Ephemeral Experiences, Long Lived Impact : Disasters and Portfolio Choice

Sreedhar T. Bharath and DuckKi Cho

W. P. Carey School of Business, Arizona State University

Household Economics and Decision Making Conference
@ Federal Reserve Bank of Cleveland

Sep 25, 2015

Motivation

Motivation

- In **traditional economic models**,

  (i) **preferences** are unaltered by experiences

  (ii) **beliefs** are shaped by rational expectations

Motivation

- In **traditional economic models**,

  (i) **preferences** are unaltered by experiences

  (ii) **beliefs** are shaped by rational expectations

- On the other hand, in **psychology literature**,

  ✓ **experiences** affect **preferences** and **beliefs**

Motivation

Motivation

- **Economic experiences** affect **financial decisions**
  - ✓ *Malmendier and Nagel (2011)*
  - ✓ *Malmendier and Nagel (2014)*
  - ✓ *Malmendier, Tate, and Yan (2011)*
  - ✓ *Knupfer, Rantapuska, and Sarvimaki (2014)*
  - ✓ *Benartzi (2001)*
  - ✓ *Choi, Laibson, Madrian, and Metrick (2009)*

Motivation

- **Economic experiences** affect **financial decisions**
  - ✓ *Malmendier and Nagel (2011)*
  - ✓ *Malmendier and Nagel (2014)*
  - ✓ *Malmendier, Tate, and Yan (2011)*
  - ✓ *Knupfer, Rantapuska, and Sarvimaki (2014)*
  - ✓ *Benartzi (2001)*
  - ✓ *Choi, Laibson, Madrian, and Metrick (2009)*
- **Non economic experiences** affect **financial decisions**
  - ✓ *Cameron and Shah (2013)*
  - ✓ *Bernile, Bhagwat, and Rau (2014)*
  - ✓ *Malmendier, Tate, and Yan (2011)*
  - ✓ *Callen, Isaqzadeh, Long, and Sprenger (2014)*

This Paper

This Paper

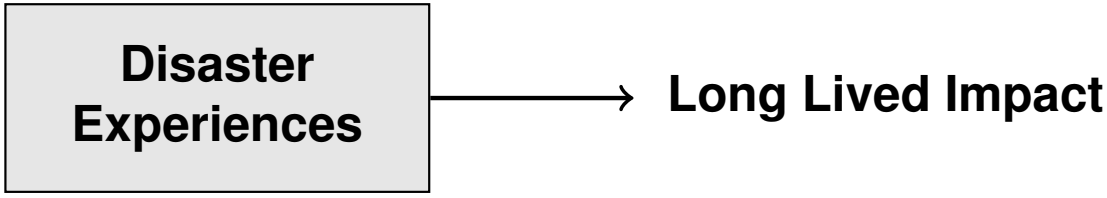
Disaster Experiences

This Paper

Disaster Experiences

- Non economic
- Fleeting
- In Adulthood

This Paper



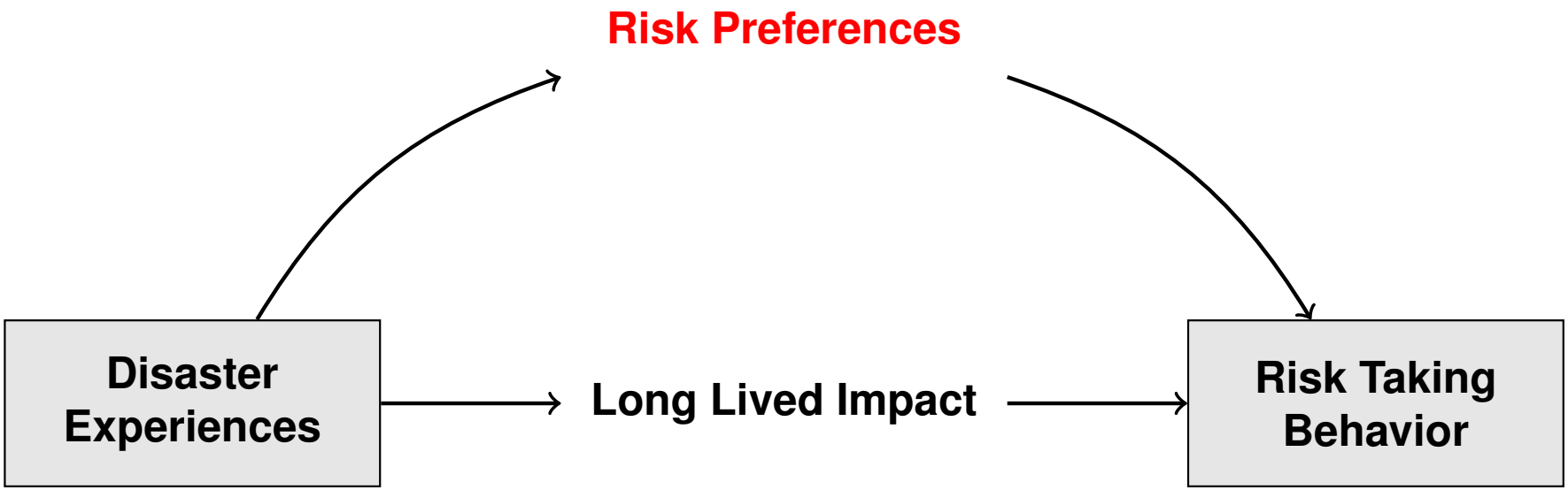
- Non economic
- Fleeting
- In Adulthood

This Paper

- Non economic
- Fleeting
- In Adulthood

- Risky Asset Market Participation Rate
- Fraction of Liquid Assets Invested in Risky Assets

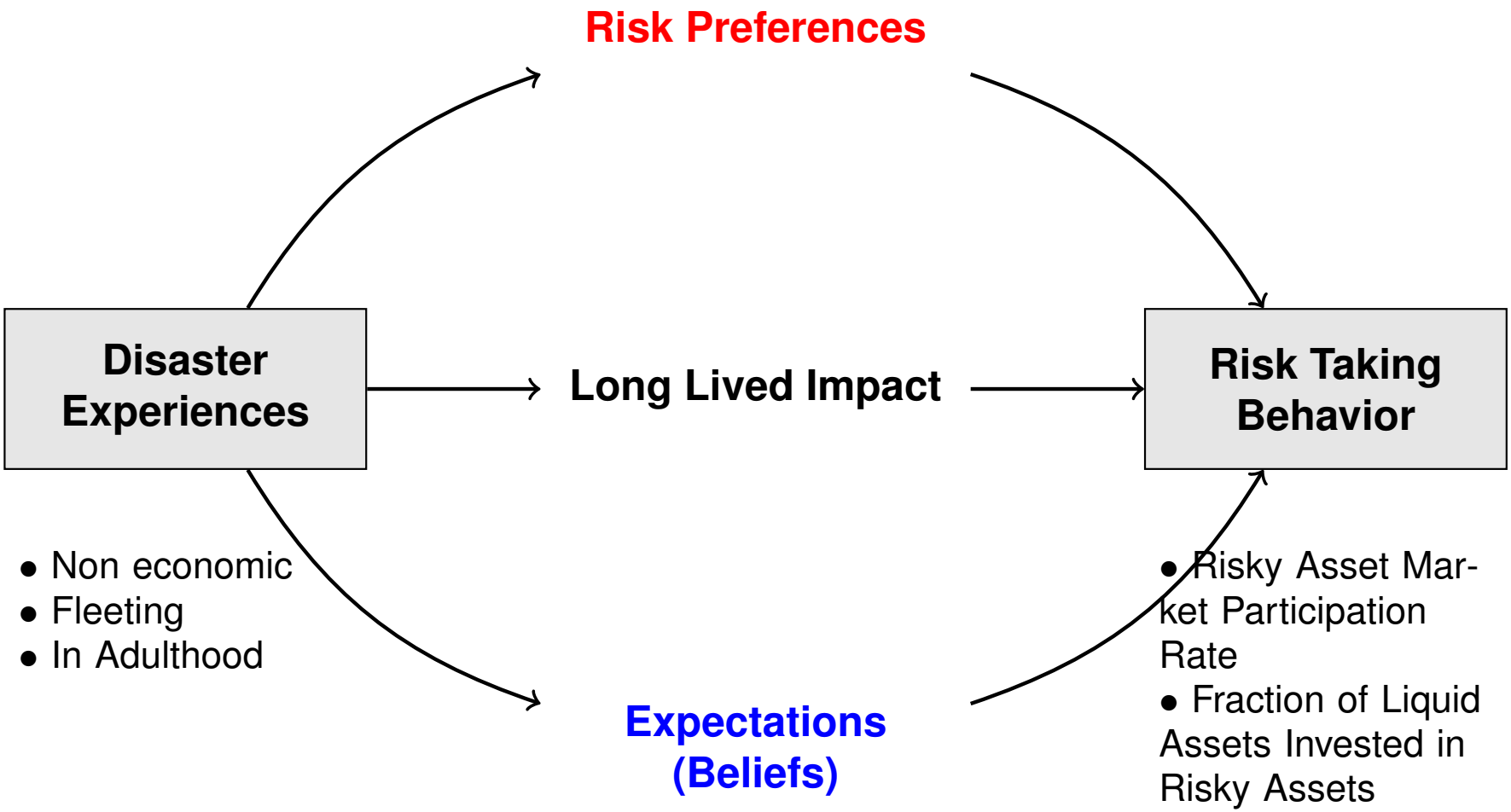
This Paper



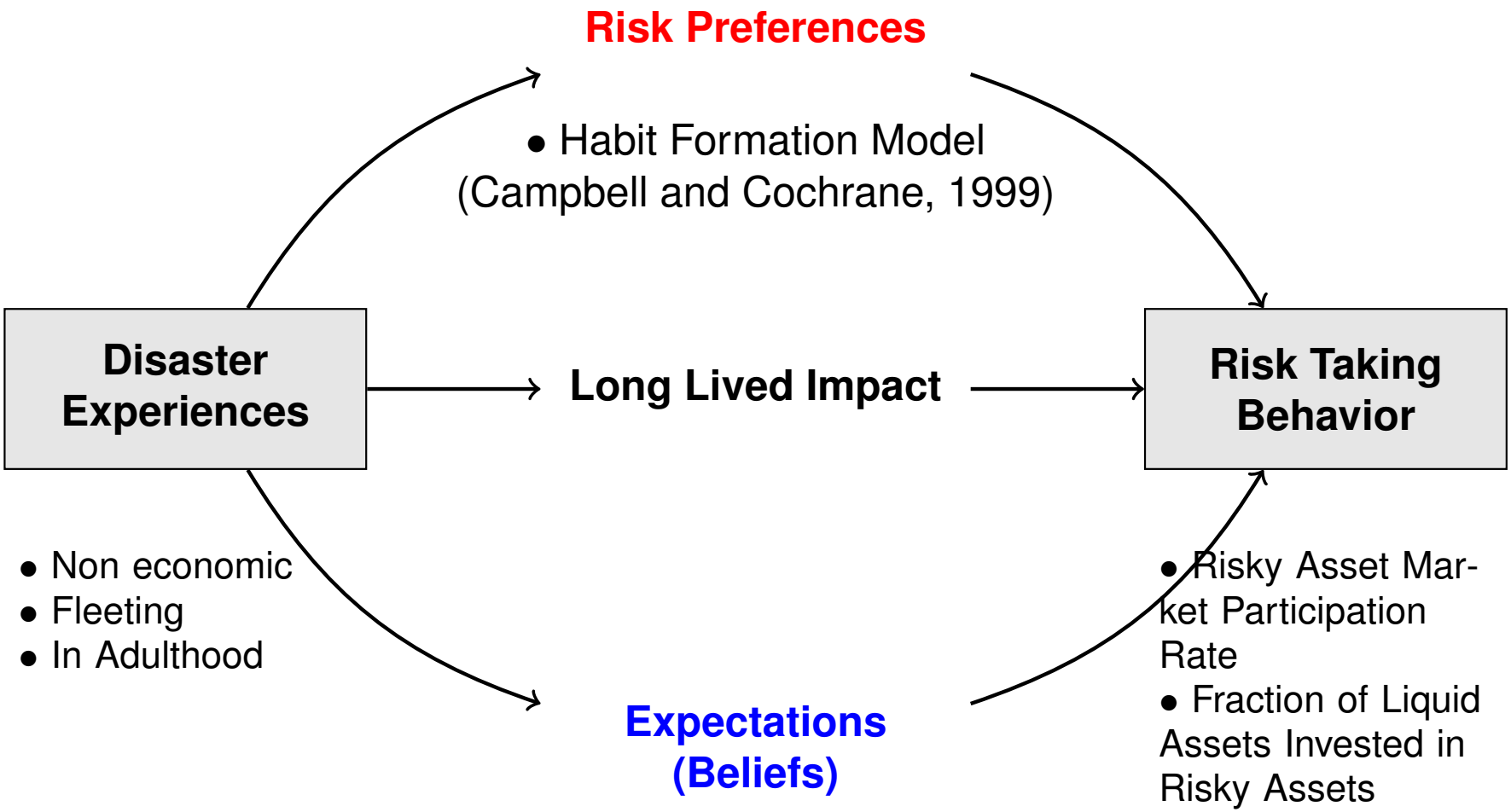
- Non economic
- Fleeting
- In Adulthood

- Risky Asset Market Participation Rate
- Fraction of Liquid Assets Invested in Risky Assets

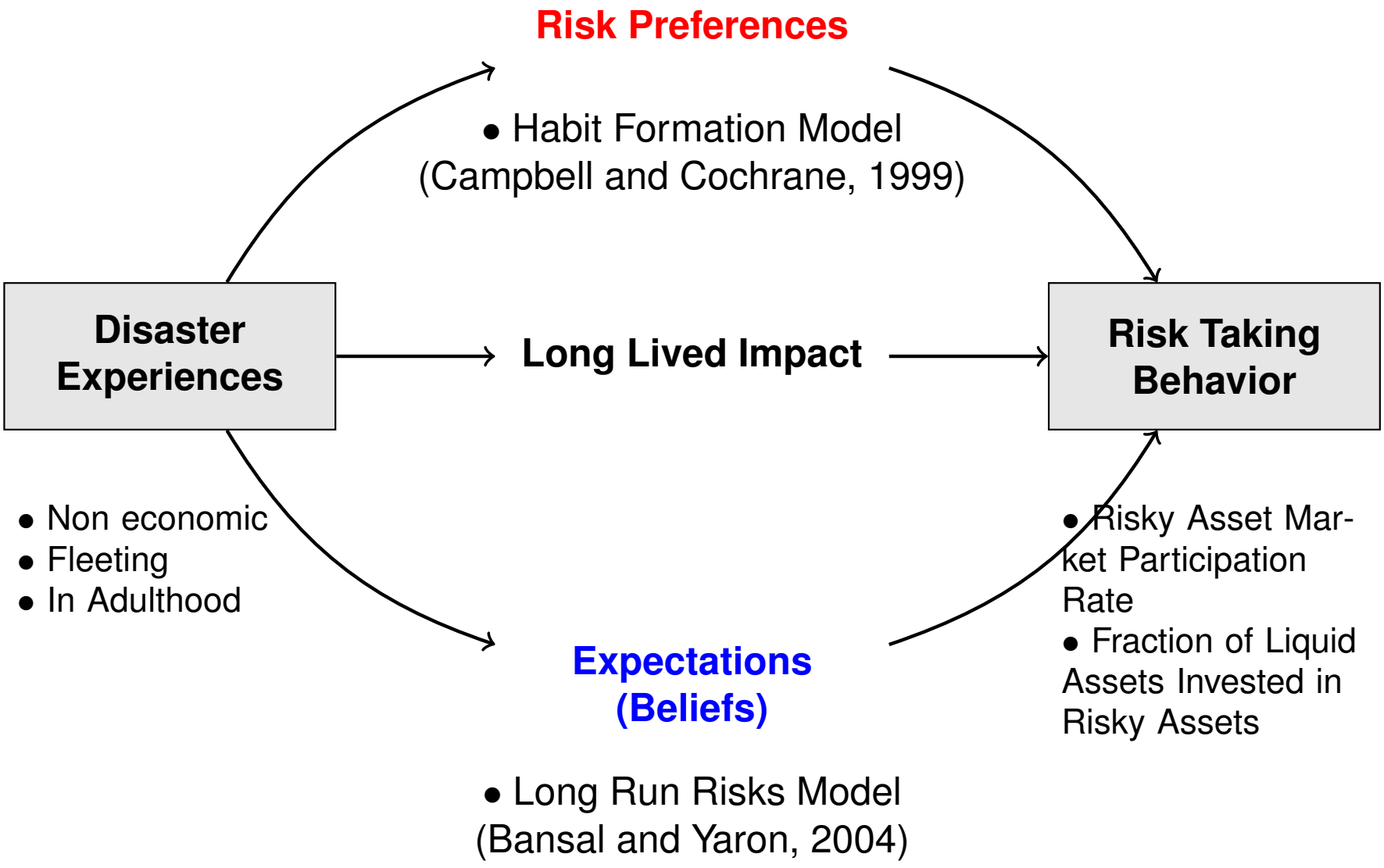
This Paper


Risk Preferences
Disaster Experiences
Long Lived Impact
Risk Taking Behavior
• Non economic
• Fleeting
• In Adulthood
Expectations (Beliefs)
• Risky Asset Market Participation Rate
• Fraction of Liquid Assets Invested in Risky Assets

This Paper

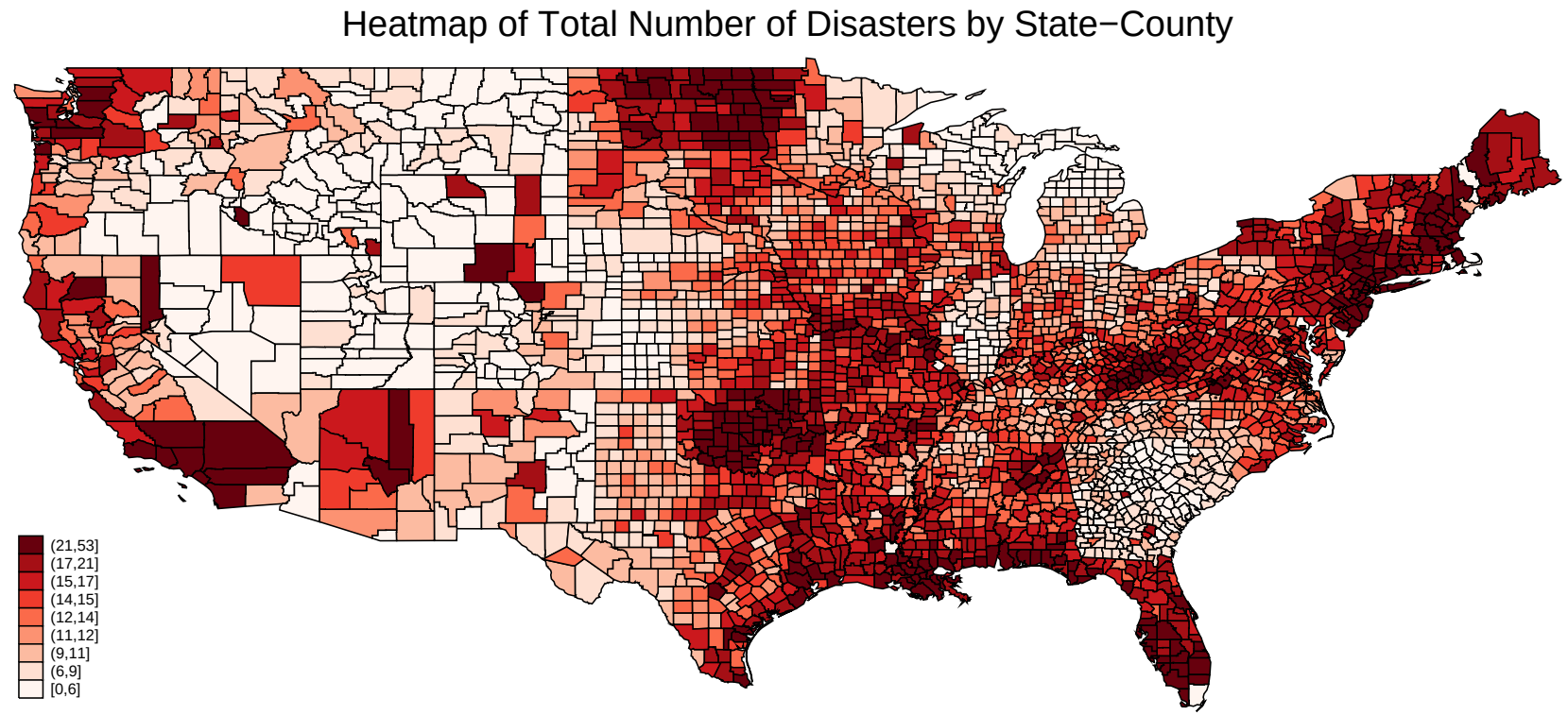

Risk Preferences
• Habit Formation Model
(Campbell and Cochrane, 1999)
Disaster Experiences
Long Lived Impact
Risk Taking Behavior
• Non economic
• Fleeting
• In Adulthood
Expectations (Beliefs)
• Risky Asset Market Participation Rate
• Fraction of Liquid Assets Invested in Risky Assets

This Paper


Risk Preferences
• Habit Formation Model
(Campbell and Cochrane, 1999)
Disaster Experiences
Long Lived Impact
Risk Taking Behavior
• Non economic
• Fleeting
• In Adulthood
Expectations (Beliefs)
• Risky Asset Market Participation Rate
• Fraction of Liquid Assets Invested in Risky Assets
• Long Run Risks Model
(Bansal and Yaron, 2004)

Disaster Characteristics - Heatmap

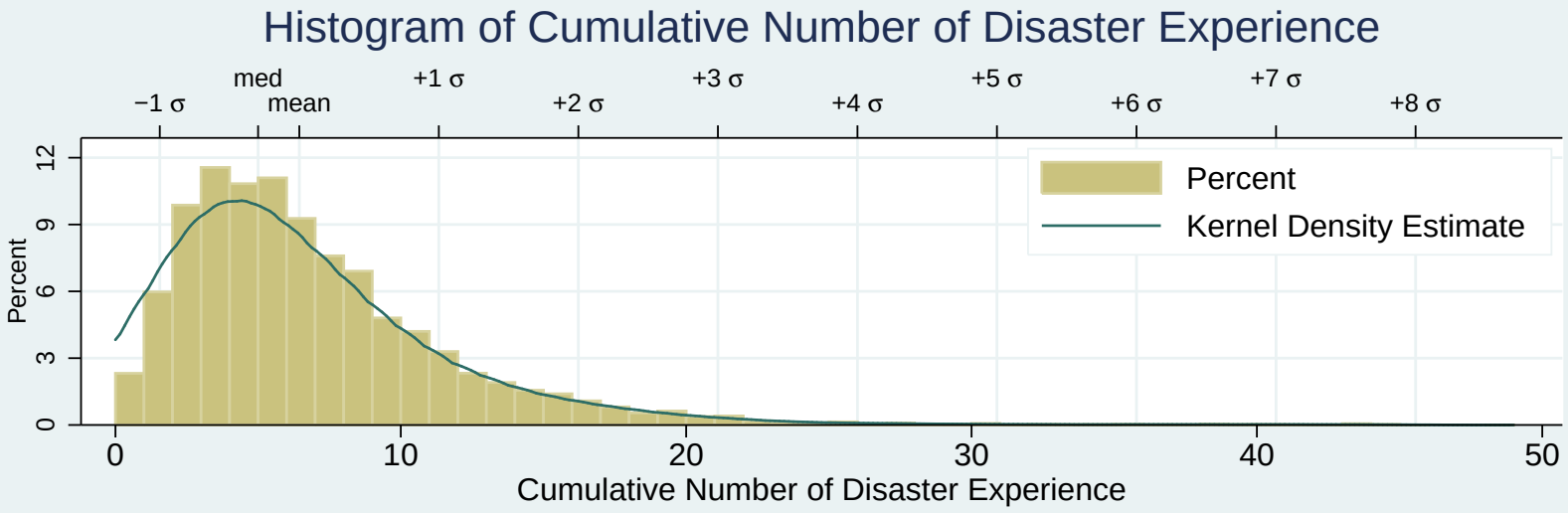
Disaster Characteristics - Heatmap

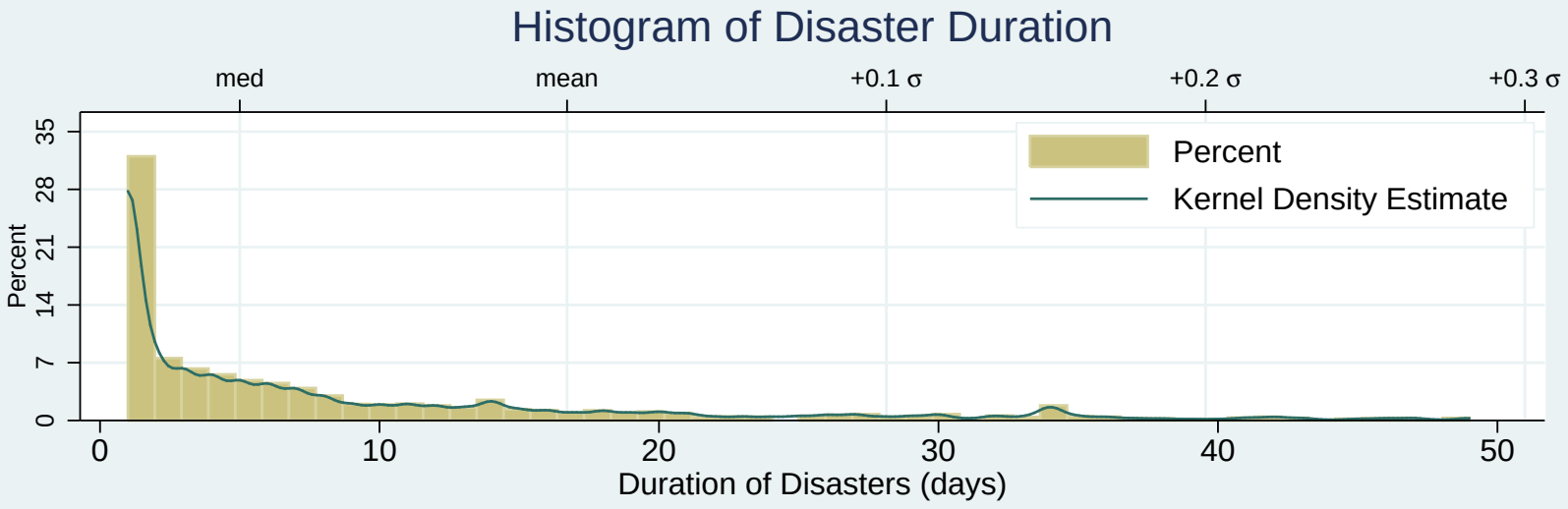


From May 1953 to December 2013

Disasters Characteristics - Distributions

Disasters Characteristics - Distributions





Data

Data

- **The Federal Emergency Management Agency (FEMA) Disaster Declarations Database from May 1953 to December 2013**
  : disaster type, incident begin / end dates, state, county, Hazard Mitigation Program project amount, Public Assistance Grant Funding amount, ...

- **The National Longitudinal Survey of Youth 1979 Cohort (NLSY79) from 1988 to 2008**
  : household asset allocation, demographics, geographic residence (Restricted Use), ...

- **The UBS/Gallup Index of Investor Optimism from 1998 to 2002**
  : households' expectations of stock market return and volatility, demographics, geographic residence, ...

Main Tests

Main Tests

$$Pr(\mathbb{1}_{\{y_{i,t}>0\}} = 1 | x_{i,t}, \textit{Disaster Experiences}_{i,t})$$
$$= F(\alpha + \beta \textit{Disaster Experiences}_{i,t} + \gamma' x_{i,t})$$

where $y_{i,t}$ is a fraction of liquid assets invested in risky assets and $x_{i,t}$ is a vector of control variables (log income, log income squared, number of children, number of children squared, liquid assets, liquid assets squared, housing variables and dummies for completed high school education, completed college education, marital status, race, gender)

Main Tests

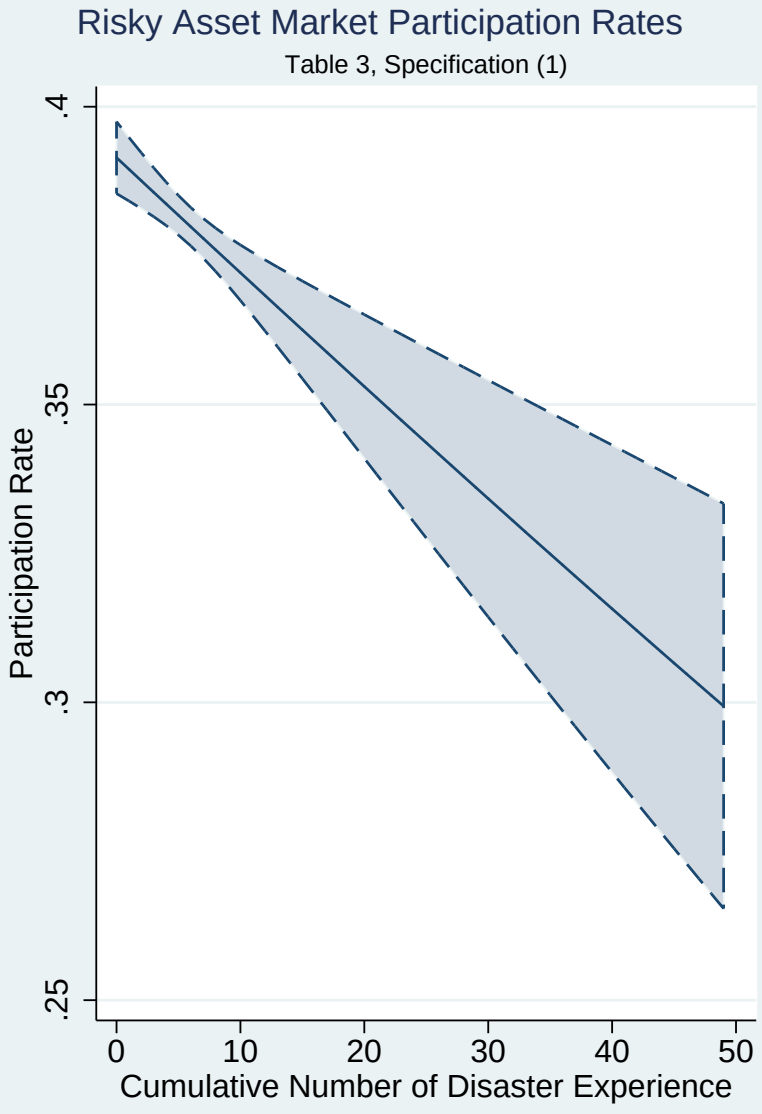
$$Pr(\mathbb{1}_{\{y_{i,t}>0\}} = 1 | x_{i,t}, \textit{Disaster Experiences}_{i,t})$$
$$= F(\alpha + \beta \textit{Disaster Experiences}_{i,t} + \gamma' x_{i,t})$$

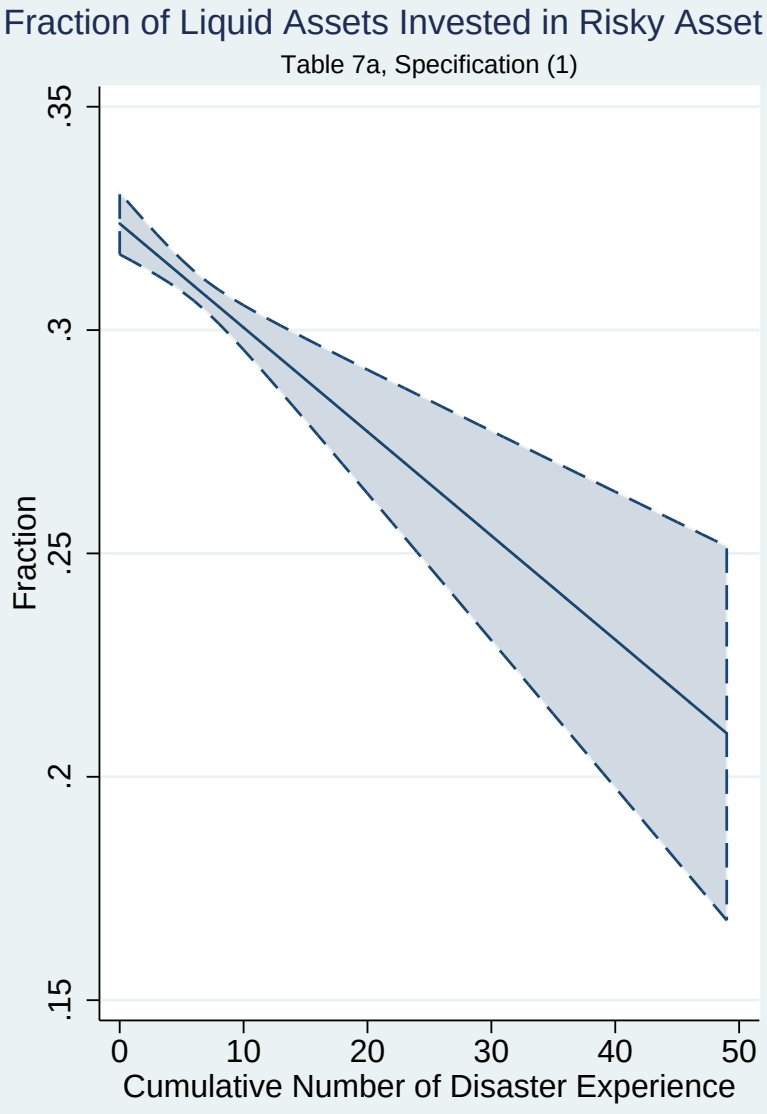
where $y_{i,t}$ is a fraction of liquid assets invested in risky assets and $x_{i,t}$ is a vector of control variables (log income, log income squared, number of children, number of children squared, liquid assets, liquid assets squared, housing variables and dummies for completed high school education, completed college education, marital status, race, gender)

$$y_{i,t} = \alpha + \beta \textit{Disaster Experiences}_{i,t} + \gamma' x_{i,t} + \epsilon_{i,t}$$

Main Results I - Participation and Fraction

Main Results I - Participation and Fraction





Main Results I - Weighted Experience

Main Results I - Weighted Experience

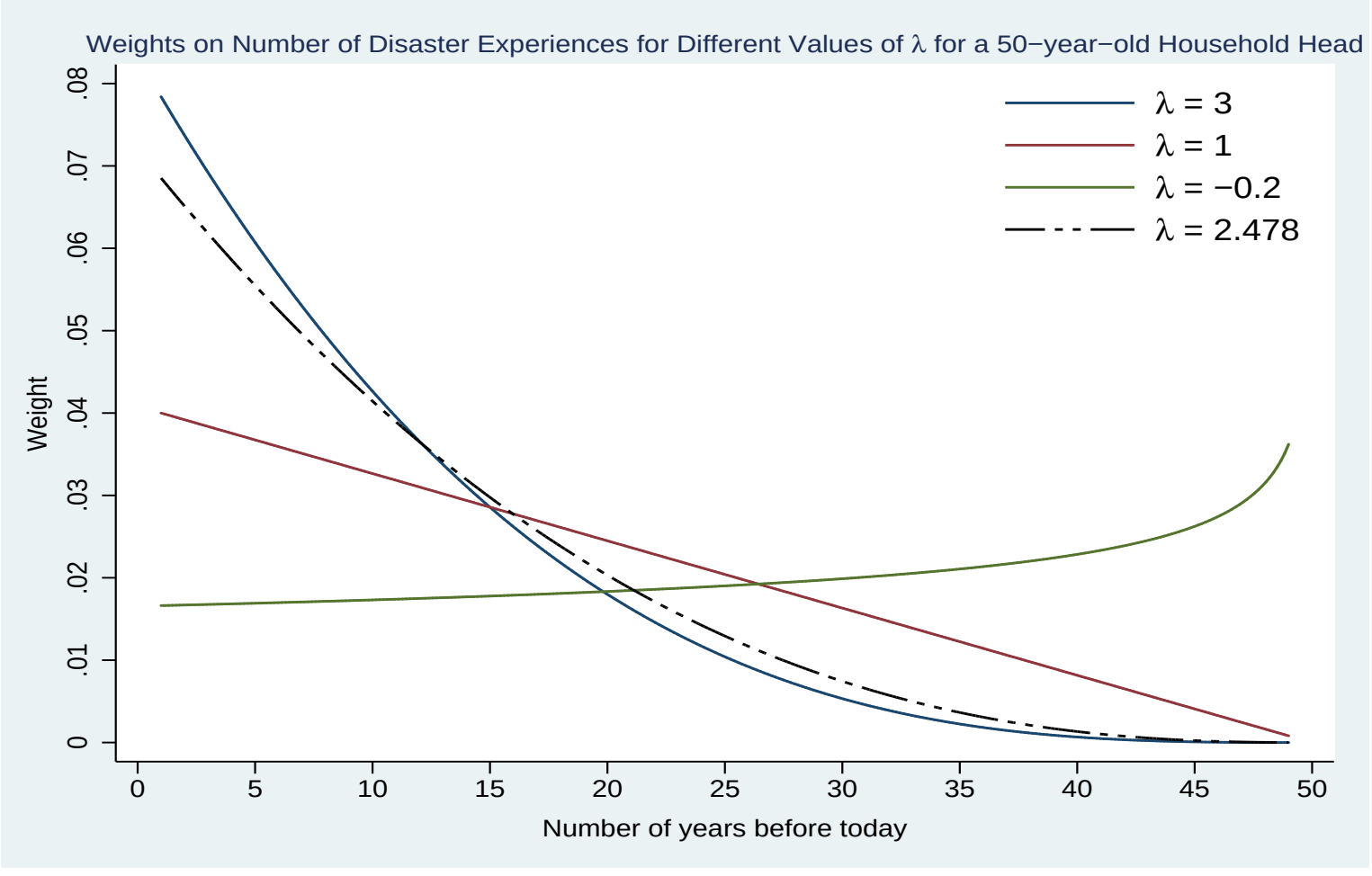
$$y_{i,t} = \alpha + \beta N_{i,t}(\lambda) + \gamma' X_{i,t} + \epsilon_{i,t}$$

$$N_{i,t}(\lambda) = \sum_{k=1}^{age_{it}-1} w_{it}(k,\lambda) \cdot NUM\_EXP_{i,t-k} \; ; \; w_{it}(k,\lambda) = \frac{(age_{it}-k)^{\lambda}}{\sum_{k=1}^{age_{it}-1}(age_{it}-k)^{\lambda}}$$

Main Results I - Weighted Experience

$$y_{i,t} = \alpha + \beta N_{i,t}(\lambda) + \gamma' X_{i,t} + \epsilon_{i,t}$$

$$N_{i,t}(\lambda) = \sum_{k=1}^{age_{it}-1} w_{it}(k,\lambda) \cdot NUM\_EXP_{i,t-k} \; ; \; w_{it}(k,\lambda) = \frac{(age_{it}-k)^{\lambda}}{\sum_{k=1}^{age_{it}-1}(age_{it}-k)^{\lambda}}$$



Main Results I - Weighted Experience

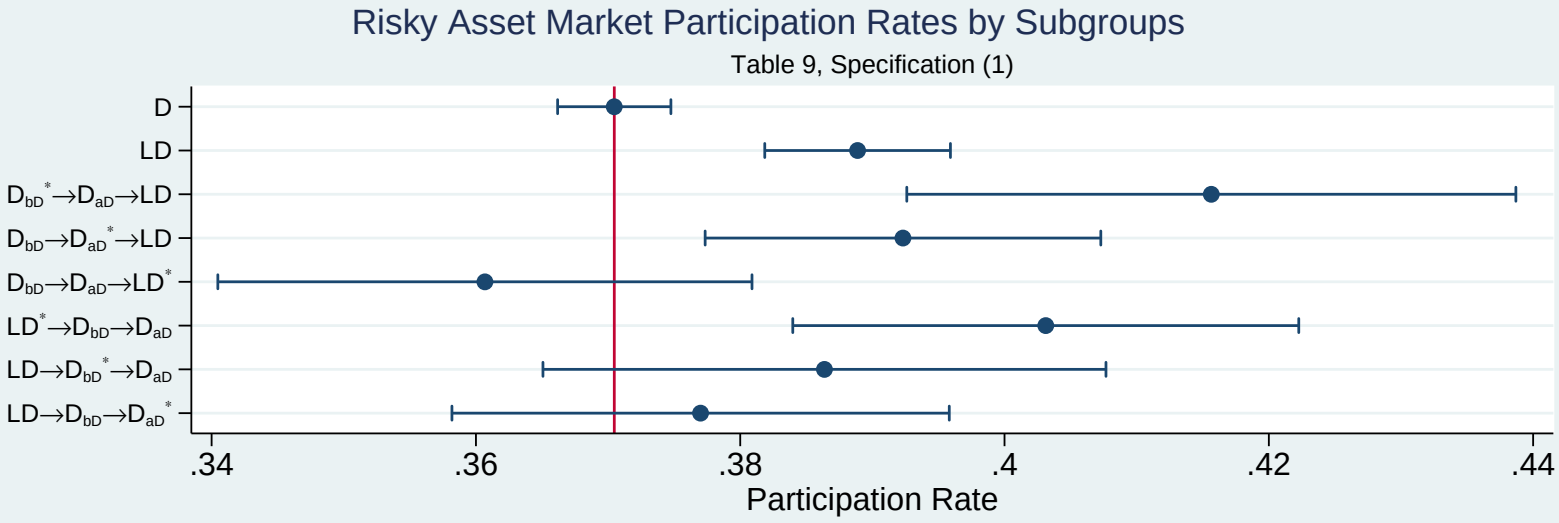
$$y_{i,t} = \alpha + \beta N_{i,t}(\lambda) + \gamma' X_{i,t} + \epsilon_{i,t}$$

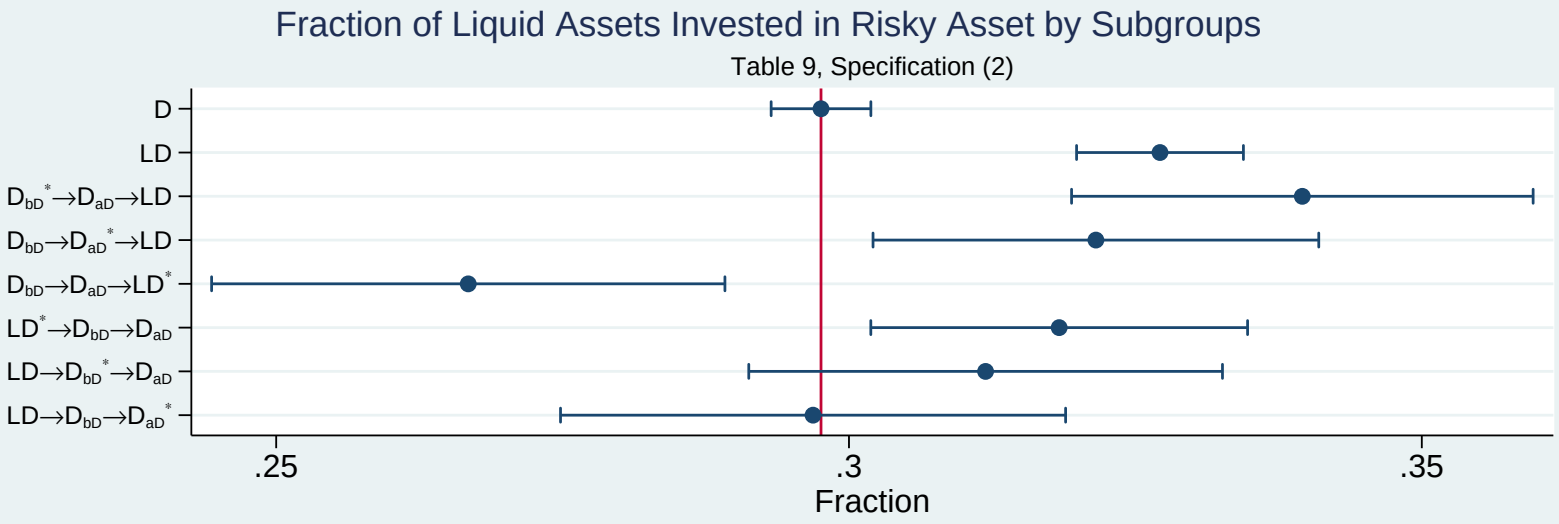
$$N_{i,t}(\lambda) = \sum_{k=1}^{age_{it}-1} w_{it}(k,\lambda) \cdot NUM\_EXP_{i,t-k} \; ; \; w_{it}(k,\lambda) = \frac{(age_{it}-k)^{\lambda}}{\sum_{k=1}^{age_{it}-1}(age_{it}-k)^{\lambda}}$$

	Weighted Experience	
Weighted # of Disasters coefficient (β)	-0.059***	(-6.074)
Weighting parameter (λ)	2.478***	(2.589)
Age Dummies	YES	
Year Dummies	YES	
Controls	YES	
# Obs.	62,553	
Sample Period	1988-2008	
Adjusted R^2	0.481	

Main Results II - Relocation

Main Results II - Relocation





Main Results III - Which Channels?

Main Results III - Which Channels?

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma \sigma^2}$$

where α is a fraction of wealth invested in risky assets, γ represents a relative risk aversion coefficient, R and R_f are returns on risky assets and safe assets respectively, and σ^2 is volatility of risky asset returns

Main Results III - Which Channels?

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma \sigma^2}$$

where α is a fraction of wealth invested in risky assets, γ represents a relative risk aversion coefficient, R and R_f are returns on risky assets and safe assets respectively, and σ^2 is volatility of risky asset returns

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Main Results III - Which Channels?

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma \sigma^2}$$

where α is a fraction of wealth invested in risky assets, γ represents a relative risk aversion coefficient, R and R_f are returns on risky assets and safe assets respectively, and σ^2 is volatility of risky asset returns

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Contribution(%) to $\Delta\alpha$	Scenario I [1926-2008]	Scenario II [1988-2008]
Δ(risk premium)	45%	61%
$\Delta\gamma$	55%	39%

Conclusions

Conclusions

- **Non economic, short-lived disaster experiences** have **long lasting effects** on economic choices, mainly driven by **severe** ones.
  - (i) less likely to participate in risky asset markets
  - (ii) lower the share of risky assets in the portfolio

Conclusions

- **Non economic, short-lived disaster experiences** have **long lasting effects** on economic choices, mainly driven by **severe** ones.
  (i) less likely to participate in risky asset markets
  (ii) lower the share of risky assets in the portfolio
- After disaster experiences, households
  (i) become **risk averse**
  (ii) have **lower expectations** on stock market returns (but not volatility)

Conclusions

- **Non economic, short-lived disaster experiences** have **long lasting effects** on economic choices, mainly driven by **severe** ones.
  (i) less likely to participate in risky asset markets
  (ii) lower the share of risky assets in the portfolio
- After disaster experiences, households
  (i) become **risk averse**
  (ii) have **lower expectations** on stock market returns (but not volatility)
- A quantitative decomposition,
  (i) **45%** of the effect is due to **change in expectations**
  (ii) **55%** of the effect is due to **change in risk aversion**

Risky Asset Market Participation

Risky Asset Market Participation

	Lifetime Experiences		5yr Experiences	
#DE_LIFE	-0.020***	(-3.707)		
#DE_5YR			-0.031***	(-2.700)
Age Dummies	YES		YES	
Year Dummies	YES		YES	
Controls	YES		YES	
Avg. fitted prob. at 95th pct. of #DE	0.364		0.372	
Avg. fitted prob. at 5th pct. of #DE	0.390		0.384	
Diff. between two fitted prob.	-0.025***	(-3.76)	-0.012***	(-2.72)
# Observations	89,265		89,265	
Sample Period	1988-2008		1988-2008	
Pseudo R^2	0.541		0.541	

* Fama-MacBeth regressions confirm the effect of disaster experiences on risky asset market participation (Table 3).
* Controlling for housing variables does not affect the results. (Table 8a)

Households with No Home Ownership

Households with No Home Ownership

	Participation		Fraction	
#DE_LIFE	-0.025***	(-3.074)	-0.002**	(-2.442)
Age Dummies	YES		YES	
Year Dummies	YES		YES	
Observations	48,258		27,244	
Sample Period	1988-2008		1988-2008	
Pseudo / Adjusted R-squared	0.483		0.361	

Fraction of Liquid Assets Invested in Risky Asset

Fraction of Liquid Assets Invested in Risky Asset

	Lifetime Experiences		5yr Experiences	
#DE_LIFE	-0.002***	(-3.930)		
#DE_5YR			-0.005***	(-3.834)
Age Dummies	YES		YES	
Year Dummies	YES		YES	
Controls	YES		YES	
Avg. fitted frac. at 95th pct. of #DE	0.291		0.297	
Avg. fitted frac. at 5th pct. of #DE	0.322		0.316	
Diff. between two fitted frac.	-0.030***	(-3.93)	-0.019***	(-3.83)
# Obs.	62,553		62,553	
Sample Period	1988-2008		1988-2008	
Adjusted R^2	0.480		0.480	

Fraction of Liquid Assets Invested in Risky Asset - Household Fixed Effects

Fraction of Liquid Assets Invested in Risky Asset - Household Fixed Effects

	Lifetime Experiences	
#DE_LIFE	-0.002*	(-1.644)
Age Dummies	YES	
Year Dummies	YES	
Household Dummies	YES	
Controls	YES	
Avg. fitted frac. at 95th pct. of #DE	0.312	
Avg. fitted frac. at 5th pct. of #DE	0.336	
Diff. between two fitted frac.	-0.023*	(-1.64)
# Obs.	51,141	
Sample Period	1988-2008	
Adjusted R^2	0.526	

Relocation Test by Subgroups

Relocation Test by Subgroups

	Participation		Fraction	
LD	0.191***	(3.676)	0.030***	(5.712)
$D^*_{bD} \mapsto D_{aD} \mapsto LD$	0.465***	(3.177)	0.042***	(3.390)
$D_{bD} \mapsto D^*_{aD} \mapsto LD$	0.226**	(2.317)	0.024**	(1.979)
$D_{bD} \mapsto D_{aD} \mapsto LD^*$	-0.102	(-0.780)	-0.031**	(-2.206)
(i) Avg. fitted prob./fraction for $[D^*_{bD} \mapsto D_{aD} \mapsto LD]$	0.416		0.340	
(ii) Avg. fitted prob./fraction for $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$	0.392		0.322	
(iii) Avg. fitted prob./fraction for $[D_{bD} \mapsto D_{aD} \mapsto LD^*]$	0.361		0.267	
Diff. between two fitted prob./fraction: (ii) - (i)	-0.023	(-1.58)	-0.018	(-1.25)
Diff. between two fitted prob./fraction: (iii) - (ii)	-0.032**	(-2.24)	-0.055***	(-3.40)
H0: $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$ - $[D^*_{bD} \mapsto D_{aD} \mapsto LD]$ = 0	-0.239	(-1.58)	-0.018	(-1.25)
H0: $[D_{bD} \mapsto D_{aD} \mapsto LD^*]$ - $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$ = 0	-0.328**	(-2.22)	-0.055***	(-3.40)

Really Long Lived Impact?

Really Long Lived Impact?

	Fraction			
	(1)		(2)	
#DE_LIFE			-0.002**	(-2.304)
LD	0.030***	(5.712)	0.025***	(4.525)
$D^*_{bD} \mapsto D_{aD} \mapsto LD$	0.042***	(3.390)	0.040***	(3.228)
$D_{bD} \mapsto D^*_{aD} \mapsto LD$	0.024**	(1.980)	0.024*	(1.951)
$D_{bD} \mapsto D_{aD} \mapsto LD^*[ST]$	-0.026*	(-1.661)	-0.027*	(-1.701)
$D_{bD} \mapsto D_{aD} \mapsto LD^*[LT]$	-0.037*	(-1.923)	-0.040**	(-2.089)
H0: $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$ - $[D^*_{bD} \mapsto D_{aD} \mapsto LD] = 0$	-0.018	(-1.25)	-0.016	(-1.14)
H0: $[D_{bD} \mapsto D_{aD} \mapsto LD^*[ST]]$ - $[D_{bD} \mapsto D^*_{aD} \mapsto LD] = 0$	-0.050***	(-2.99)	-0.051***	(-3.01)
H0: $[D_{bD} \mapsto D_{aD} \mapsto LD^*[LT]]$ - $[D_{bD} \mapsto D^*_{aD} \mapsto LD] = 0$	-0.061***	(-2.82)	-0.064***	(-2.95)
# Obs.	57,970		57,970	
Sample Period	1988-2008		1988-2008	
Adjusted R^2	0.484		0.484	

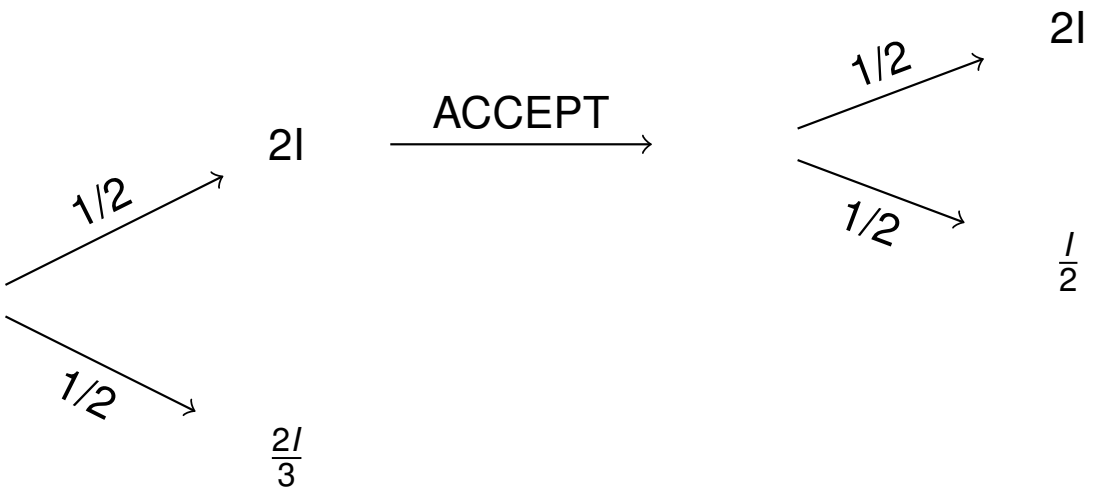
Does Risk Aversion Matter?

Does Risk Aversion Matter?

”Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?”
[from the NLSY79]

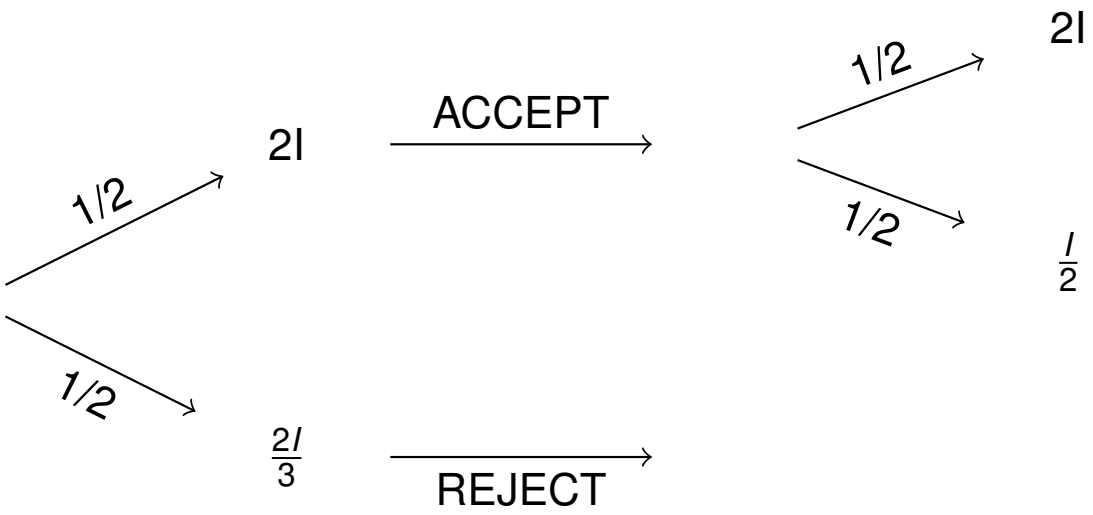
Does Risk Aversion Matter?

”Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?”
[from the NLSY79]



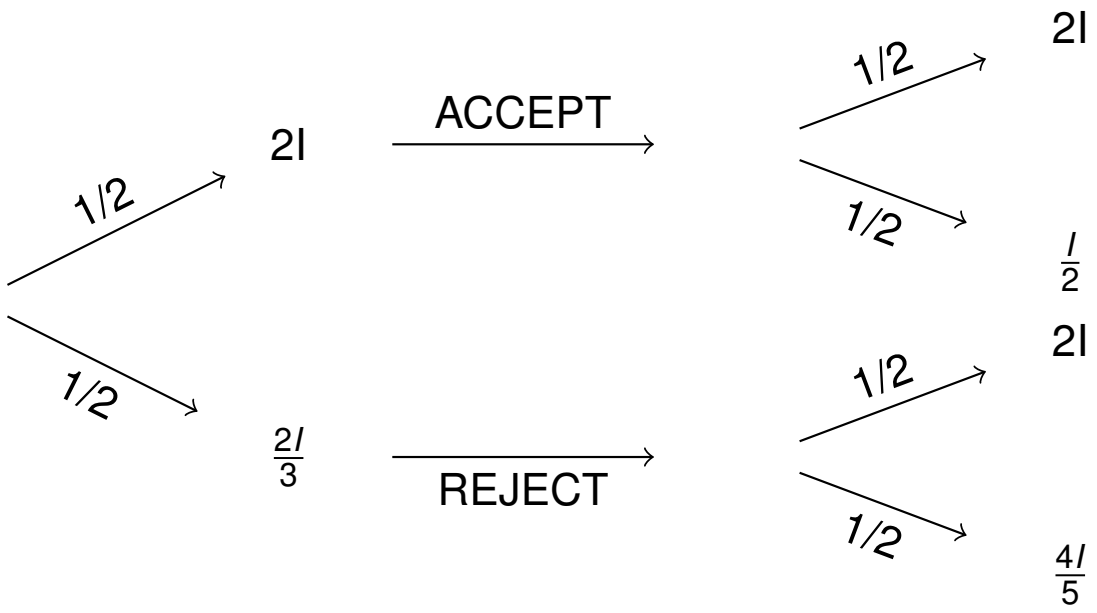
Does Risk Aversion Matter?

"Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?"
[from the NLSY79]



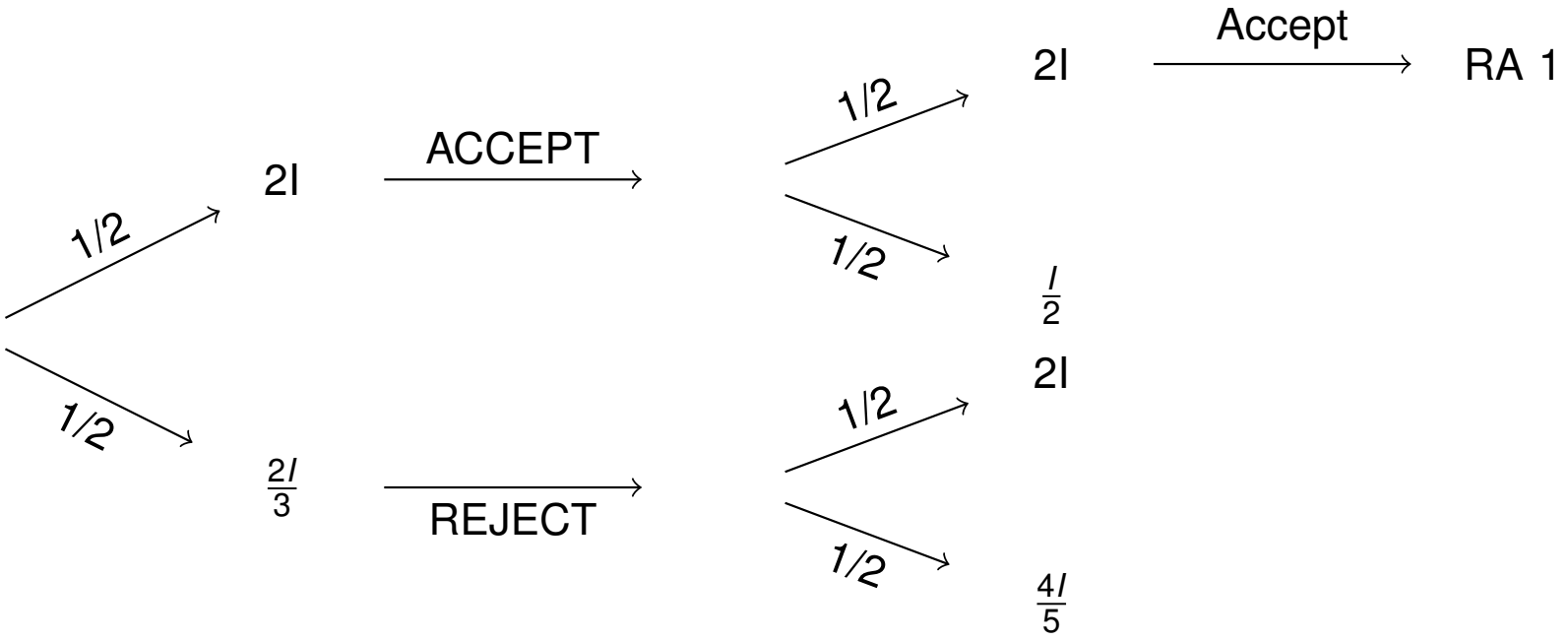
Does Risk Aversion Matter?

"Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?"
[from the NLSY79]



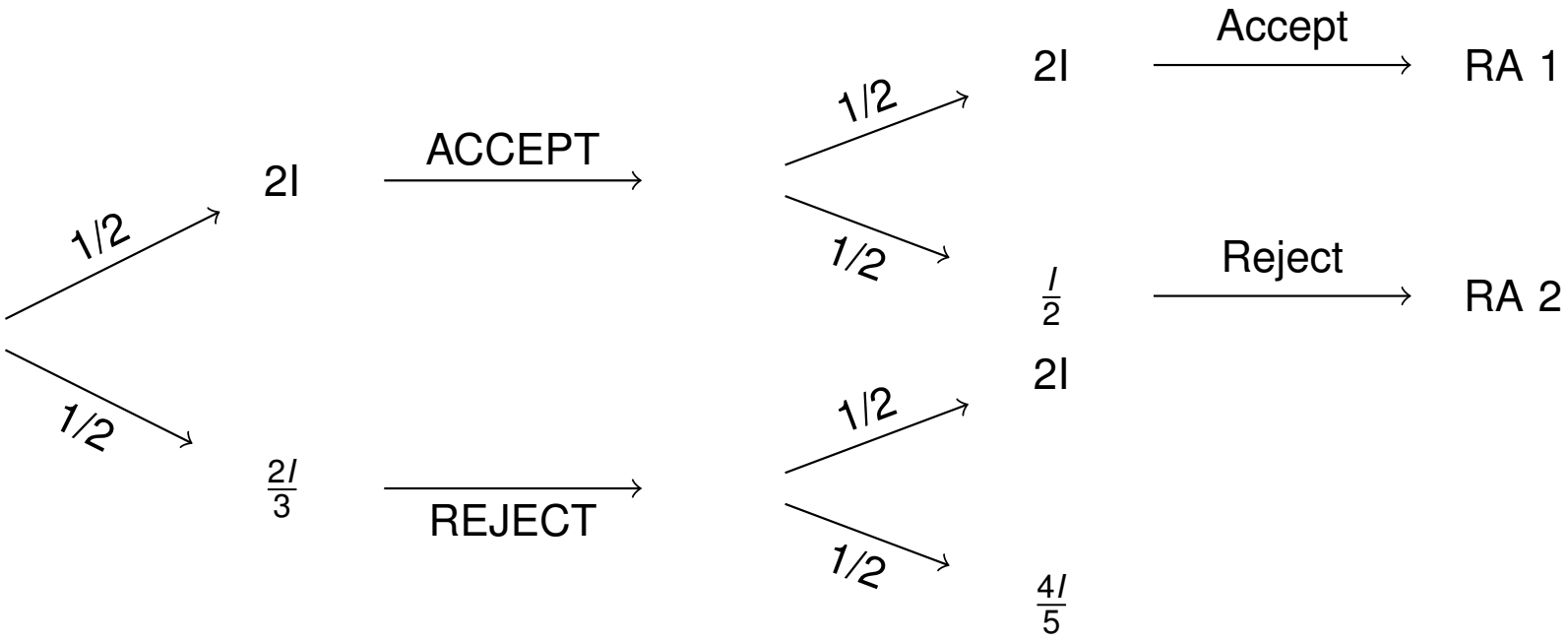
Does Risk Aversion Matter?

"Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?"
[from the NLSY79]



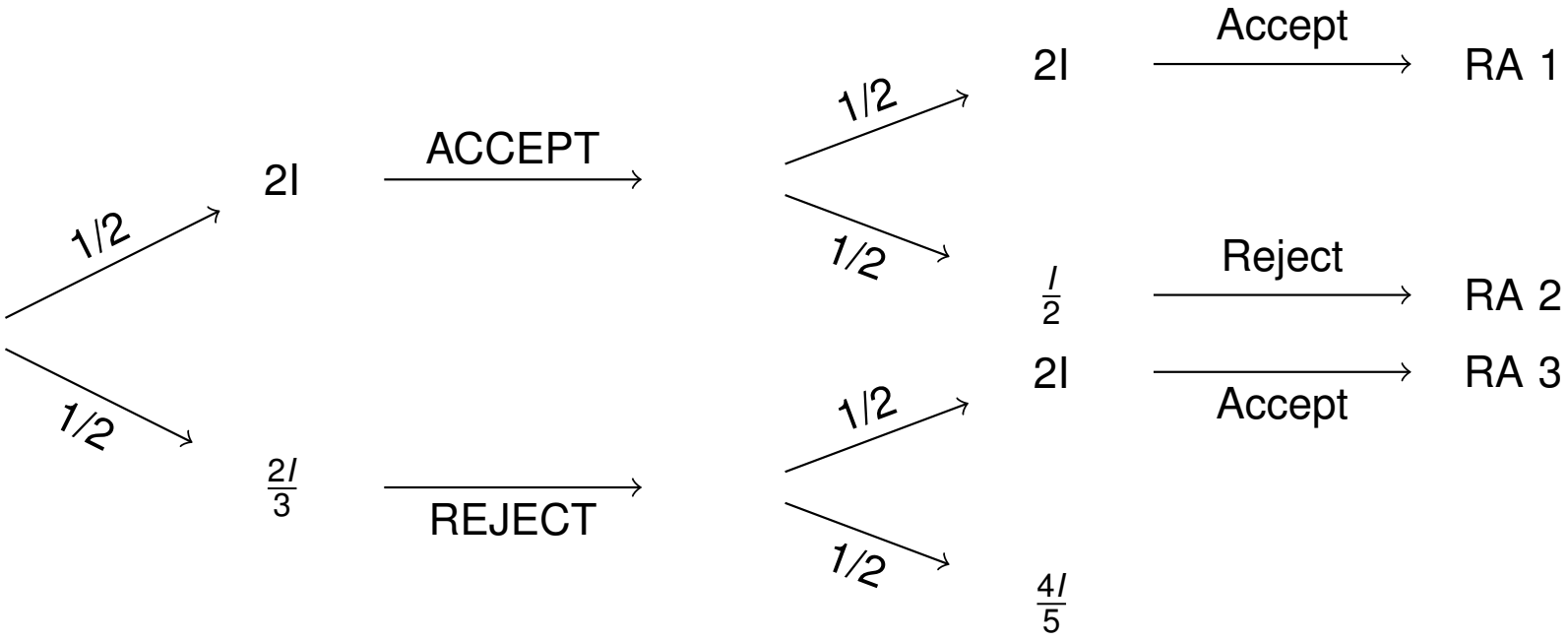
Does Risk Aversion Matter?

"Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?"
[from the NLSY79]



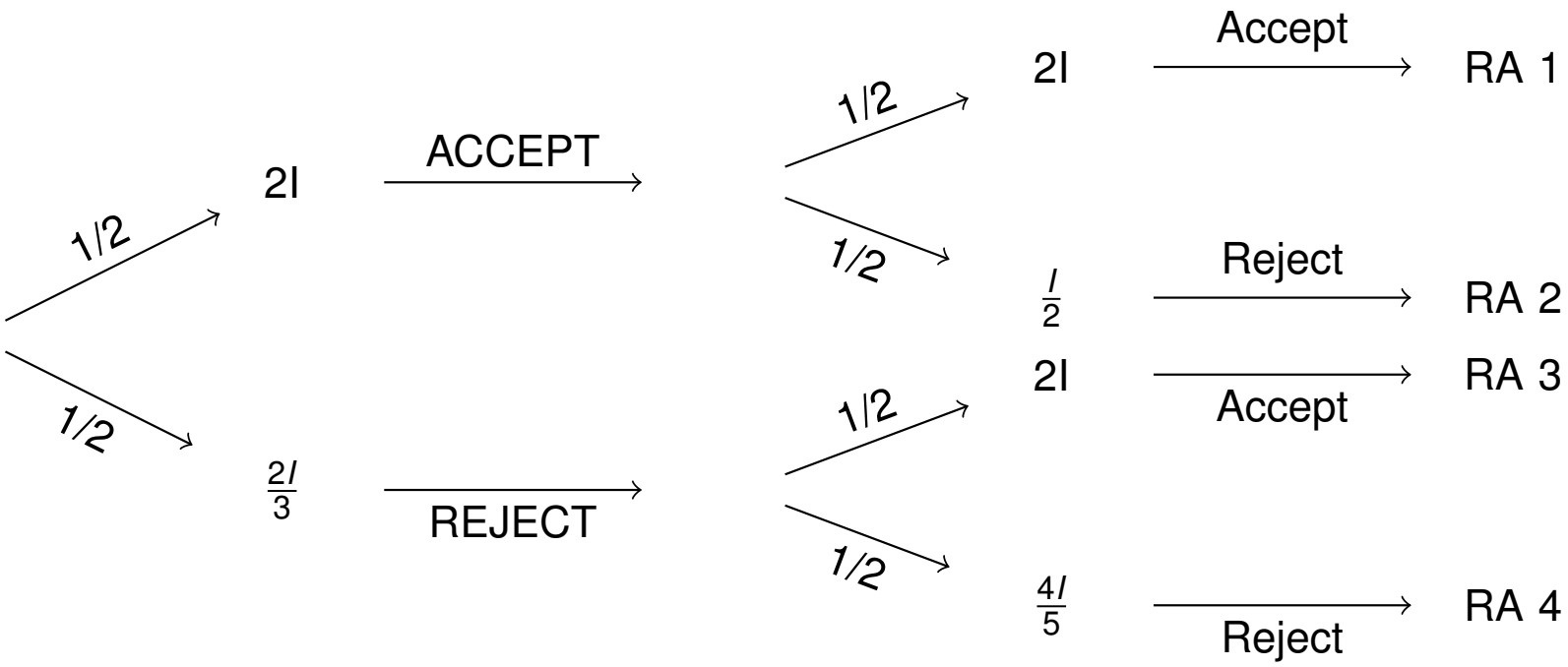
Does Risk Aversion Matter?

"Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?"
[from the NLSY79]



Does Risk Aversion Matter?

"Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?"
[from the NLSY79]



Does Risk Aversion Matter?

Does Risk Aversion Matter?

	$\mathbb{1}\{\Delta(\textit{Risk Aversion Measure})>0\}$							
	Cumulative Number of Disasters				Cumulative Severity of Disasters			
	(1)		(2)		(3)		(4)	
ΔDE	0.052***	(6.140)	0.050***	(5.629)	0.276***	(3.089)	0.265***	(2.773)
Δln(Income)			-0.501***	(-3.519)			-0.537***	(-3.716)
Δln(income) Squared			0.030***	(4.069)			0.033***	(4.331)
# Observations	20,392		18,505		20,383		18,503	
Pseudo R^2	0.002		0.004		0.000		0.003	

Expected Stock Market Return

Expected Stock Market Return

Thinking about the stock market more generally, what overall rate of return do you think the stock market will provide investors during the coming twelve months?
[from the UBS/Gallup Survey]

Expected Stock Market Return

Thinking about the stock market more generally, what overall rate of return do you think the stock market will provide investors during the coming twelve months?
[from the UBS/Gallup Survey]

	Expected Stock Market Return Over the Next 12 months			
	Dummy for Disaster Experiences		Number of Disaster Experiences	
Dummy_DE	-0.005**	(-2.243)		
#DE			-0.003**	(-2.161)
Age Dummies	YES		YES	
Year-Month Dummies	YES		YES	
Controls	YES		YES	
# Observations	26,365		26,365	
Sample Period	2000-2002		2000-2002	
Adjusted R^2	0.095		0.095	

Expected Stock Market Volatility

Expected Stock Market Volatility

Do you think the amount of volatility in the marketplace during the next twelve months will increase, stay at the same level, or decrease from what it has been during the last several months?
[from the UBS/Gallup Survey]

	$\mathbb{1}\{\textit{Increase in Volatility}\}$			
	Dummy for Disaster Experiences		Number of Disaster Experiences	
Dummy_DE	-0.058	(-1.099)		
#DE			-0.015	(-0.390)
Age Dummies	YES		YES	
Year-Month Dummies	YES		YES	
Controls	YES		YES	
# Observations	19,040		19,040	
Sample Period	1998-2000		1998-2000	
Pseudo R^2	0.021		0.021	

Decomposition of Contributions

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma \sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma \sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma \sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma\sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	Table 11 Panel A (4)

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma\sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	Table 11 Panel A (4)
α_{5th}	32.15%	32.15%	Table 7a (1) (at 5th pct. Of #DE)
α_{95th}	29.13%	29.13%	Table 7a (1) (at 95th pct. Of #DE)

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma\sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	Table 11 Panel A (4)
α_{5th}	32.15%	32.15%	Table 7a (1) (at 5th pct. Of #DE)
α_{95th}	29.13%	29.13%	Table 7a (1) (at 95th pct. Of #DE)
γ_{5th}	6.42	7.92	implied risk aversion coefficient (at 5th pct. Of #DE)
γ_{95th}	6.78	8.24	implied risk aversion coefficient (at 95th pct. Of #DE)
$\Delta\gamma$	0.36	0.31	γ_{95th} - γ_{5th}

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma\sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	Table 11 Panel A (4)
α_{5th}	32.15%	32.15%	Table 7a (1) (at 5th pct. Of #DE)
α_{95th}	29.13%	29.13%	Table 7a (1) (at 95th pct. Of #DE)
γ_{5th}	6.42	7.92	implied risk aversion coefficient (at 5th pct. Of #DE)
γ_{95th}	6.78	8.24	implied risk aversion coefficient (at 95th pct. Of #DE)
$\Delta\gamma$	0.36	0.31	γ_{95th} - γ_{5th}
$\Delta\alpha$ due to			
Δ(rp)	-1.39%	-1.88%	$\frac{\Delta(rp)}{\gamma\sigma^2}$
$\Delta\gamma$	-1.71%	-1.22%	$\frac{(rp)}{\sigma^2}\Delta\left(\frac{1}{\gamma}\right)$
Contribution to $\Delta\alpha$			normalized

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma\sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	Table 11 Panel A (4)
α_{5th}	32.15%	32.15%	Table 7a (1) (at 5th pct. Of #DE)
α_{95th}	29.13%	29.13%	Table 7a (1) (at 95th pct. Of #DE)
γ_{5th}	6.42	7.92	implied risk aversion coefficient (at 5th pct. Of #DE)
γ_{95th}	6.78	8.24	implied risk aversion coefficient (at 95th pct. Of #DE)
$\Delta\gamma$	0.36	0.31	γ_{95th} - γ_{5th}
$\Delta\alpha$ due to			
Δ(rp)	-1.39%	-1.88%	$\frac{\Delta(rp)}{\gamma\sigma^2}$
$\Delta\gamma$	-1.71%	-1.22%	$\frac{(rp)}{\sigma^2}\Delta\left(\frac{1}{\gamma}\right)$
Contribution to $\Delta\alpha$			normalized
Δ(rp)	45%	61%	

Decomposition of Contributions

$$\alpha = \frac{\mathbb{E}[R - R_f]}{\gamma\sigma^2}$$

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(\textit{risk premium})}{\gamma} + (\textit{risk premium})\Delta\left(\frac{1}{\gamma}\right)\right]$$

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	Table 11 Panel A (4)
α_{5th}	32.15%	32.15%	Table 7a (1) (at 5th pct. Of #DE)
α_{95th}	29.13%	29.13%	Table 7a (1) (at 95th pct. Of #DE)
γ_{5th}	6.42	7.92	implied risk aversion coefficient (at 5th pct. Of #DE)
γ_{95th}	6.78	8.24	implied risk aversion coefficient (at 95th pct. Of #DE)
$\Delta\gamma$	0.36	0.31	γ_{95th} - γ_{5th}
$\Delta\alpha$ due to			
Δ(rp)	-1.39%	-1.88%	$\frac{\Delta(rp)}{\gamma\sigma^2}$
$\Delta\gamma$	-1.71%	-1.22%	$\frac{(rp)}{\sigma^2}\Delta\left(\frac{1}{\gamma}\right)$
Contribution to $\Delta\alpha$			normalized
Δ(rp)	45%	61%	
$\Delta\gamma$	55%	39%	

10 Most Disaster-Prone States

10 Most Disaster-Prone States

	Total Number of Disasters		Sum of PA* amount	
Rank	State	Number	State	$ millions
1	Texas	245	Louisiana	13,430
2	California	205	New York	8,859
3	Oklahoma	154	Florida	5,149
4	Florida	118	Texas	4,071
5	New York	91	Mississippi	3,442
6	Washington	88	Iowa	1,619
7	Alabama	77	New Jersey	1,579
8	New Mexico	76	California	1,299
9	Louisiana	71	Kansas	956
10	Colorado	70	Oklahoma	842

*PA: Public Assistance Grant Program

Summary Statistics

Summary Statistics

of households = 12,686; 11 survey years

Variables	Mean	Std.Dev.	10th pct	90th pct
Income ($)	55,514	163,726	10,859	99,305
Safe Assets ($)	14,471	67,066	0	29,117
Risky Assets ($)	34,050	294,773	0	67,154
Liquid Assets ($)	47,825	315,436	0	96,121
Financial Assets* ($)	87,277	3,293,097	-578	271,269
Risky Asset Market Participation	0.39	0.49	0	1
Safe Asset Market Participation	0.74	0.44	0	1
Fraction of Risky Assets	0.32	0.39	0	1

*net of debt

Severe vs. Non-severe

Severe vs. Non-severe

	Fraction of Liquid Assets Invested in Risky Assets			
	75th HM* amount		75th PA+ amount	
#DE_NOSV	-0.002*	(-1.764)	-0.002	(-1.068)
#DE_SV	-0.007***	(-3.906)	-0.011***	(-3.062)
Age Dummies	YES		YES	
Year Dummies	YES		YES	
Controls	YES		YES	
Avg. fitted frac. at 95th pct. of #DE_SV	0.421		0.570	
Avg. fitted frac. at 5th pct. of #DE_SV	0.457		0.602	
Diff. between two fitted frac.	-0.036***	(-3.91)	-0.032***	(-3.06)
H0: #DE_SV - #DE_NOSV = 0	-0.005**	(-1.98)	-0.009**	(-2.05)
Observations	37,216		14,052	
Sample Period	1993-2008		1999-2008	
Adjusted R^2	0.416		0.321	

*HM: Hazard Mitigation Grant Program; +PA: Public Assistance Grant Program