Mechanical and Aerospace Engineering
Co-Director, The Carbon Mitigation Initiative
Director, Climate and Energy Challenge

Princeton University

Outline

- Focus
 - Rising Sea Levels
 - Storms
- Attitudes toward adaptation
 - Wait or Prepare?
- Specific preparation strategies
- Communicating scientific uncertainty

Survey Methodology

- Nationally representative “probability” sample
- 1,174 American adults
- English and Spanish
- GfK Custom Research
- Internet data collection
- March 3 to 18, 2013

The Basics

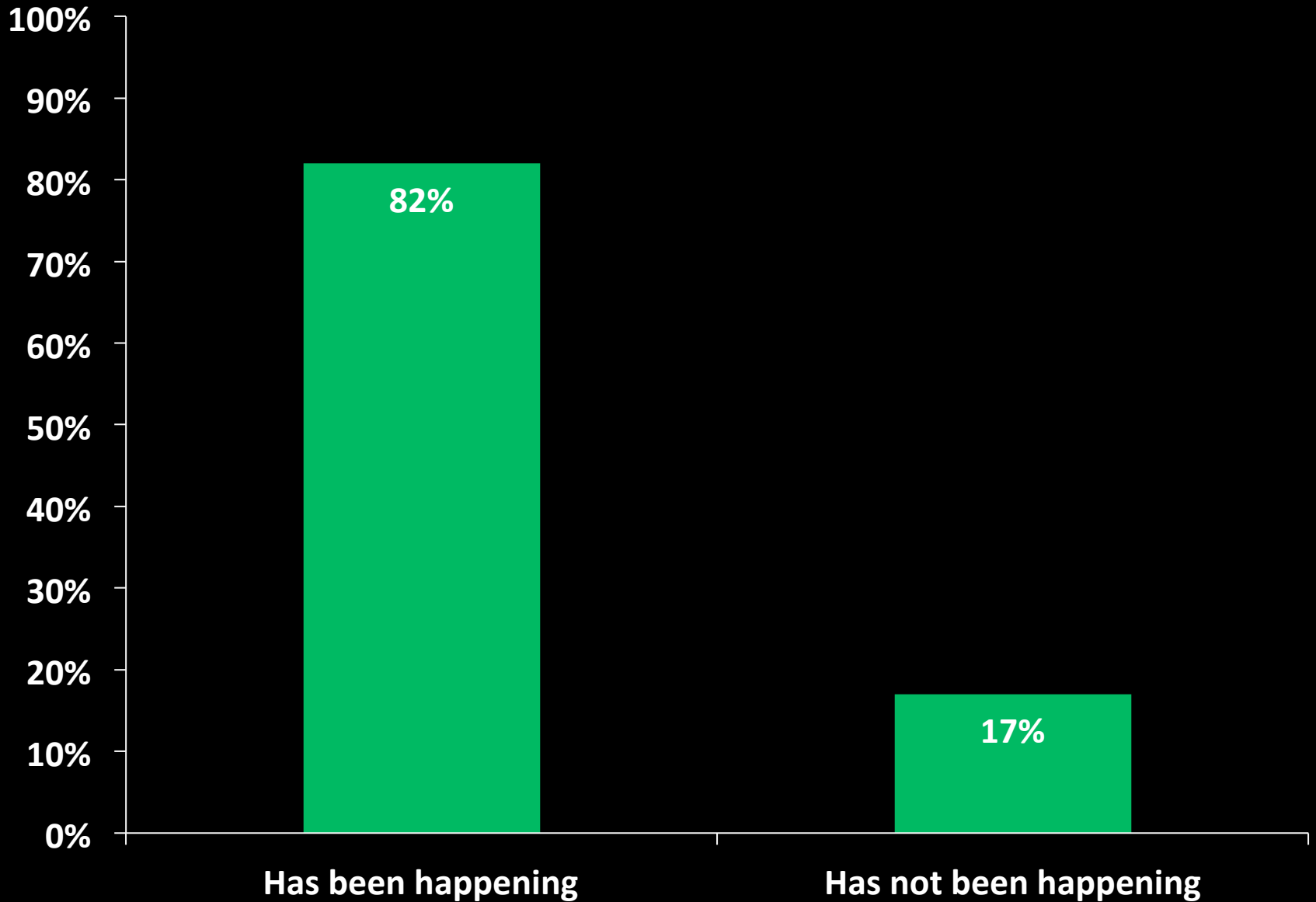
Existence of Global Warming

“What is your personal opinion?

Do you think that the world's temperature probably has been going up over the past 100 years,

or do you think this probably has not been happening?”

Existence of Global Warming



Sea Level Rise Threat

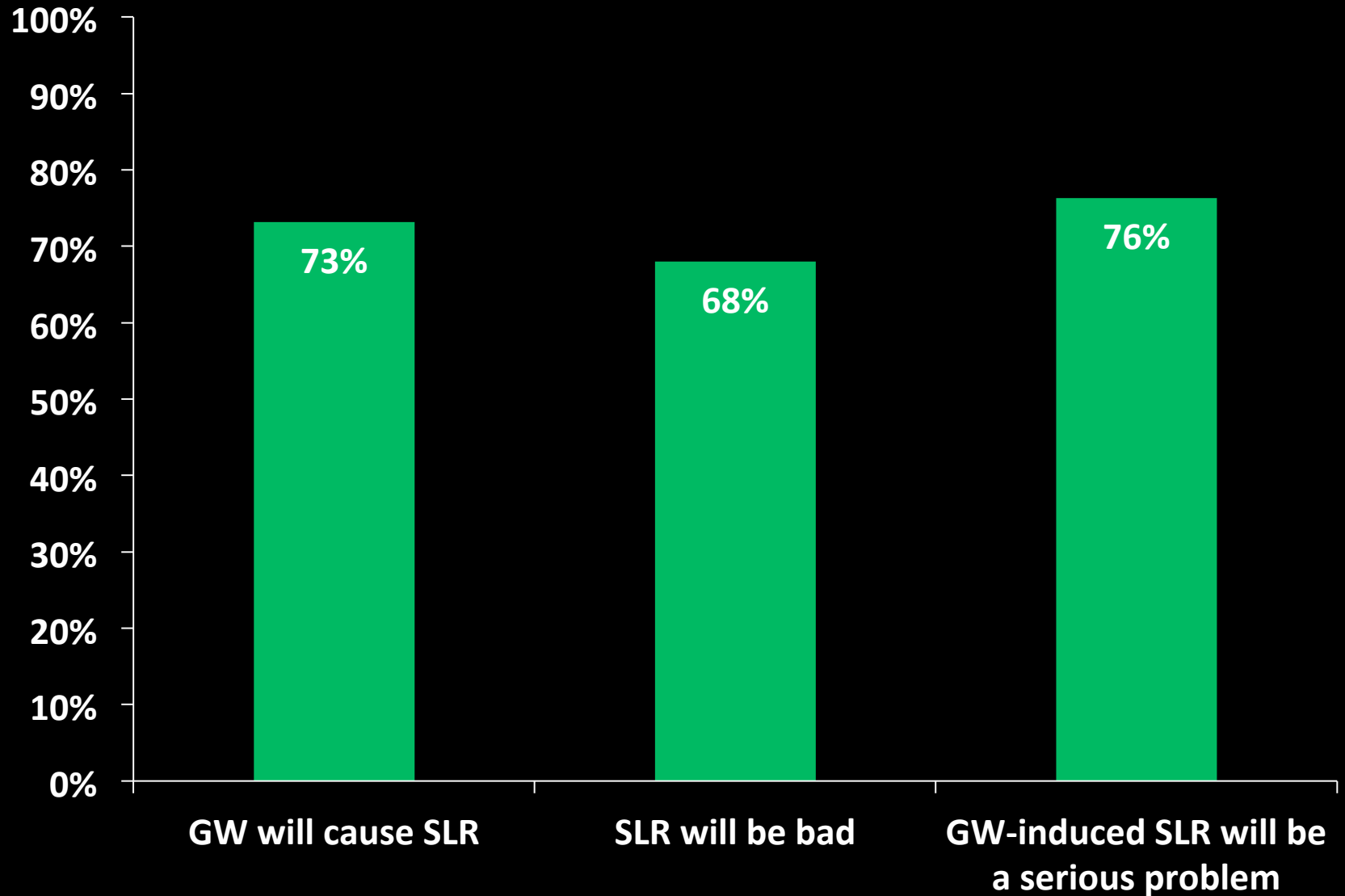
Will GW cause sea level rise or not?

Would sea level rise be good, bad, neither?

How serious of a problem will sea level rise be for the U.S. over the next 100 years?

Moderately, very, extremely serious

Sea Level Rise Threat

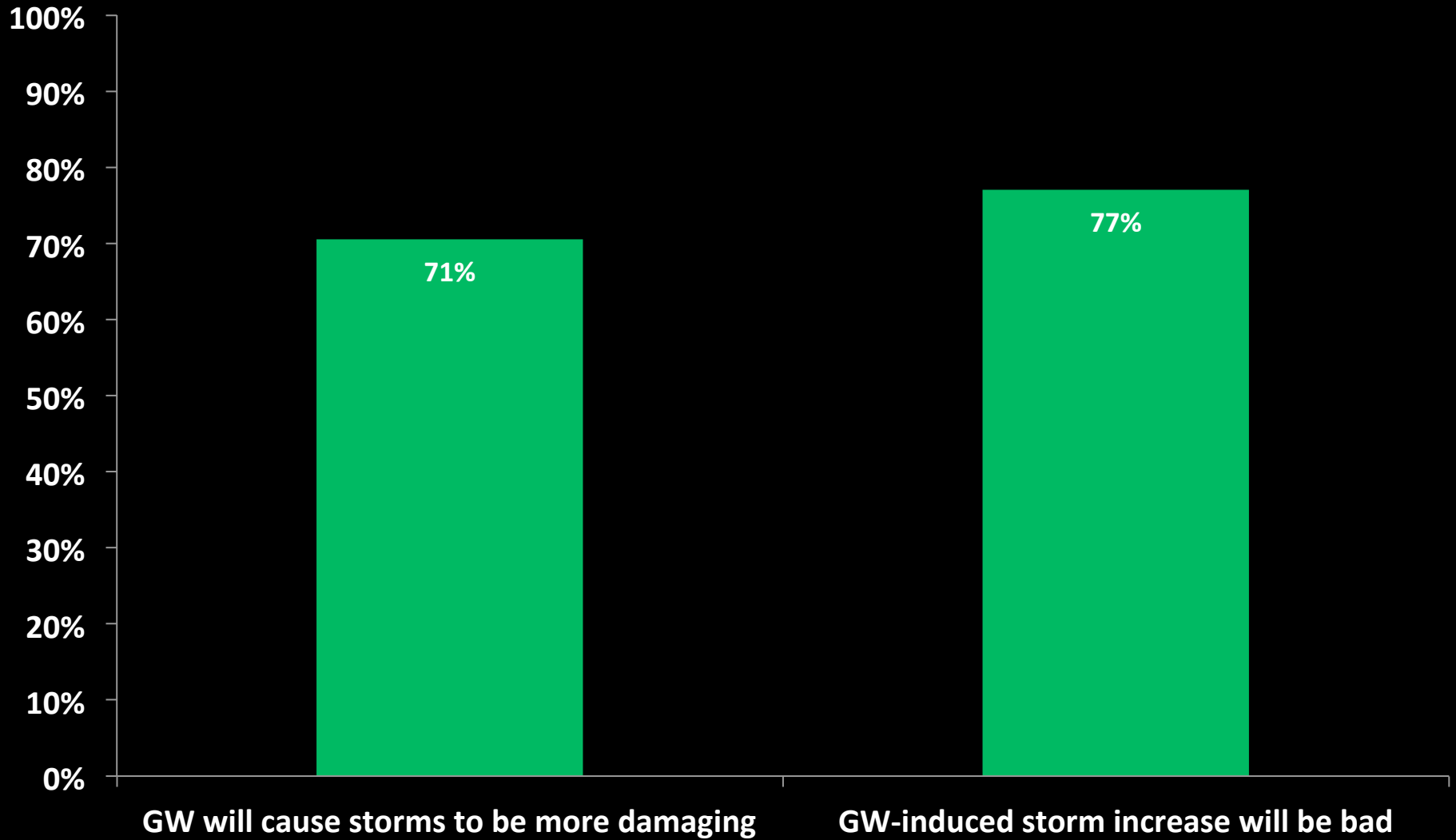


Storms Threat

Will GW cause storms to be more damaging?

Will GW-induced increase in storms be good, bad, or neither good nor bad?

Storms Threat



Effort to Reduce the Effects of Sea Level Rise

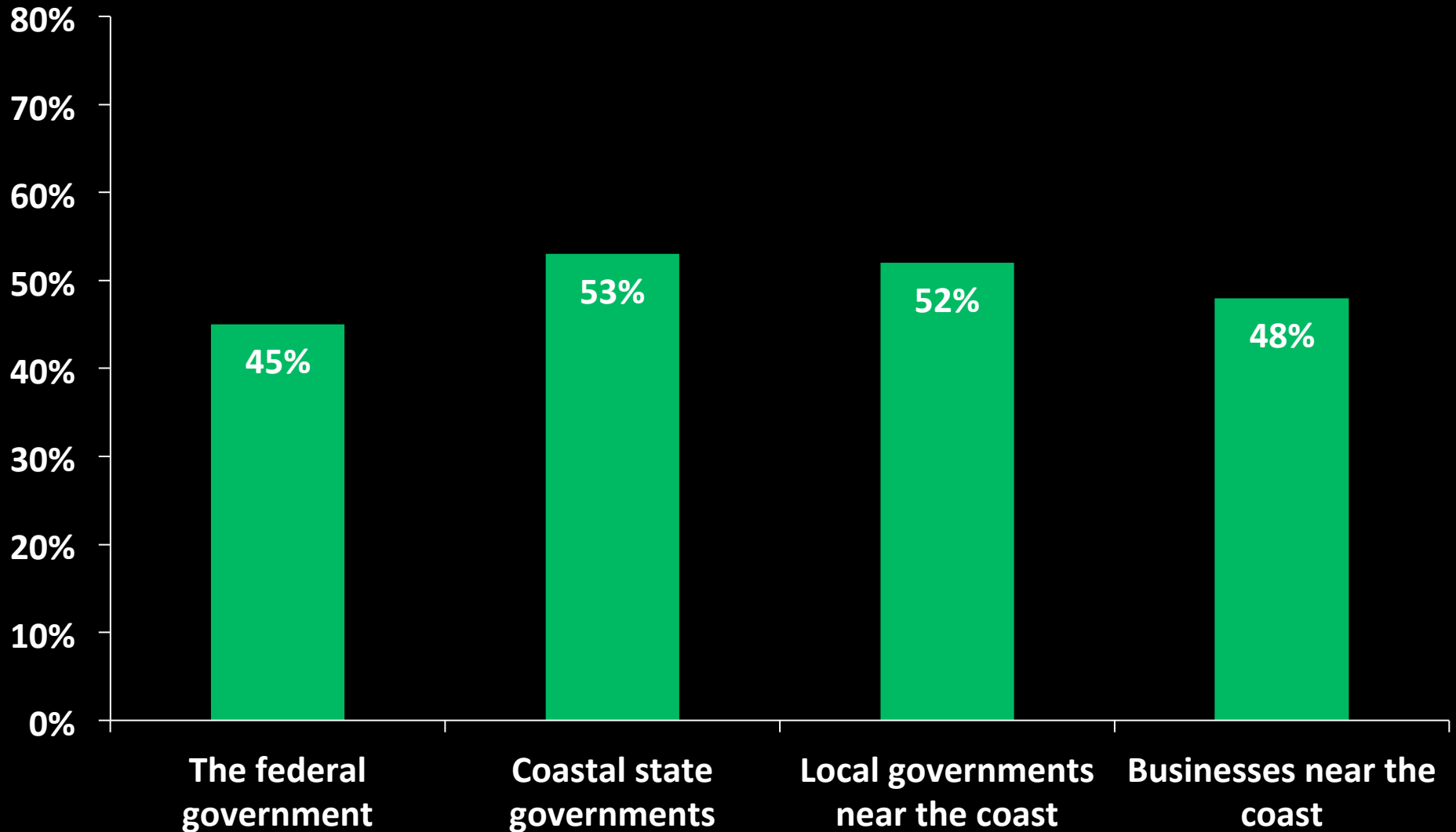
Federal government

Coastal state governments

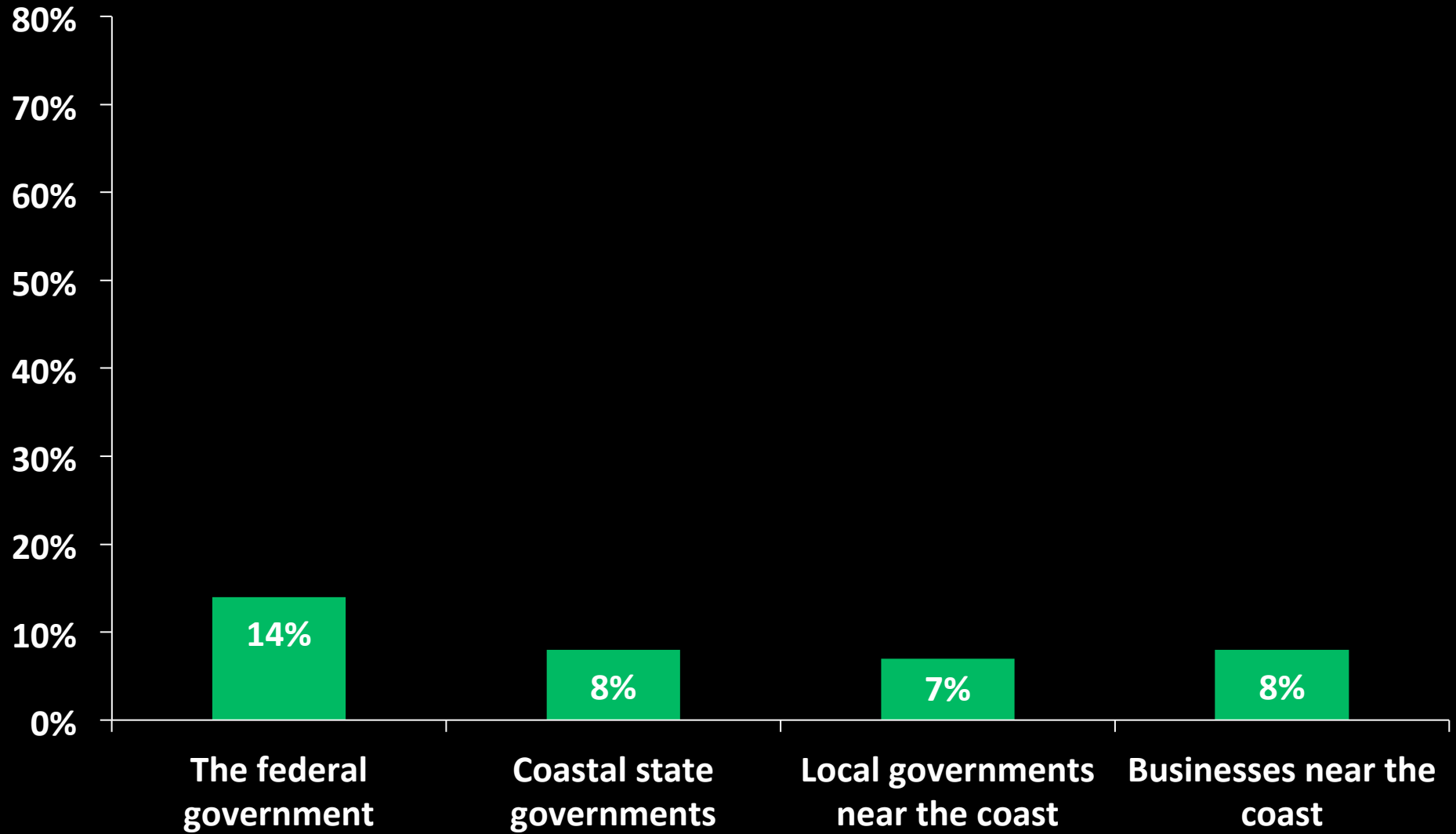
Local governments near the coast

Businesses near the coast

Quite a Bit or a Great Deal



Nothing

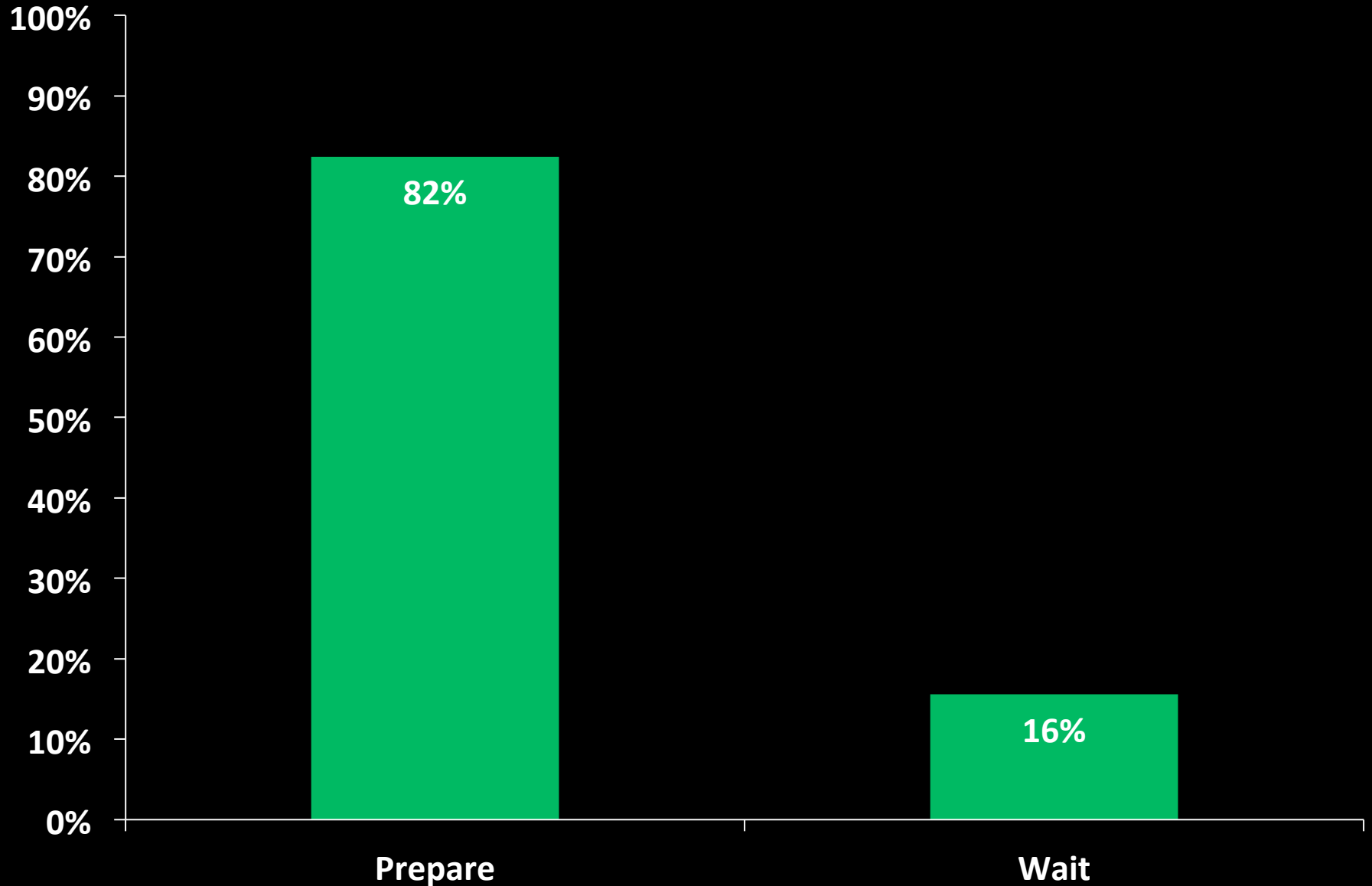


Prepare or Wait?

“One option people and organizations have is to wait for this damage to happen and then adapt to it.

“Rather than waiting, people and organizations could instead do things soon to try to prepare for the damage before it happens.

Prepare or Wait?



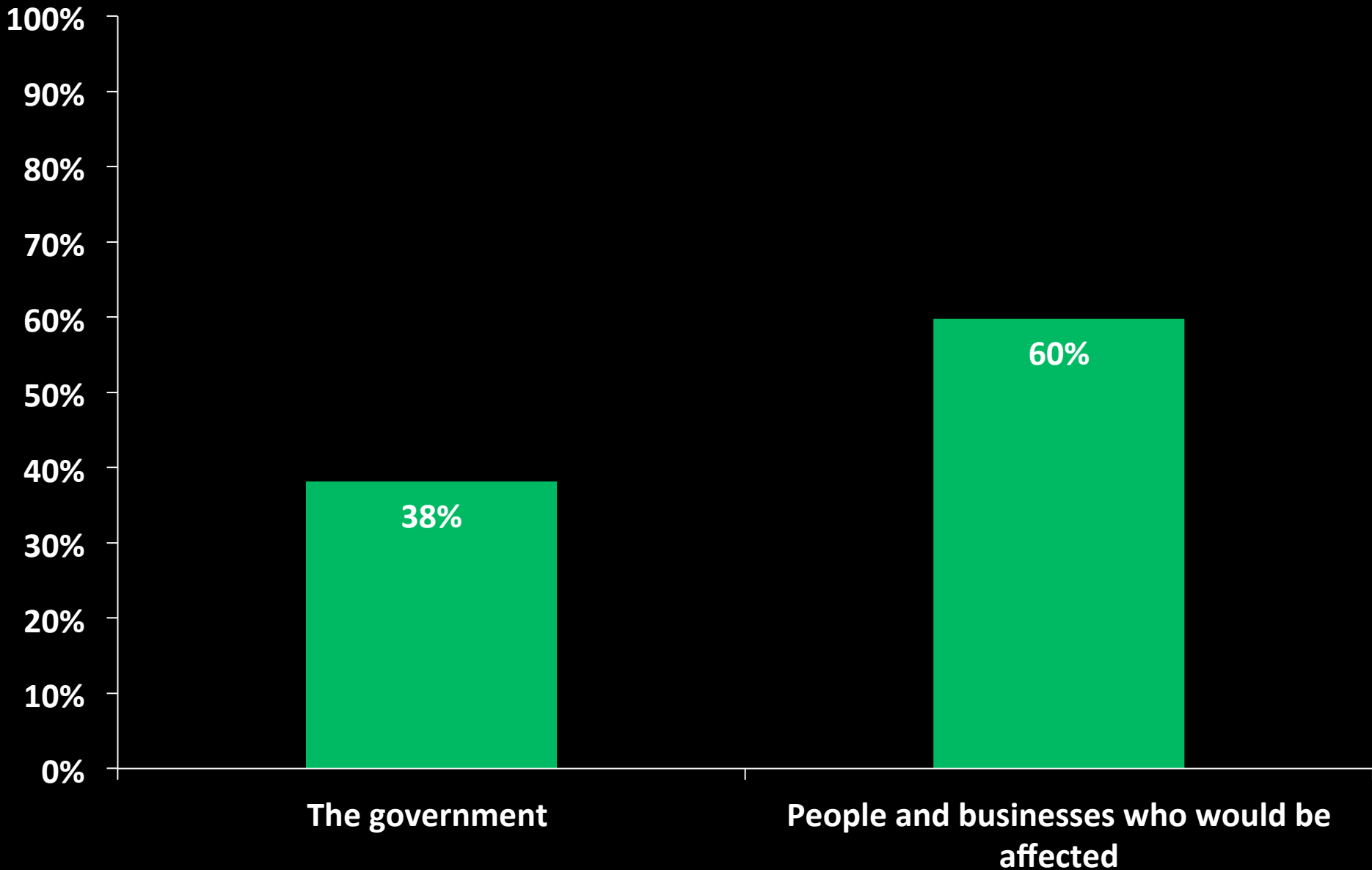
Who Should Pay for Preparation?

The government

or

the people and businesses who would be affected by the damage?

Who Should Pay for Preparation?



Some Effects of Preparation

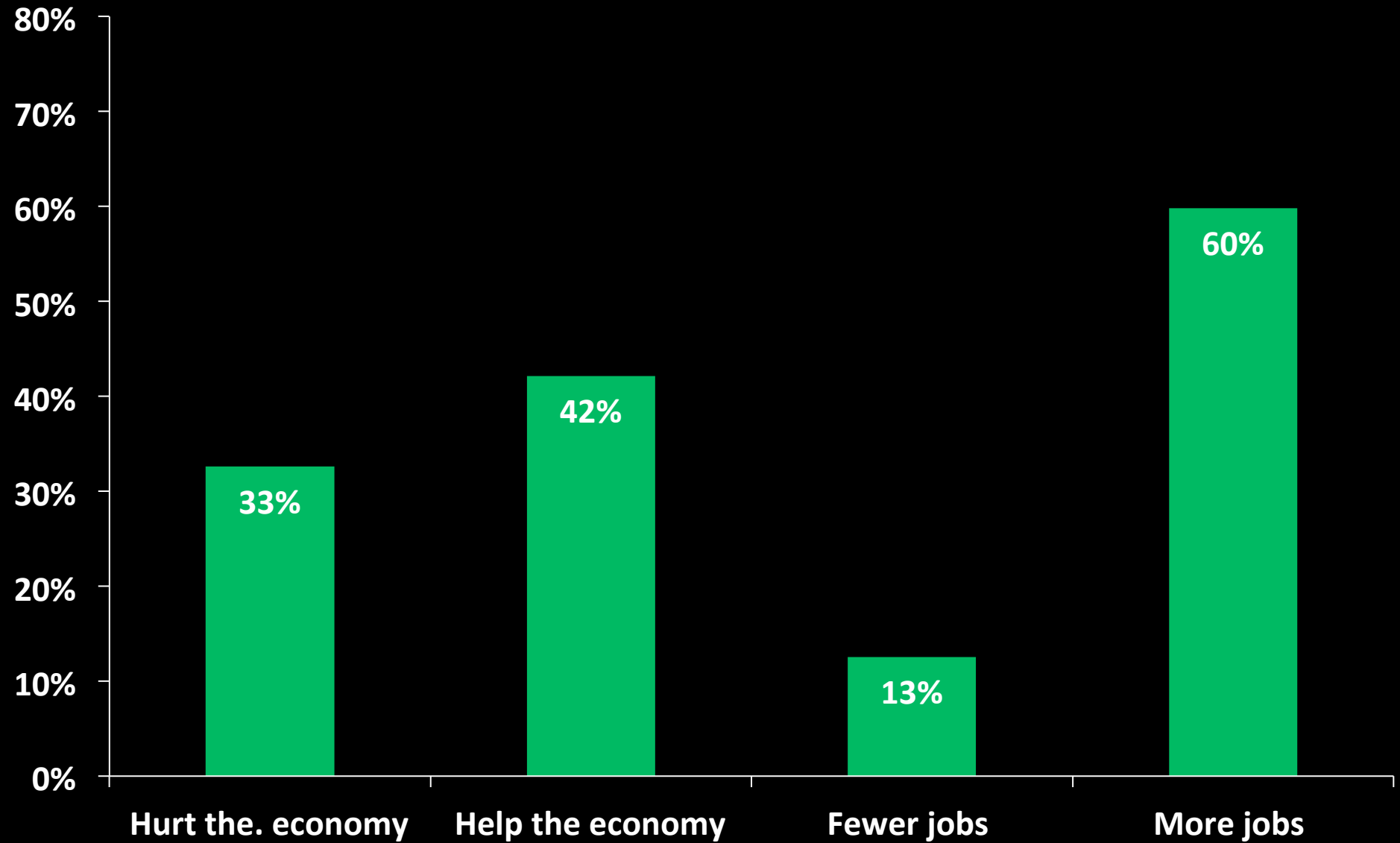
Help/hurt the U.S. economy and jobs

Help/hurt your state's economy and jobs

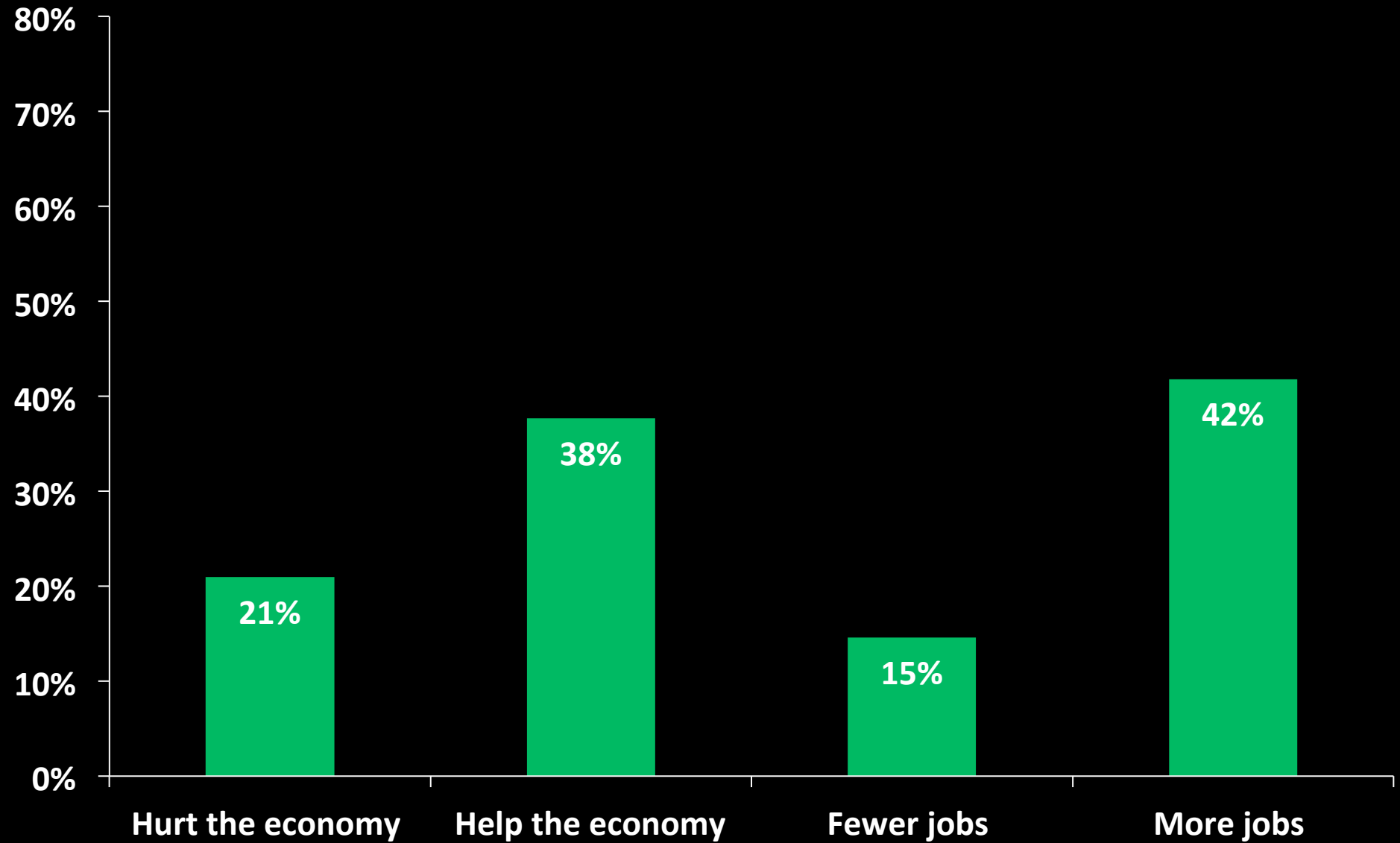
Help/hurt your state's economy and jobs in your town

Make your life better/worse

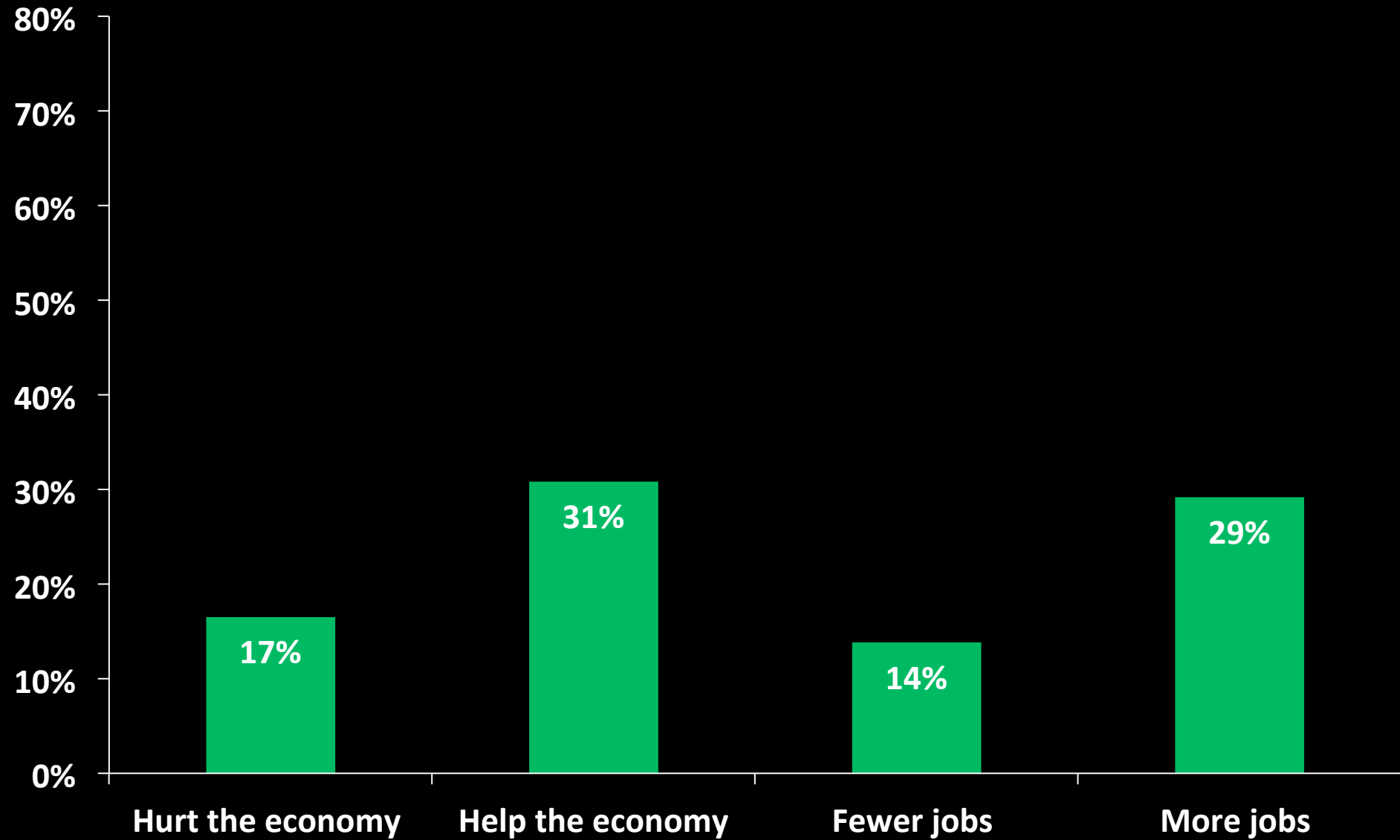
Economic Impact: the Nation



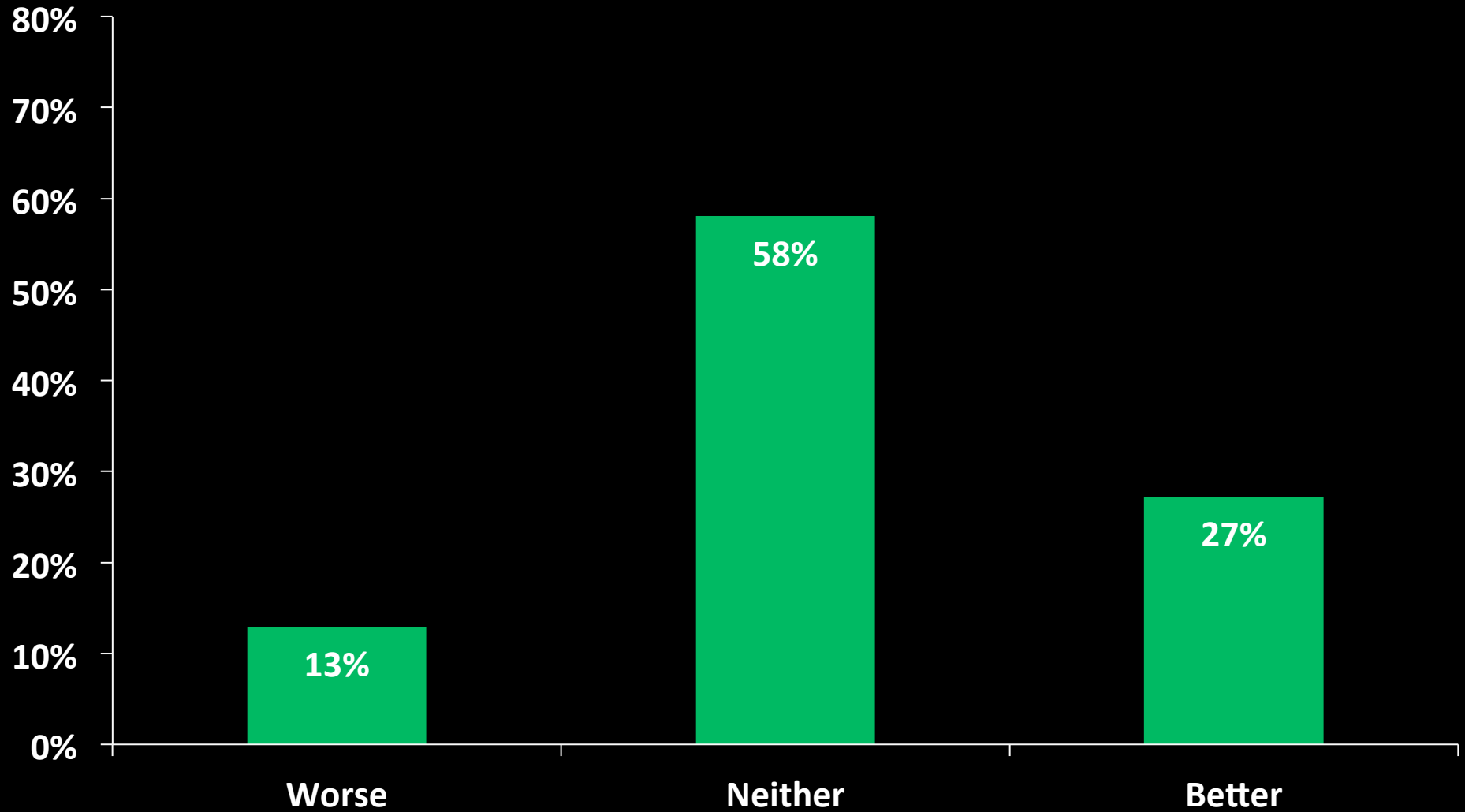
Economic Impact: Your State



Economic Impact: Your Town



Impact on You



Attitude Index

Sea level rise is a threat

Storms are a threat

Support preparation action

Predicting Attitudes

Predictor	OLS Regression Coefficient
Effects of preparation on U.S. economy	.06
Effects of preparation on state economy	.08*
Effects of preparation on local economy	.07*
Would preparation help/hurt respondent	.15***
% of R's state's population in a coastal county	.12*
Coastal dweller	-.07
Trust scientists	.17***
Believe global warming has been happening	.22***
Democrat	.08***
Republican	-.05*
Liberal	.04
Conservative	-.03

Also controlling for demographics

Specific Prevention Strategies

Strategies

- Build walls of steel, rocks, or cement along the shore.
- Add sand to beaches after sand is washed away.
- Put large mounds of sand and plants, called “sand dunes”, along the shore.
- Offer money to people/businesses near the coast to move back.
- Laws: Reduce building new buildings near the coast.
- Laws: New building codes to reduce damage
- Laws: No replacement of damaged buildings along the coast.

Additional Information

- Advantages and disadvantages of the policy
- Costs of the policies
- Photographs

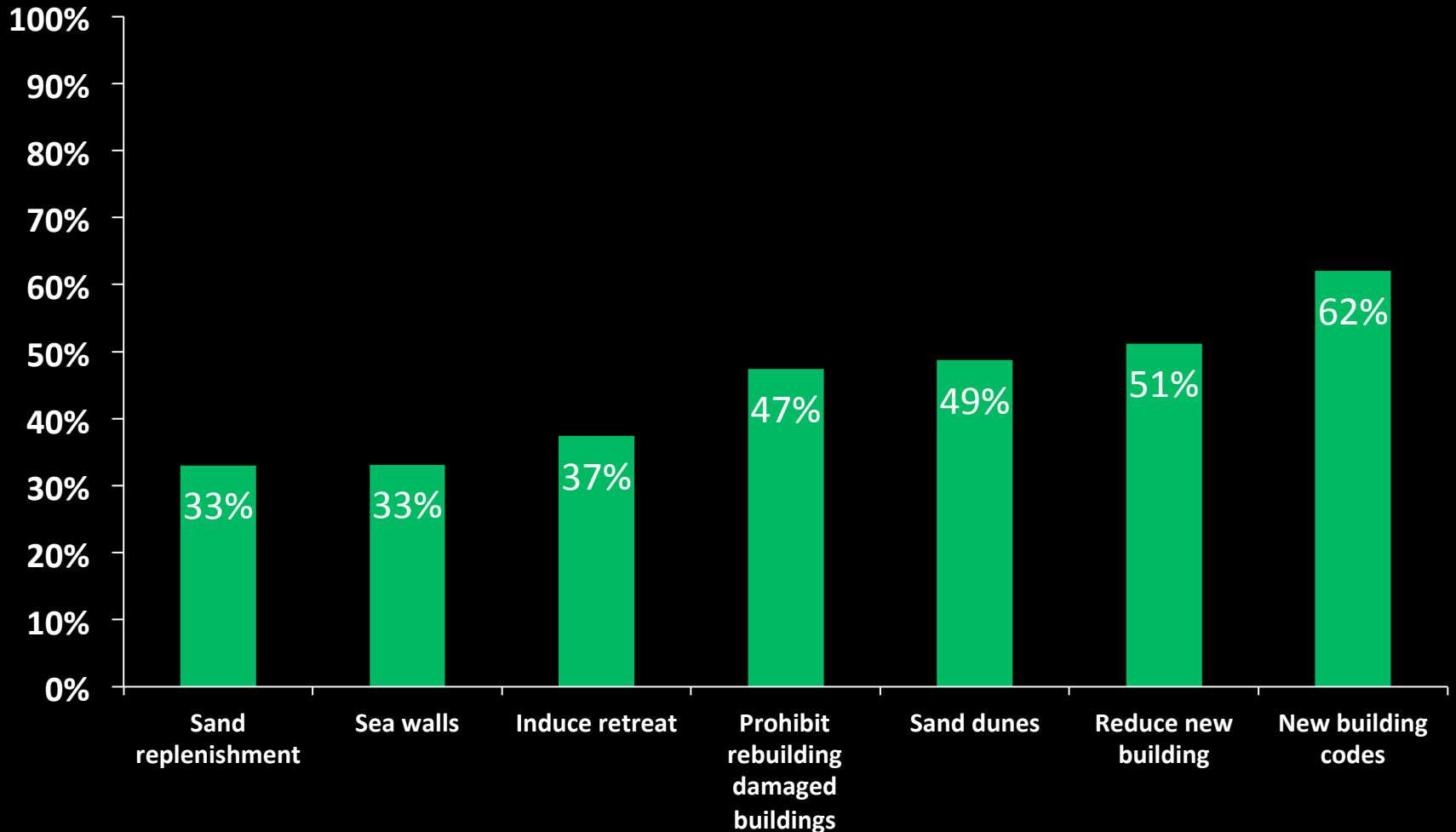








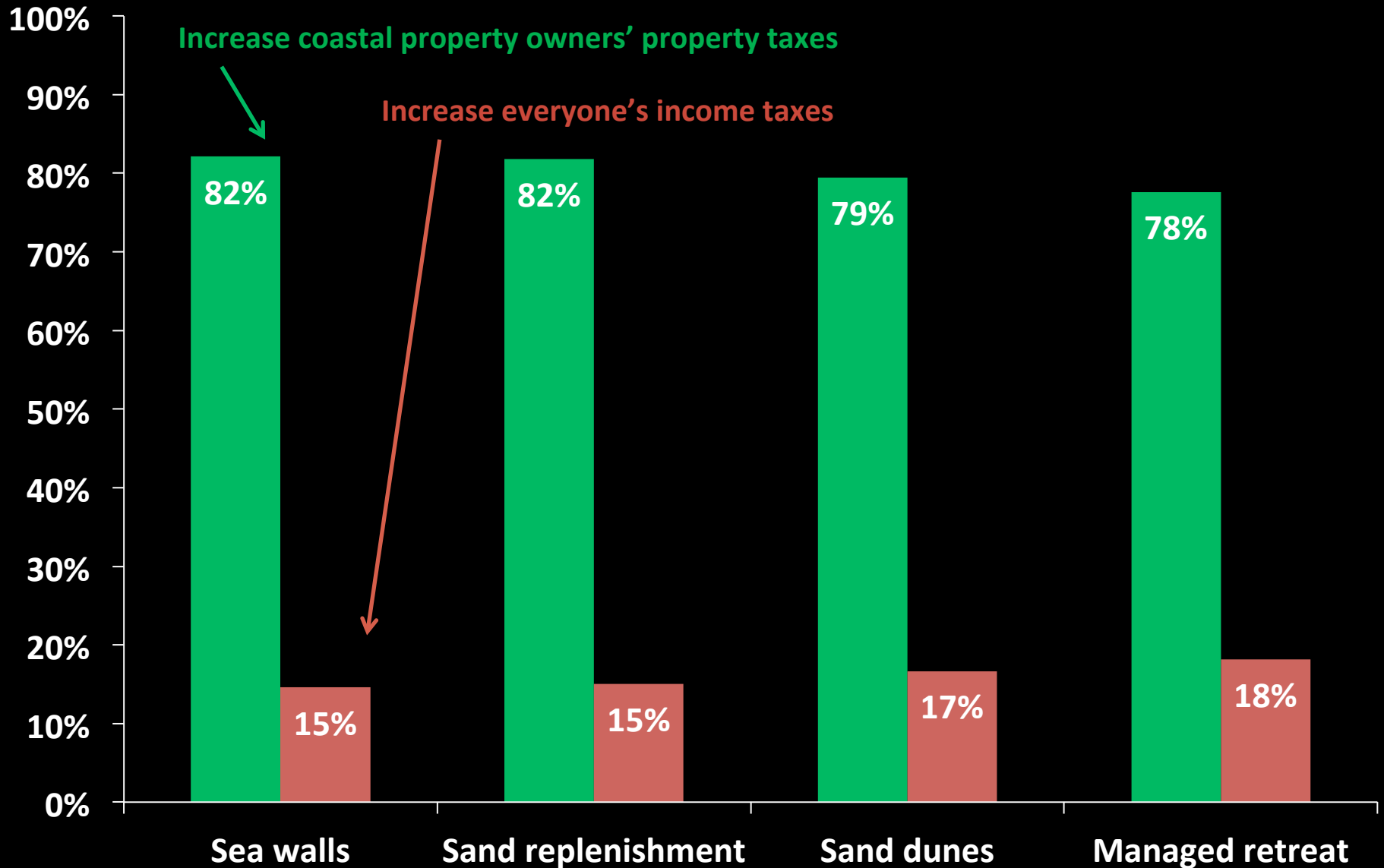
% Favoring Coastal Adaptation Policies



For Policies That Would Cost Money

Who should pay?

Who Should Pay?



Impact of
Expressing Scientific Uncertainty

Natural Scientists

- Three options
 - Leave uncertainty unstated
 - Our best guess ...
 - Acknowledge worst case possibility
 - Our best guess, but it could be as much as ...
 - Acknowledge full range of uncertainty
 - Our best guess, but it could be as much as ..., or it could be as little as ...

Lauren

Natural Scientists

- Three options
 - Leave uncertainty unstated
 - Our best guess ...
 - Acknowledge worst case possibility
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 - Acknowledge full range of uncertainty
 - Our best guess, but it could be as much as ..., or it could be as little as ...

Two Types of Uncertainty

- How much sea level rise
 - Best guess
 - Best guess plus “high tail”
 - Best guess plus “high tail” and “low tail”
- Storm surges

Research Questions

- Does mentioning a high tail increase perceived threat?
- Does mentioning a low tail offer an opportunity for denial?
- Does mentioning both tails reduce trust?
- Does mentioning both tails increase trust?
- Does mentioning storms reduce trust?
- Does mentioning storms increase trust?

Experimental Design

	No storm surge	Storm surge
Best guess		
Best guess plus high tail		
Best guess plus both tails		

Best Guess

Scientists believe that, during the next 100 years, global warming will cause the surface of the oceans around the world to rise about 4 feet.

In the United States, sea level rise will mostly affect towns and cities along the coasts, where millions of people live and work.

Sea level rise will gradually flood these areas, so people living and working along the coasts will have to move their homes and businesses to other places, farther from the ocean.

If sea level rises by 4 feet and nothing is done to prepare for it, about 5 million Americans who currently live and work less than 4 feet above sea level will have to move out of their homes and businesses.

Best Guess Plus High Tail

Scientists believe that, during the next 100 years, global warming will cause the surface of the oceans around the world to rise about 4 feet. However, sea level could rise by as much as 7 feet.

...

If sea level rises by 7 feet and nothing is done to prepare for it, about 8 million Americans who currently live and work less than 7 feet above sea level will have to move out of their homes and businesses.

Best Guess Plus Both Tails

Scientists believe that, during the next 100 years, global warming will cause the surface of the oceans around the world to rise about 4 feet. However, sea level could rise by as much as 7 feet, or it could rise by as little as 1 foot.

...

If sea level rises by 1 foot and nothing is done to prepare for it, about 1 million Americans who currently live and work less than 1 foot above sea level will have to move out of their homes and businesses.

Storm Surge

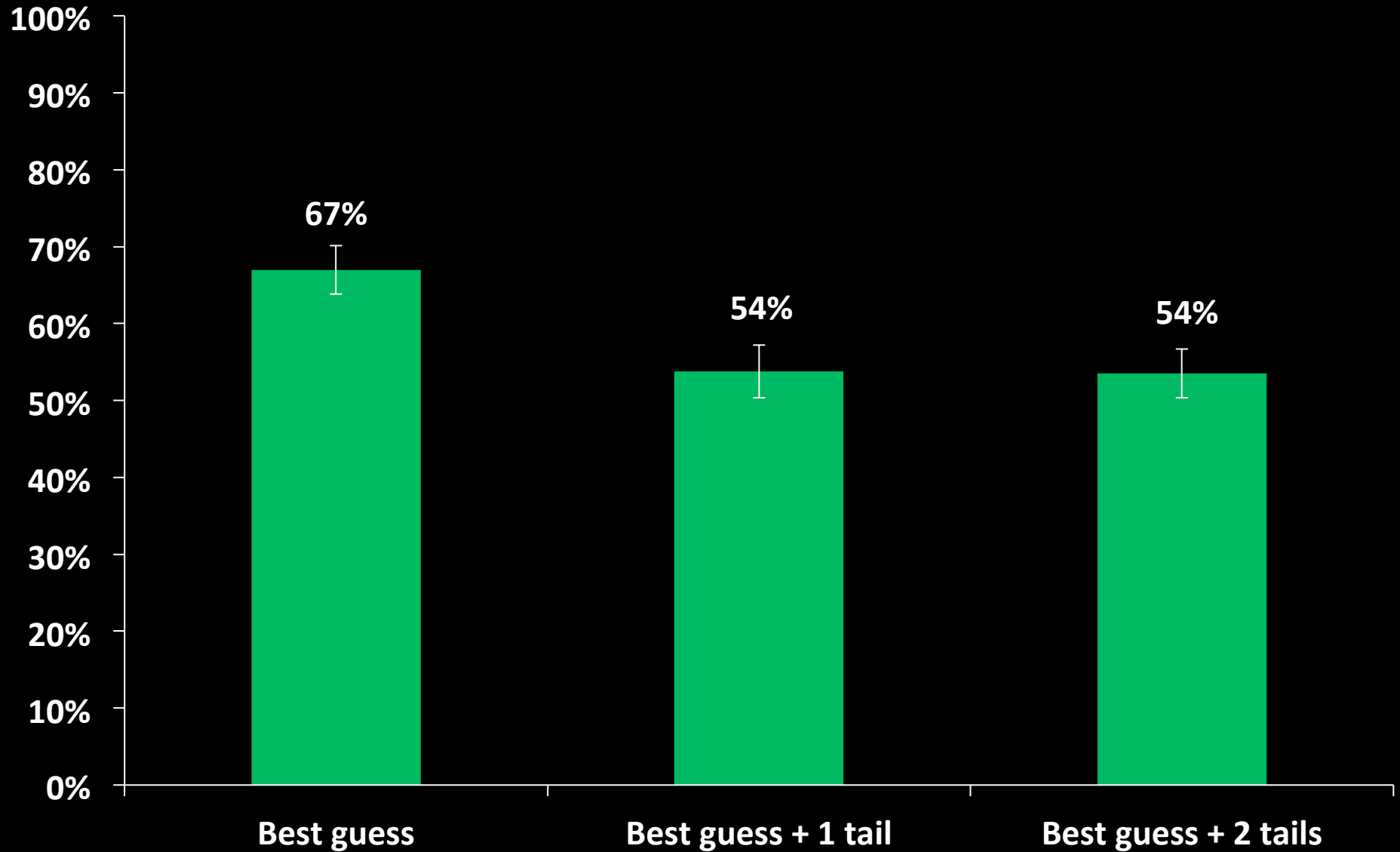
This rise in sea level will make hurricanes, cyclones, and other storms worse for people living and working near the coast.

Scientists believe that global warming will cause these storms to be more intense in the future. During these storms, oceans will surge as high as 20 feet along hundreds of miles of coastline and will suddenly flood cities with large amounts of water. These floods will be more damaging over the years as sea level rises, and floods will be even worse when storms hit during high tide.

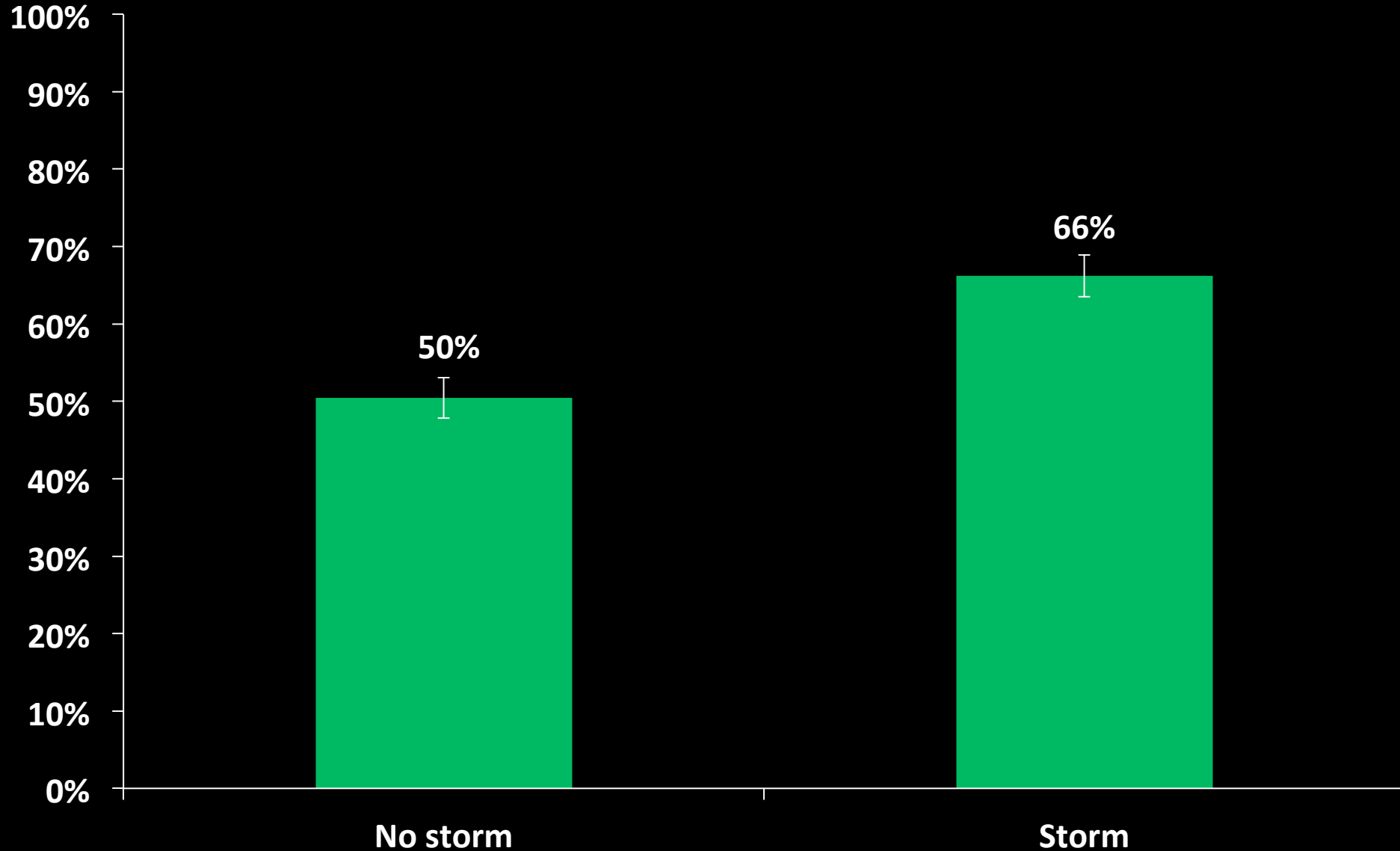
For example, Hurricane Sandy caused ocean surges as high as 14 feet and flooded tunnels, buildings, and other parts of New York and New Jersey.

Remember hearing or reading
this sort of information?

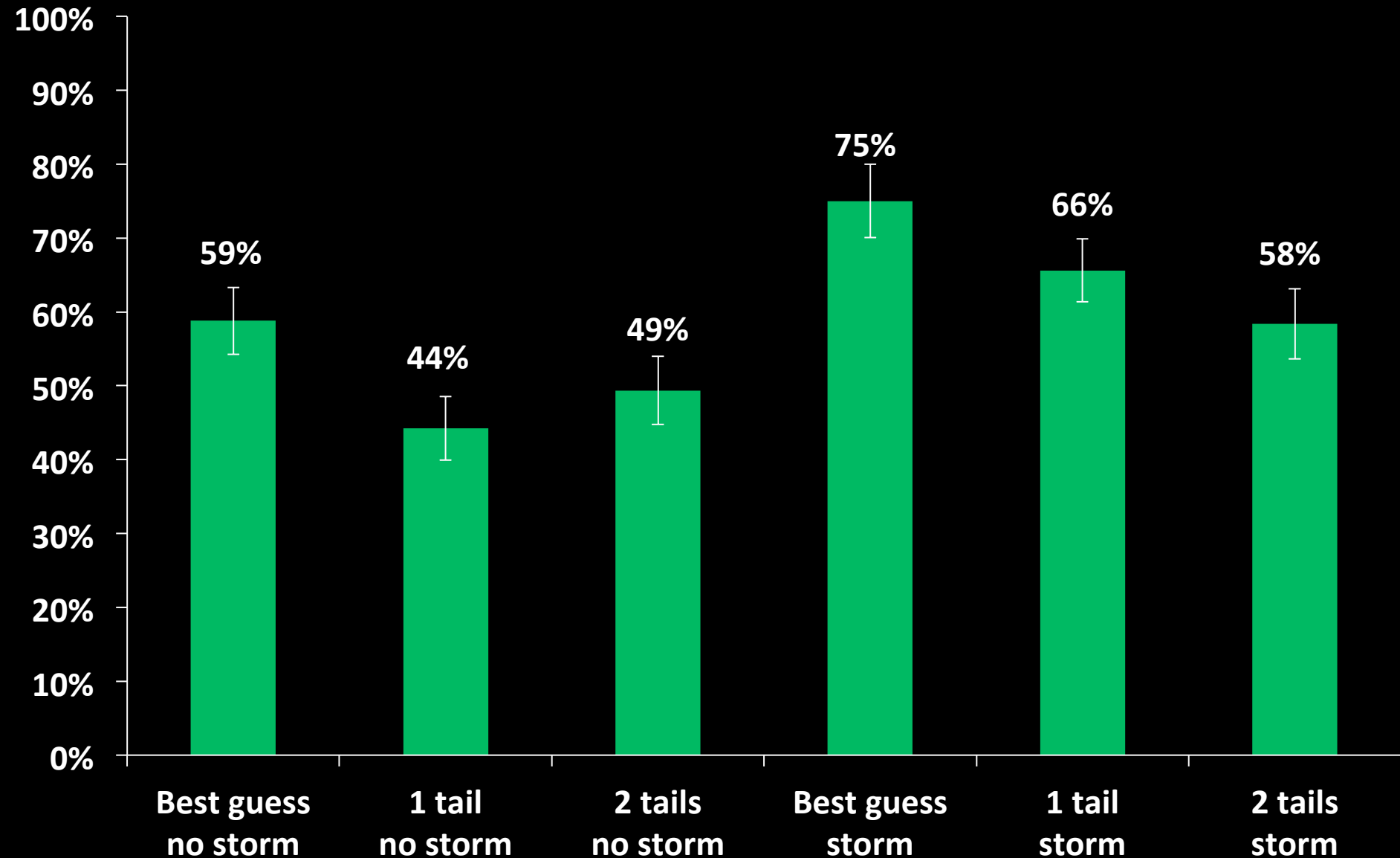
Remember Hearing or Reading



Remember Hearing or Reading

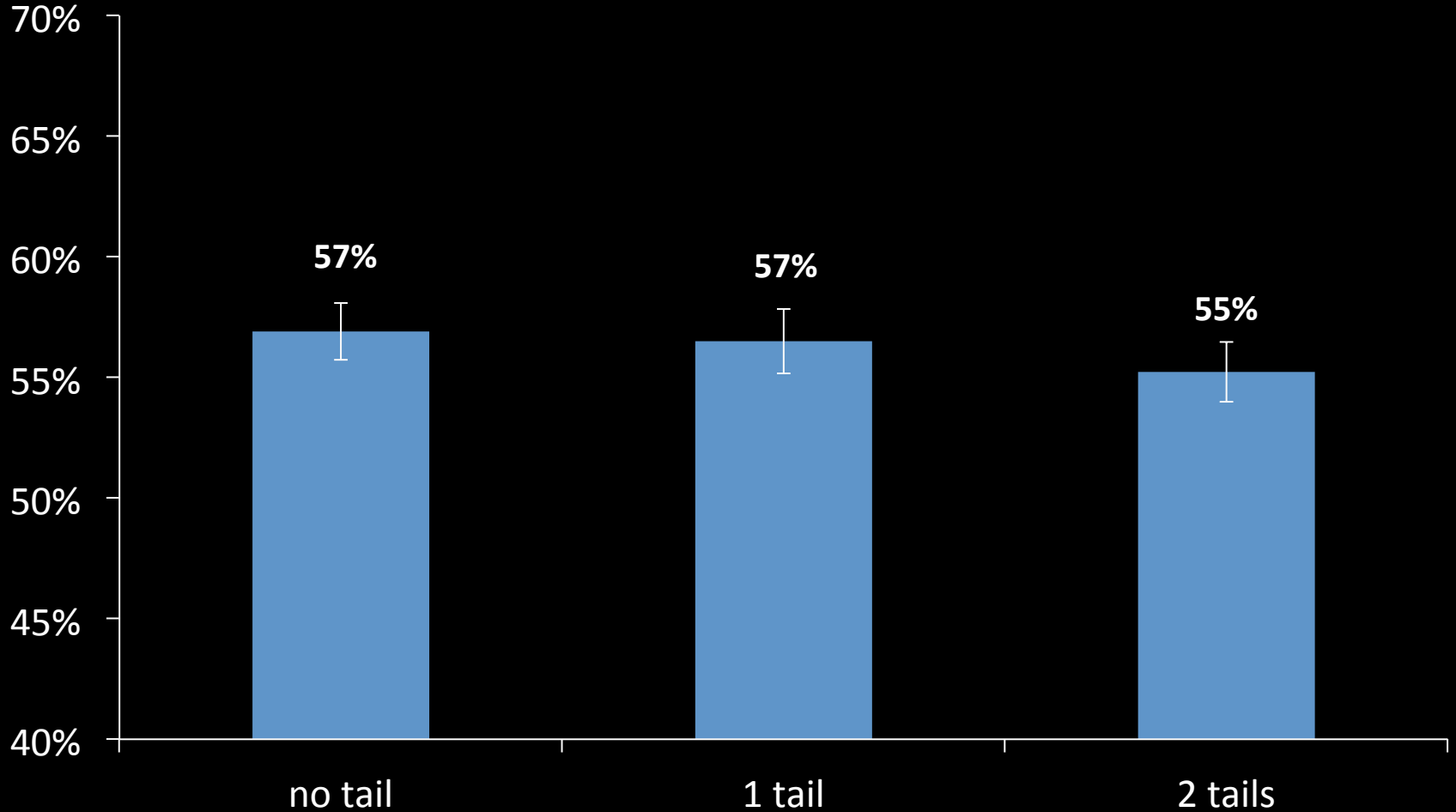


Remember Hearing or Reading

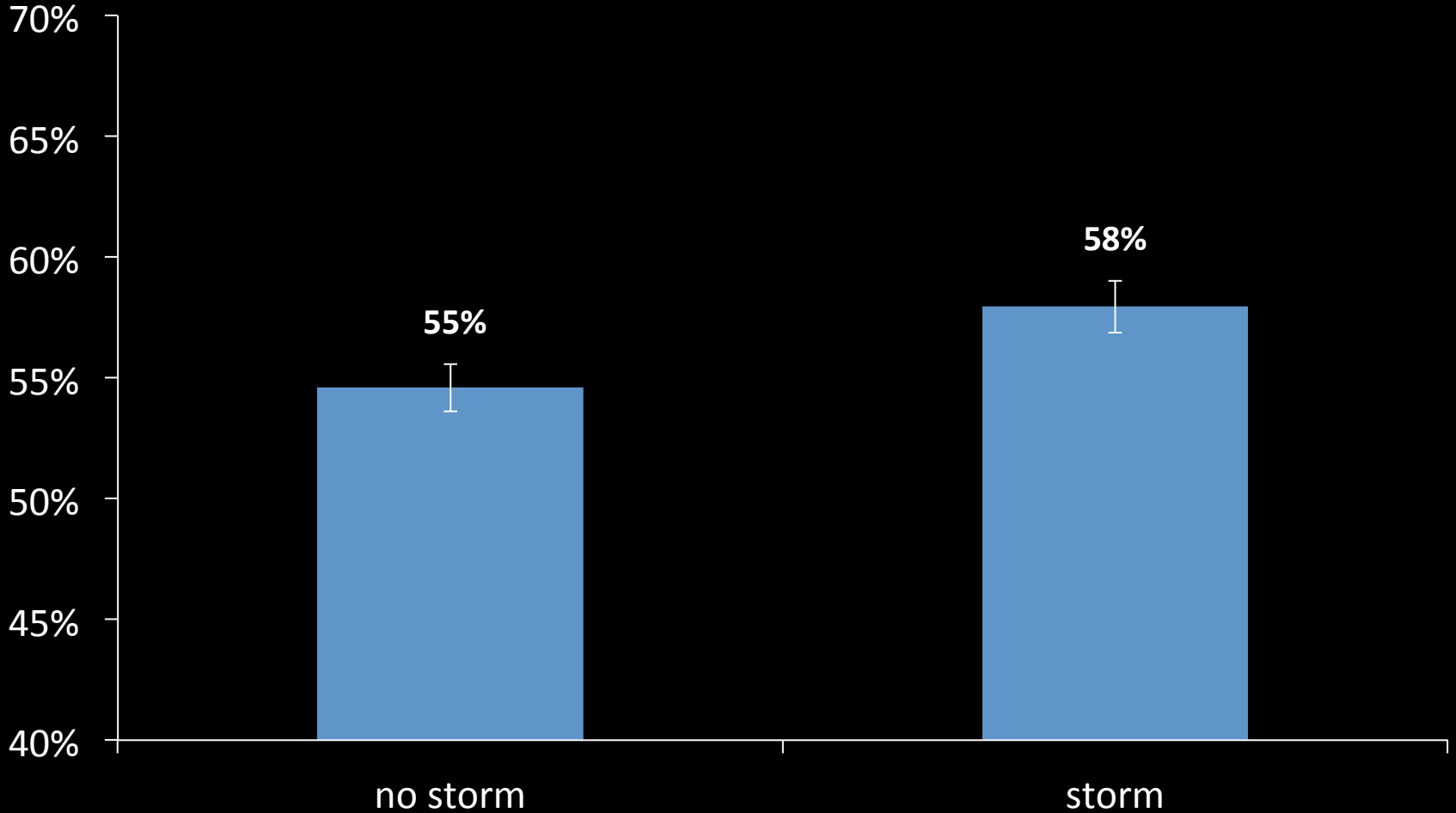


Effects of Messages
on Perceptions of Threat
and Attitudes Toward Preparation

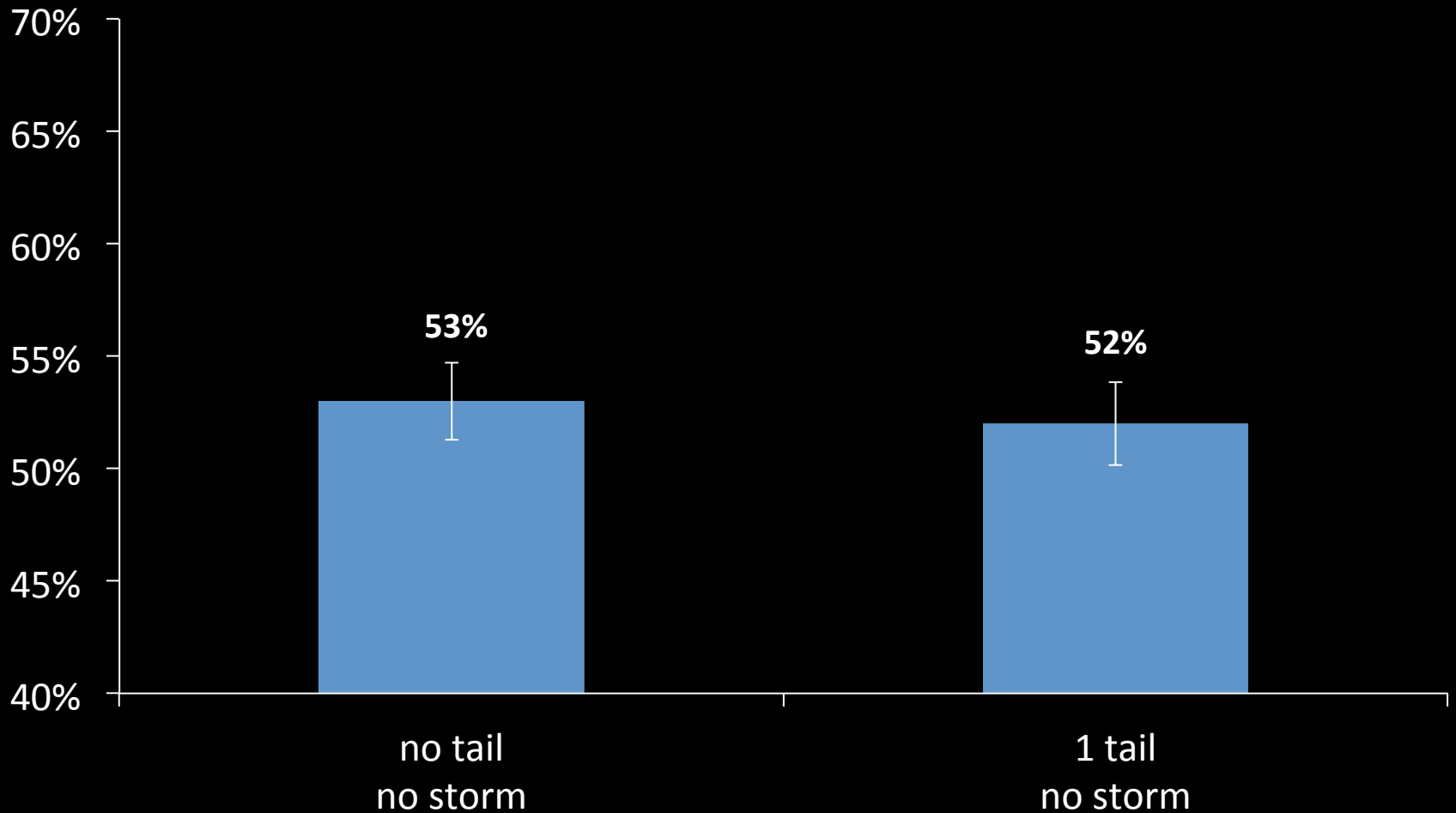
Effects of Uncertainty About SLR



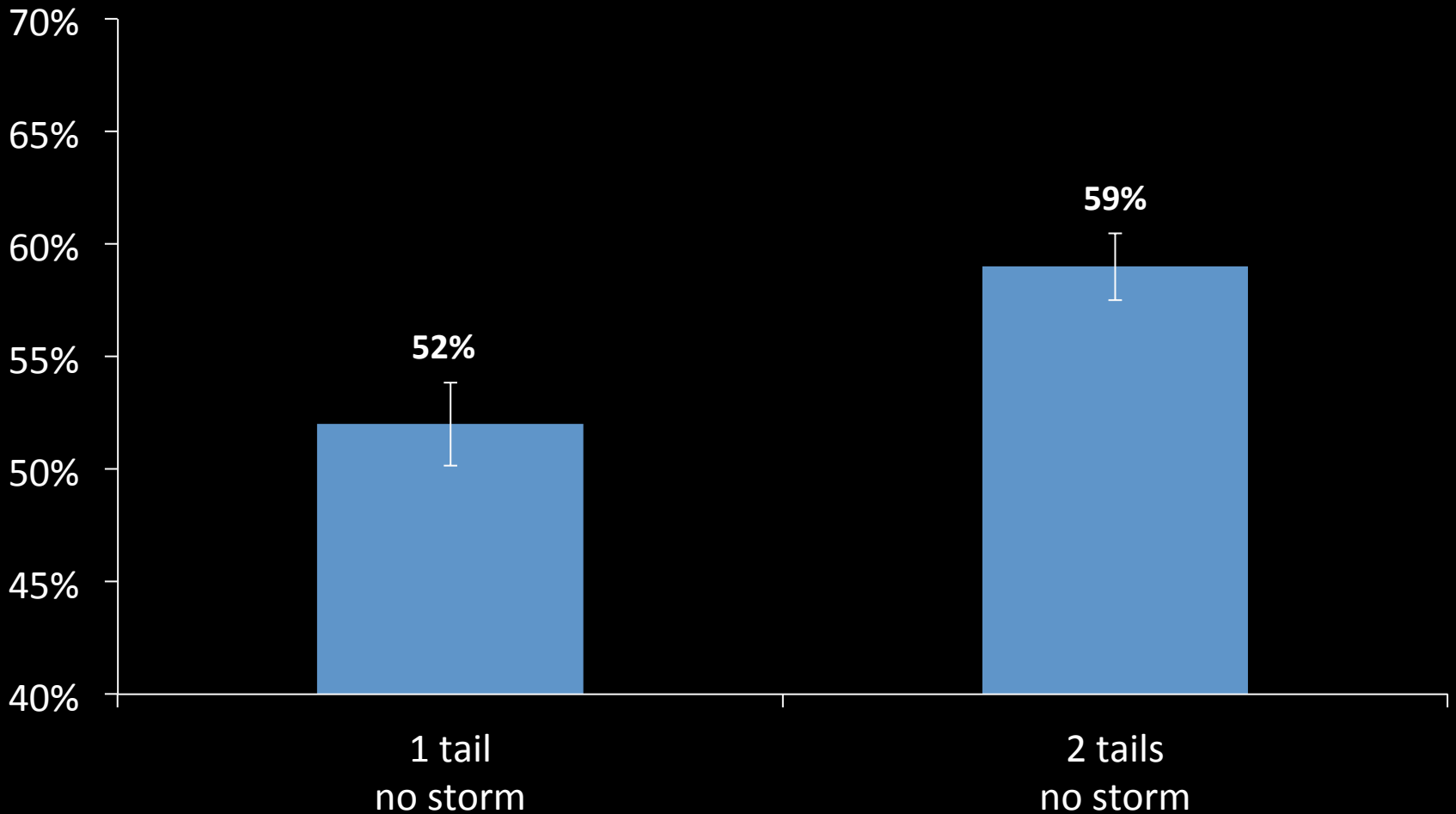
Adding Storms



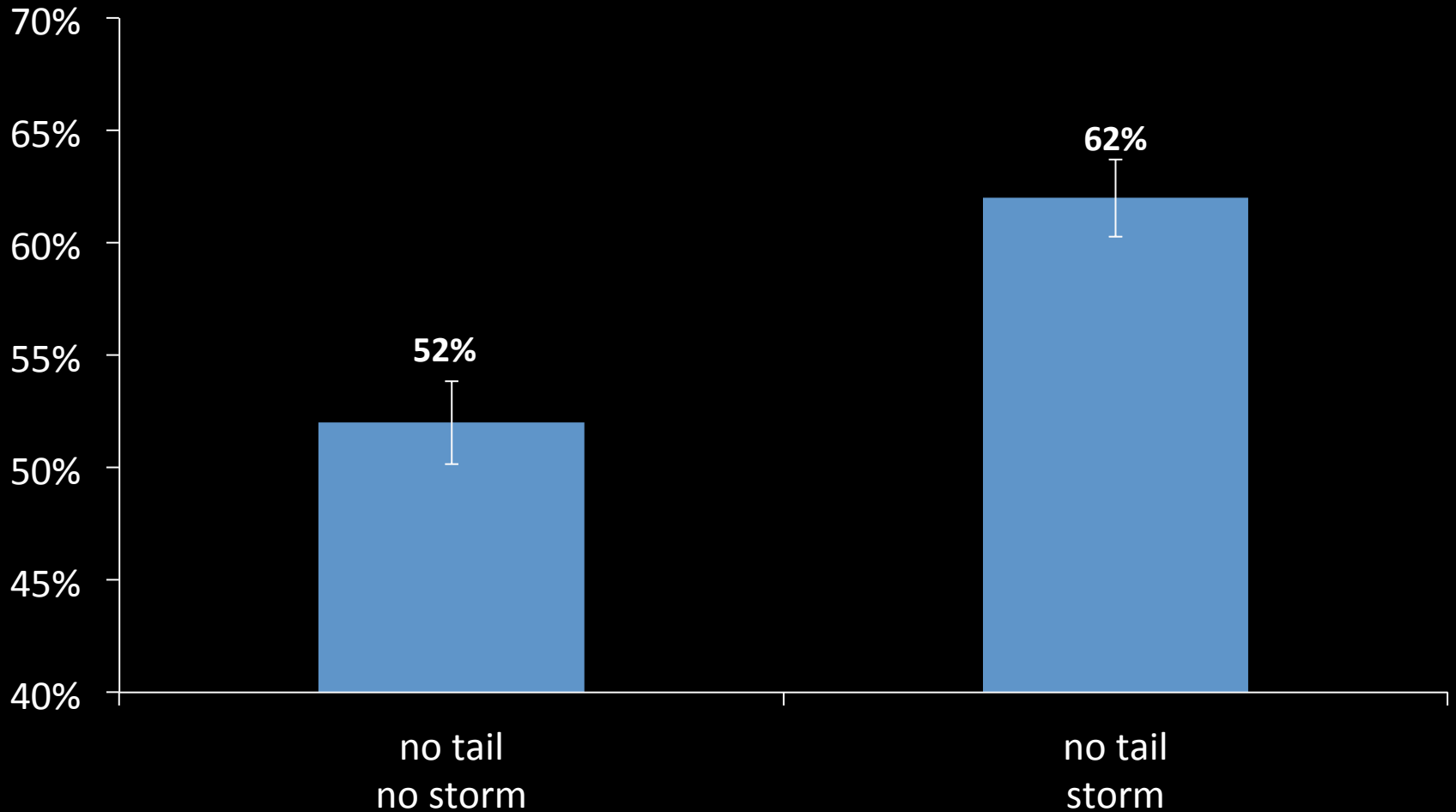
No Storms: Adding One Tail



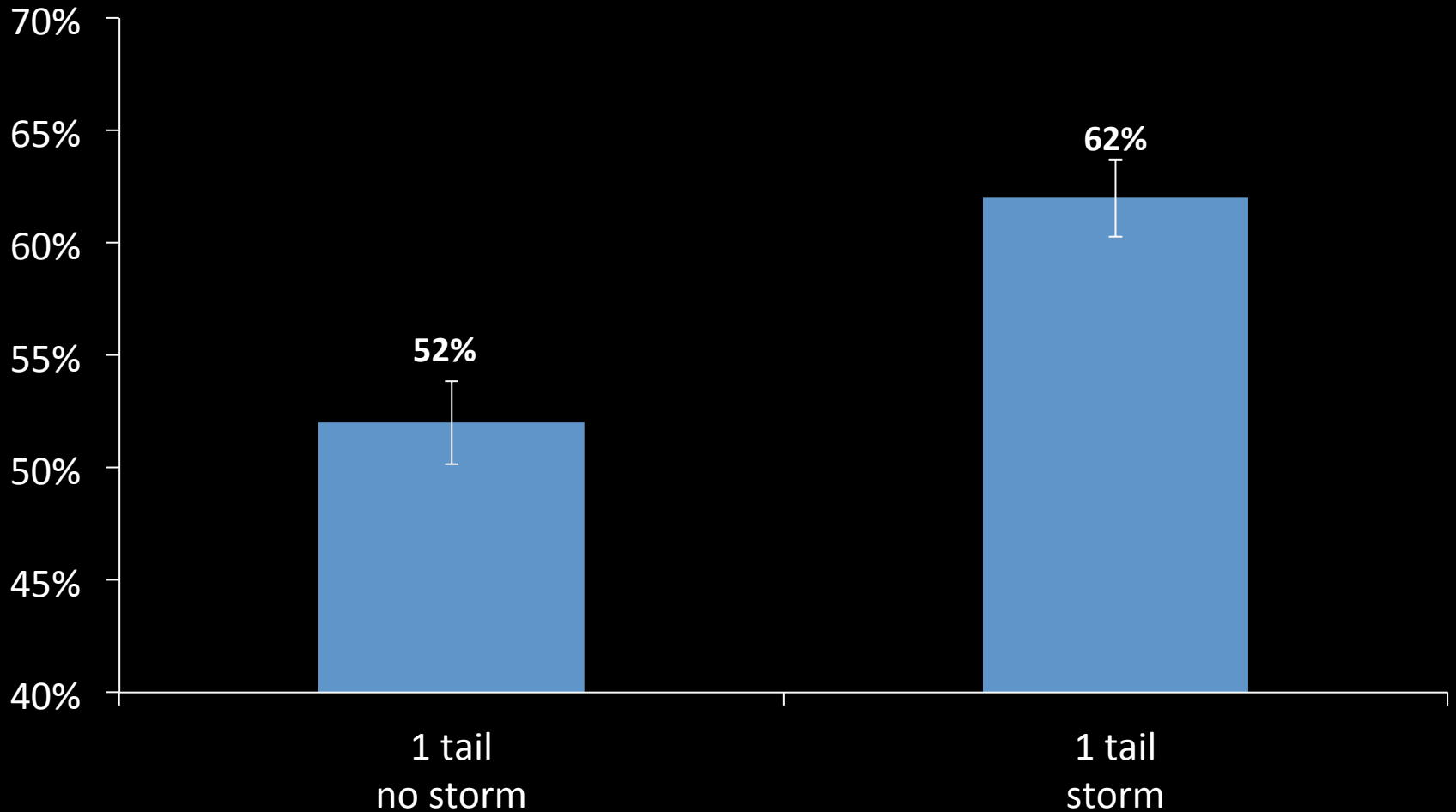
No Storms: Adding Two Tails



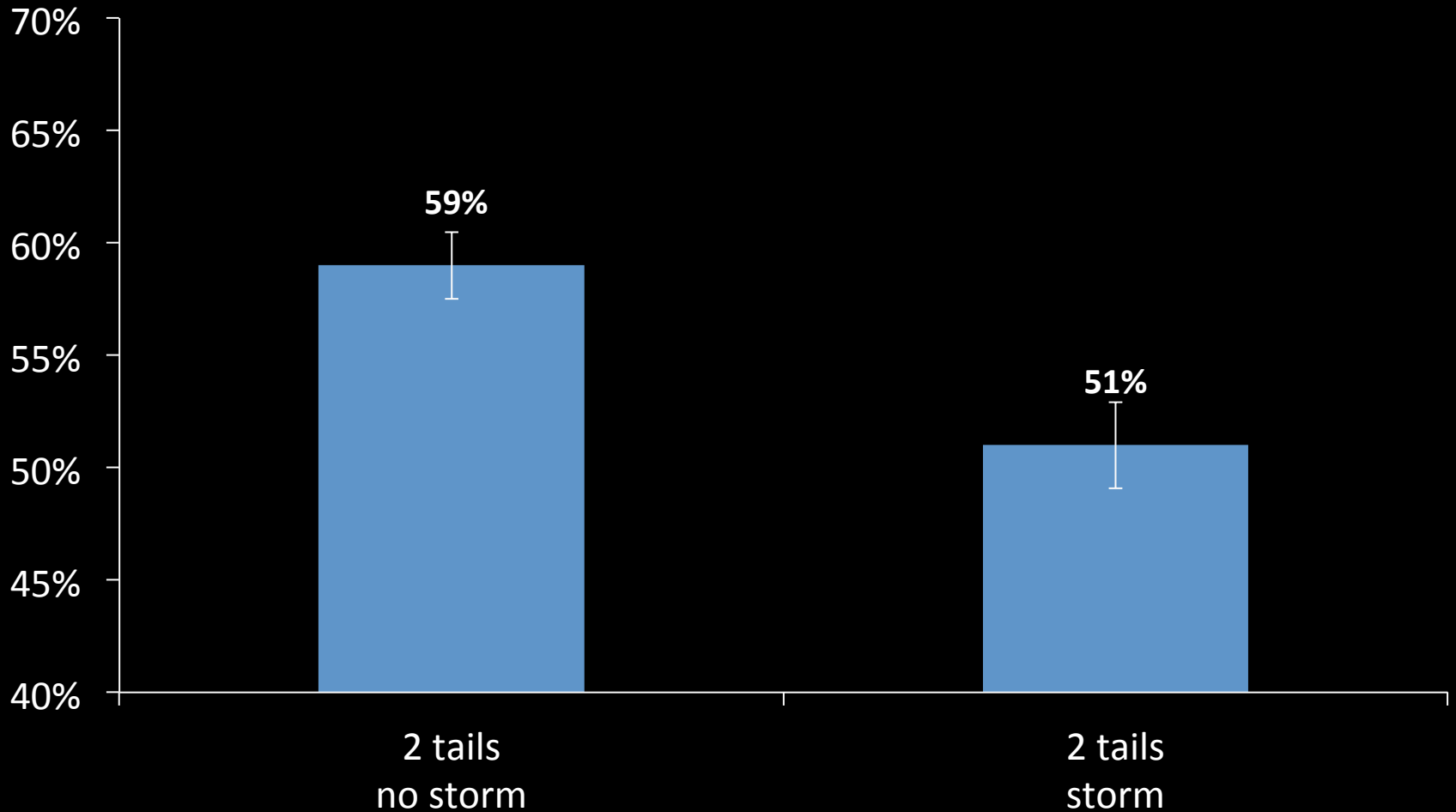
Best Guess: Adding Storms



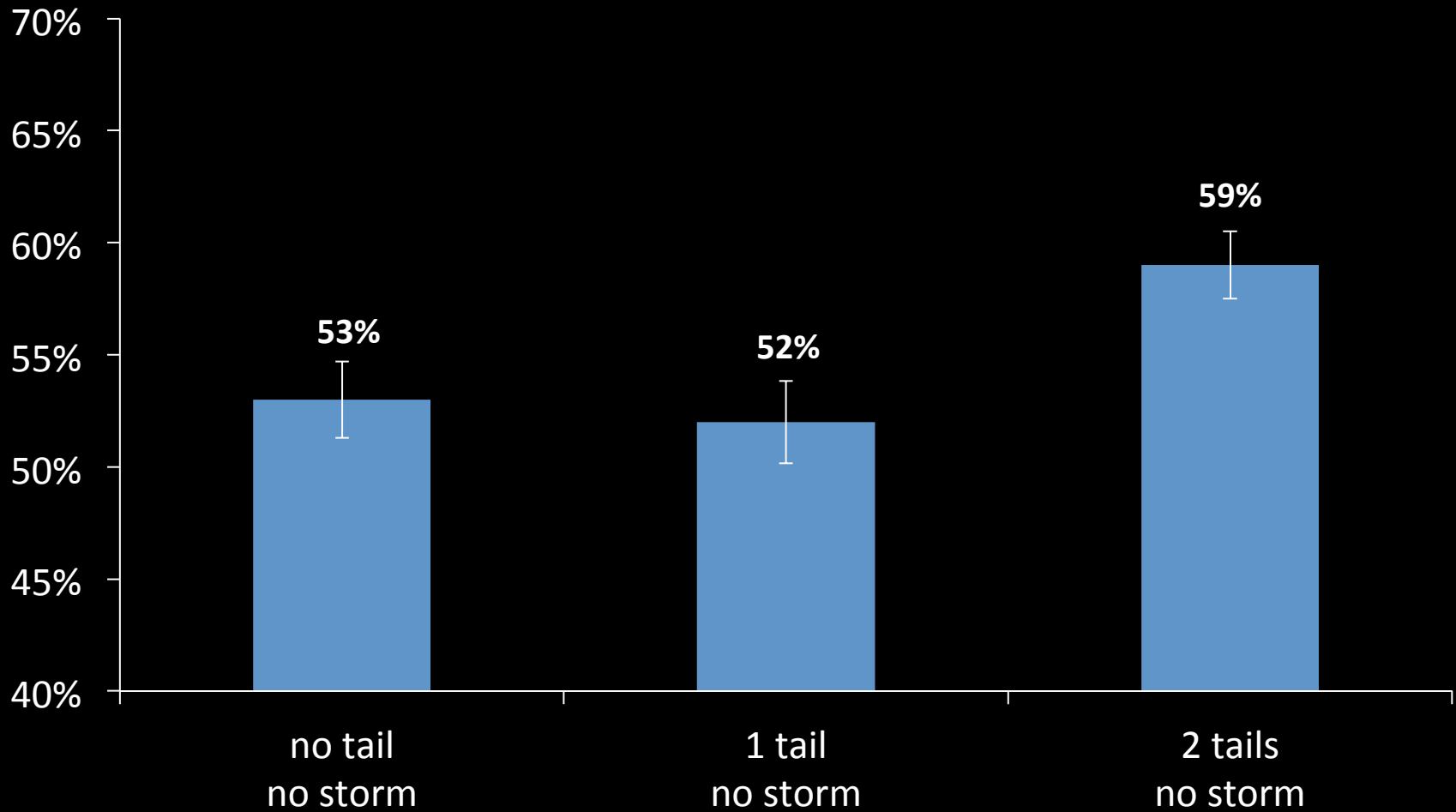
One Tail: Adding Storms



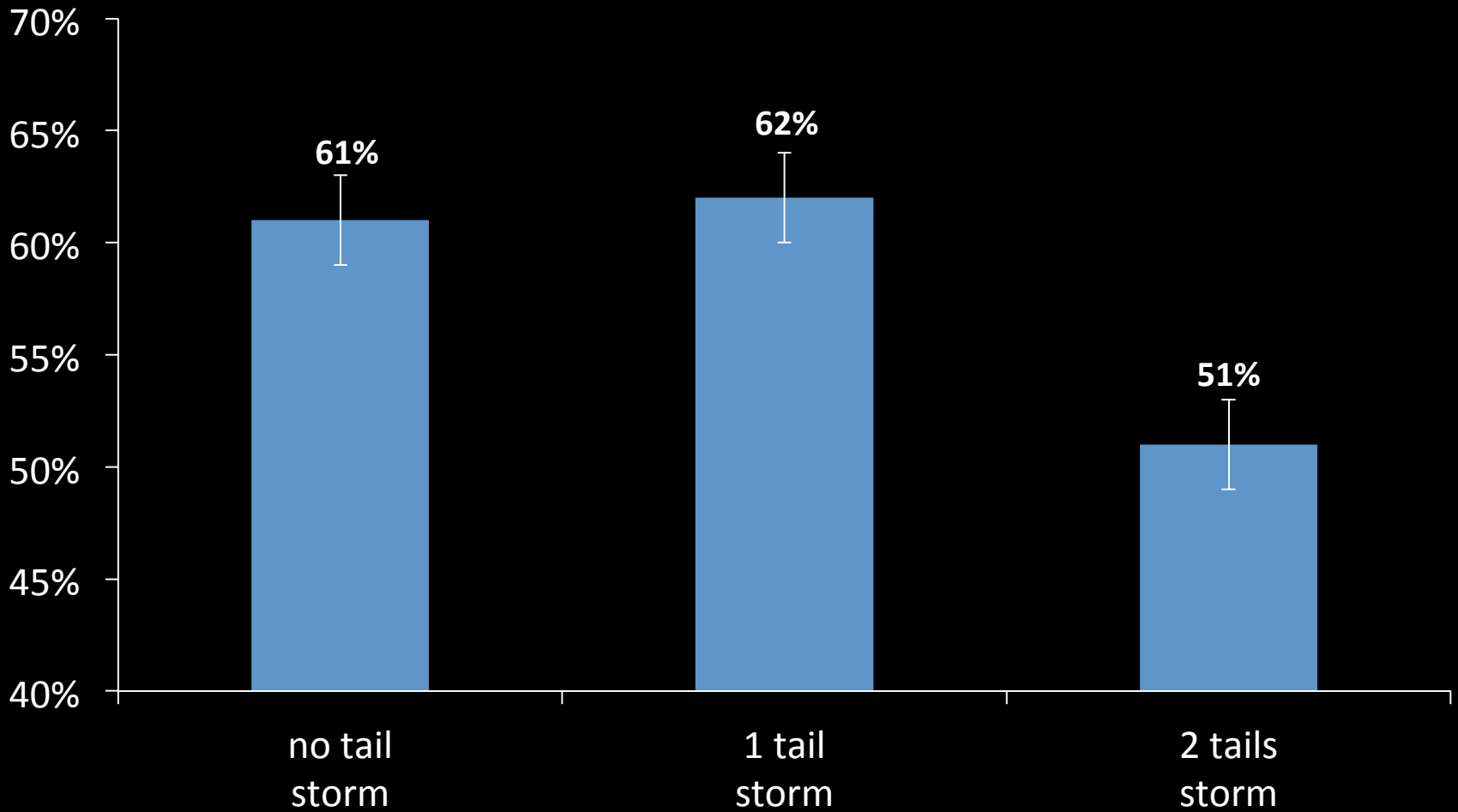
Two Tails: Adding Storms



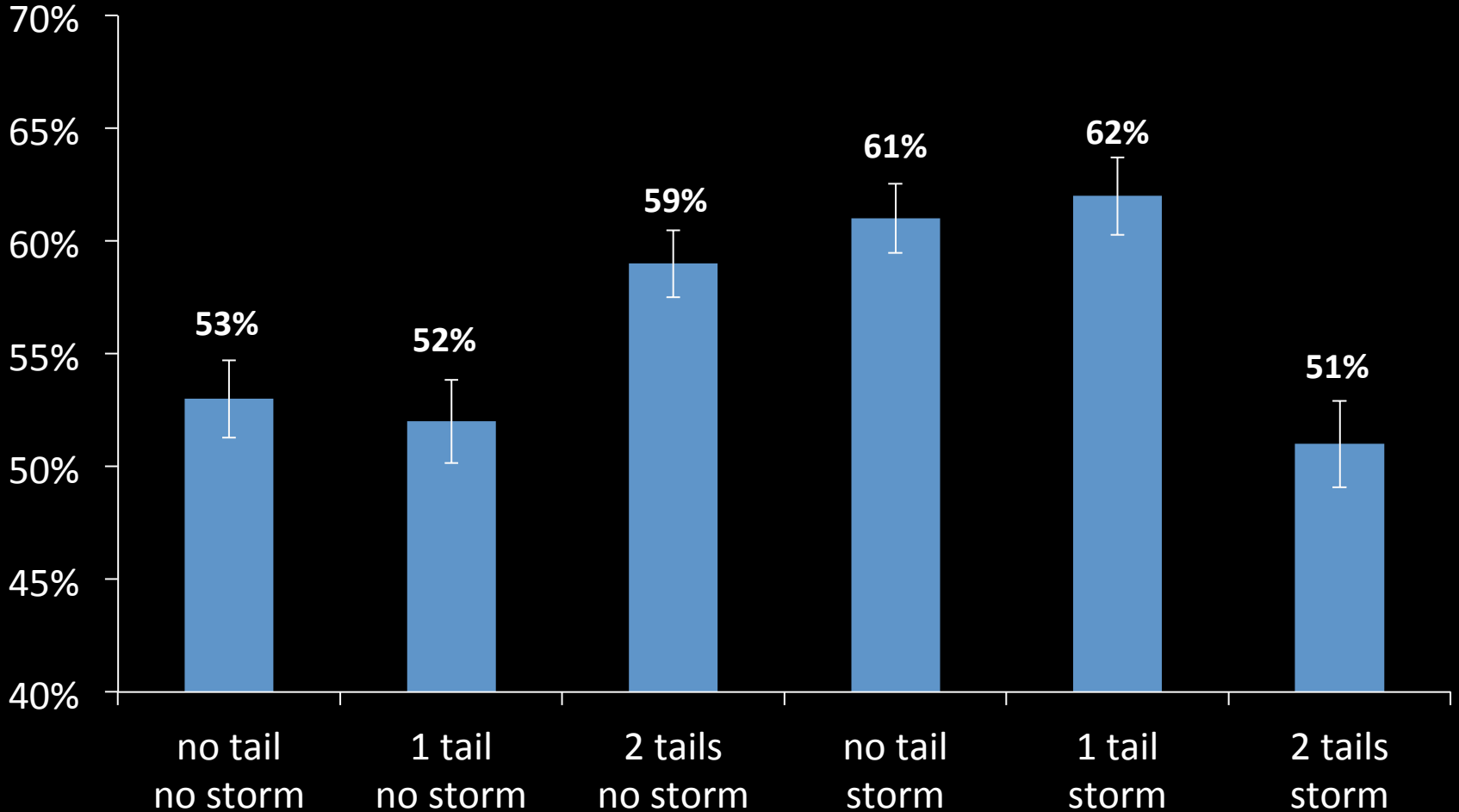
No Storms: Adding Tails



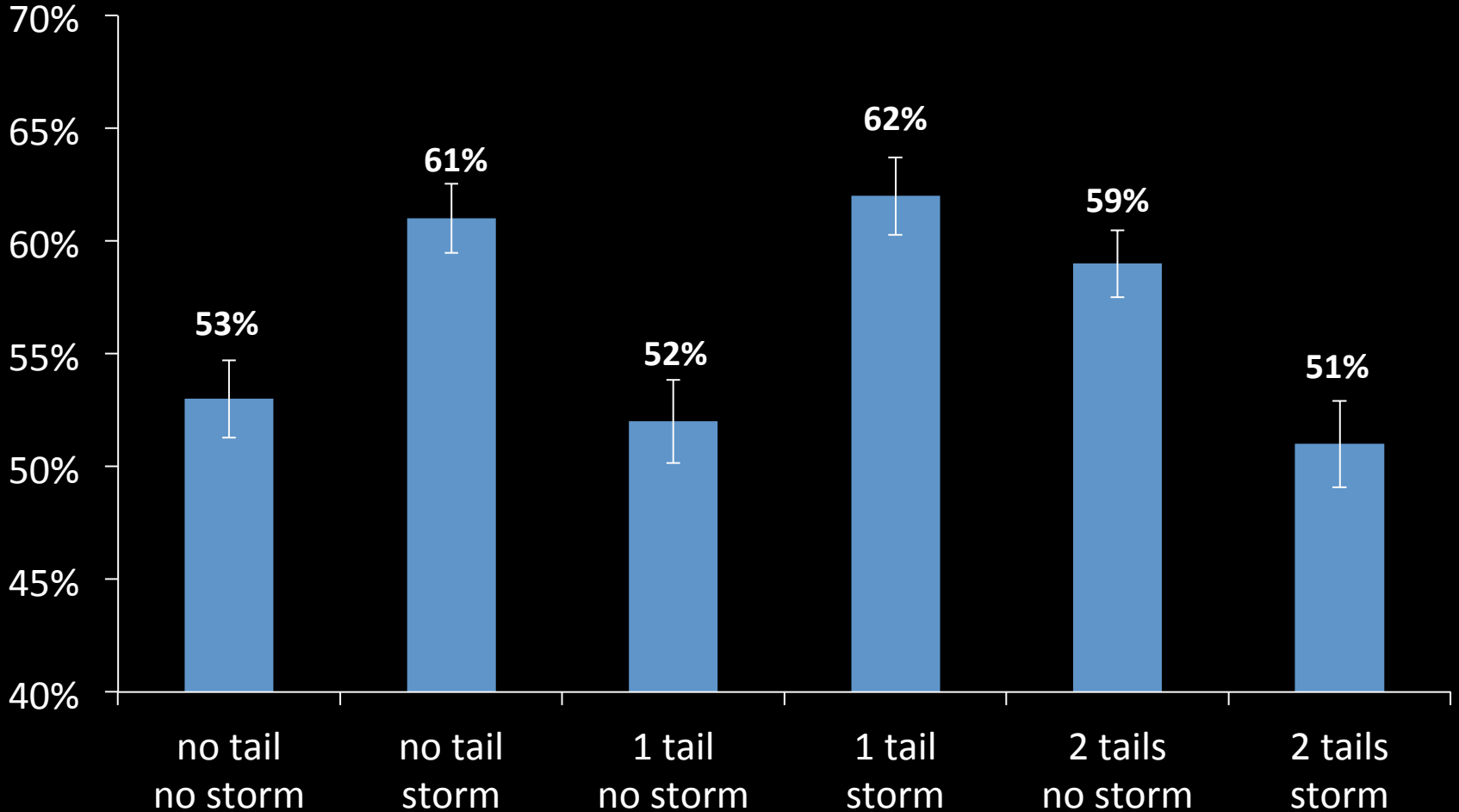
Storm: Adding Tails



Impact of Tails and Storms



Impact of Tails and Storms



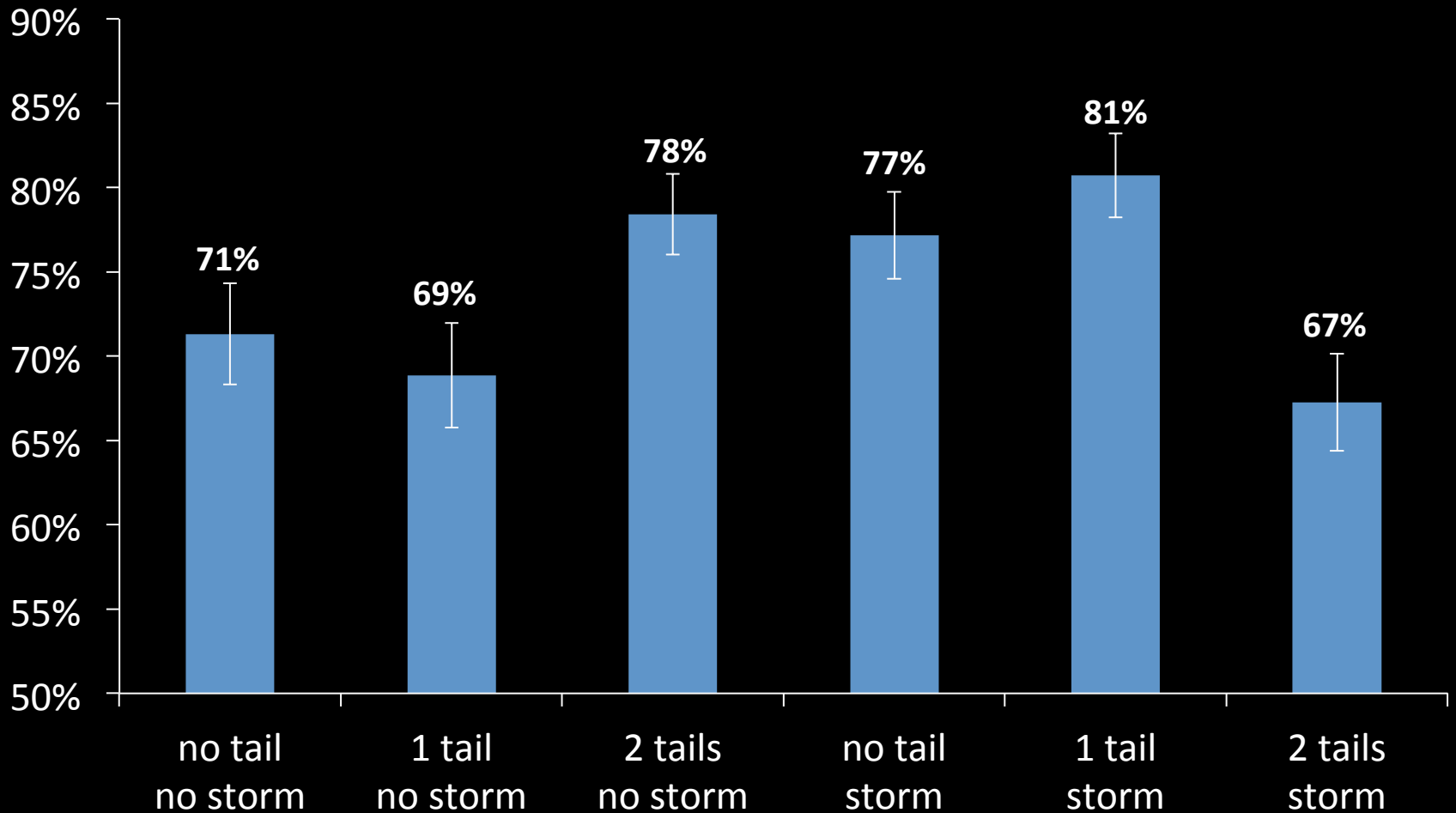
Conclusions

- Full acknowledgement of uncertainty increases acceptance.
- Mention of storms increases acceptance.
- Mentioning storms in the presence of full acknowledgement of uncertainty is overwhelming and reduces acceptance.

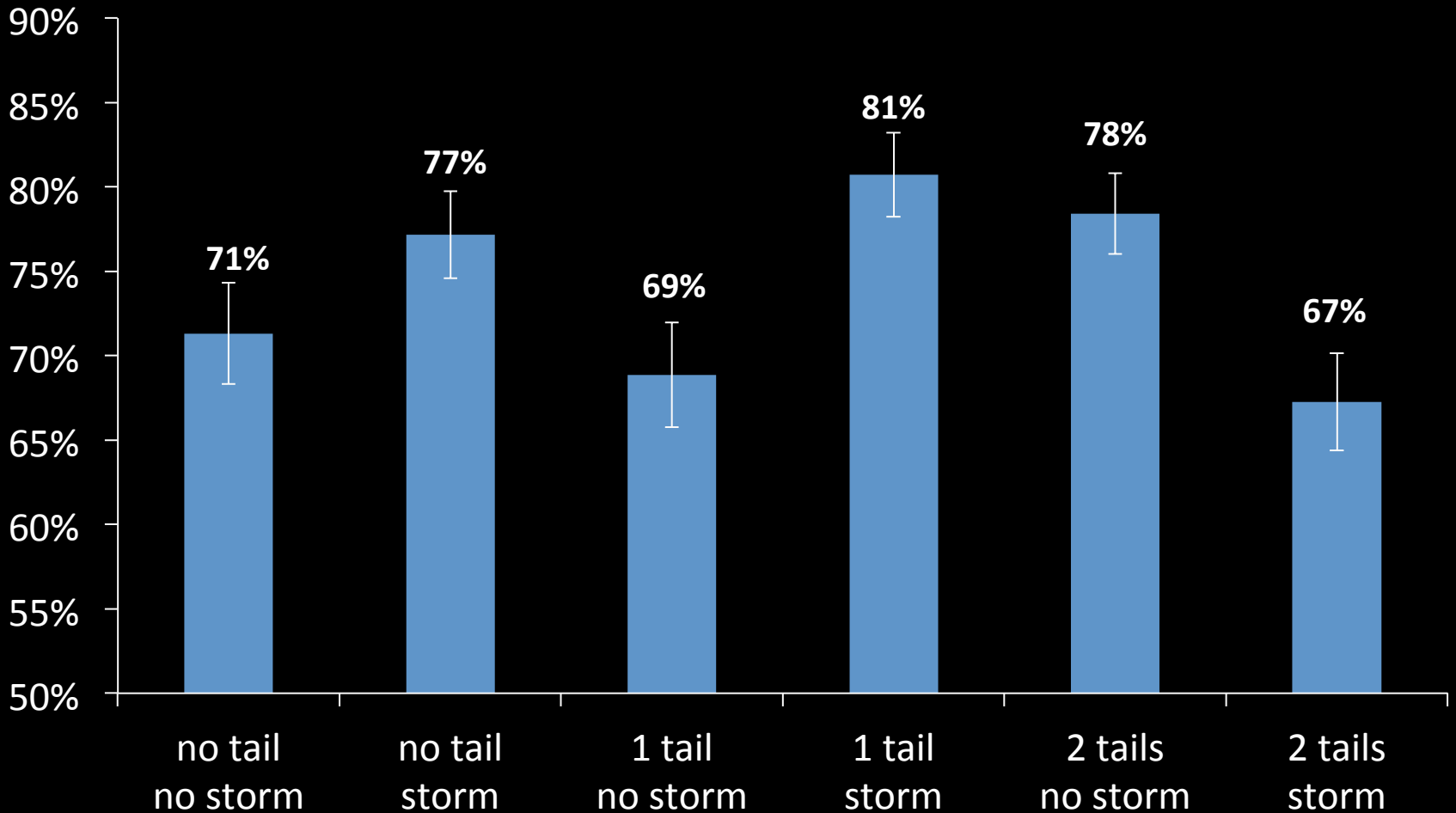
Why the Impact of Tails?

Does Full Honesty Increase Trust?

High Trust in Scientists



High Trust in Scientists



Conclusions

- Most Americans support preparation.
- Little support for fighting Mother Nature.
- Most support for restricting and strengthening coastal development in the future.
- Coastal dwellers should pay the cost.
- If scientists confess their uncertainty, this increases trust in them and acceptance of their messages.
- Faced with full honesty by natural scientists and focus on extreme weather, people shut down.