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Shocks and Coping Actions of Rural Households: Empirical Evidence from Northeast Thailand

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ten years of war against Poverty

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Chronic Poverty Research Centre

Introduction

- Poverty and disparities between the rich and the poor remains a phenomenon in emerging market economies.
- Despite *ex-ante* risk management, unexpected negative events (shocks) may drive households towards poverty.
- Rural households are exceptionally prone to covariate shocks and at the same time subject to idiosyncratic shocks.
- Understanding shocks and their consequences is essential for effective poverty alleviation strategies.

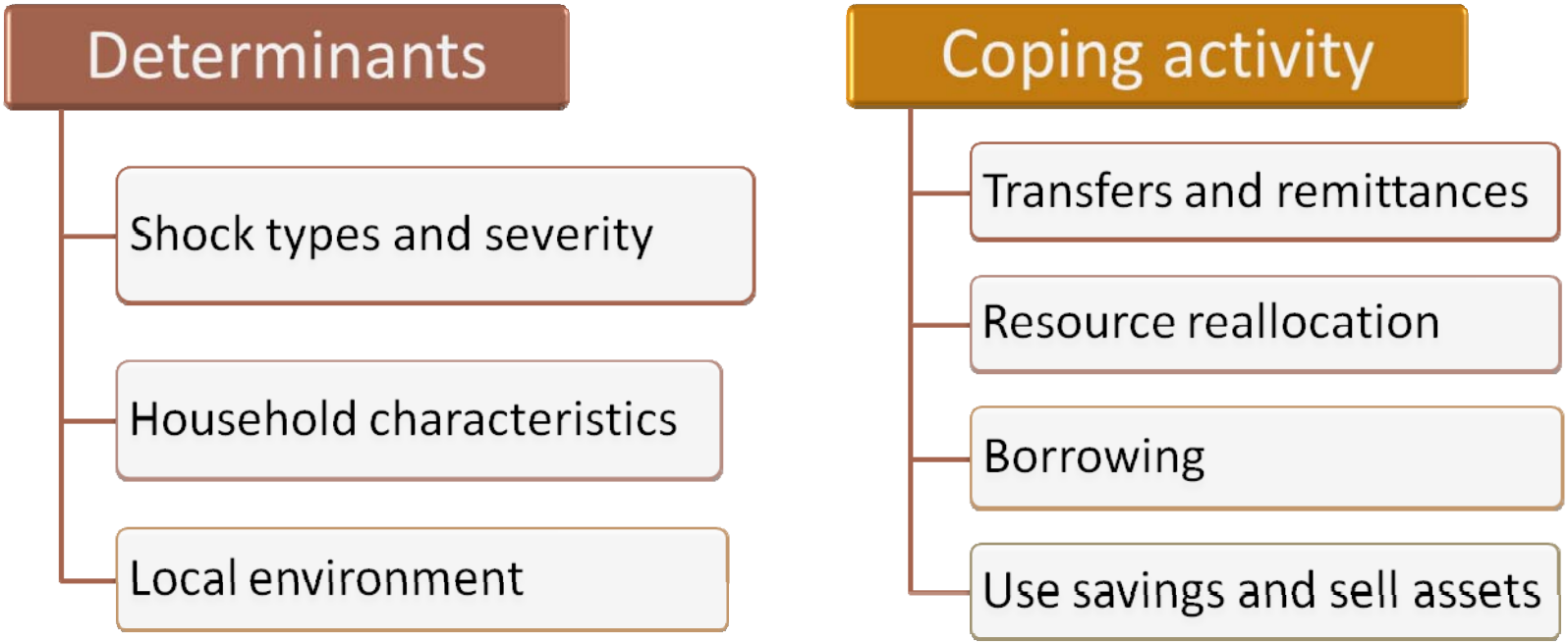
Introduction

Research questions:

1) What type of shocks do rural households face and what are their effects on household income and assets?
2) What are ex-post shock coping measures?
3) What drives households to undertake coping actions?
4) What factors determine the choice of a specific coping activity?

Conceptual framework

Coping responses



e.g. Dercon (2007), Hoddinott (2006), Takasaki et al.(2010), Berloffa and Modena (2009), Heltberg and Lund (2009), Rashid et al. (2006), Kochar (1999), Newhouse (2005), Kijima et al. (2006)

Methodology

- Binary response – Probit Regression

$$Y_i^* = X_i\beta + \varepsilon_i \qquad ,i = 1,\ldots,n$$

Model Step 1

$$Y_{ij} = \begin{cases} 1 \quad \text{(cope)} & \text{if} \quad Y_i^* > 0 \\ 0 \quad \text{(no cope)} & \text{if} \quad Y_i^* \leq 0 \end{cases} \quad , j = 1,\ldots,J$$

$$\Pr(Y_{ij} = 1 \,|\, \beta, \varepsilon) = \Phi(Y_i^*) \text{ and } \; Y_{ij}^* \; : \; N(X_i\beta, \varepsilon)$$

$$\log L = \sum_{y_i=0}^{n} \log\left[1 - \Phi(\beta' X_i)\right] + \sum_{y_i=1}^{n} \log \Phi(\beta' X_i) \qquad \text{for } i = 1,\ldots,n$$

Methodology

- Multivariate response – Multivariate Probit Regression

Model Step 2

$$Y_{i1} = \begin{cases} 1 & \text{(coping activity 1)} \quad \text{if} \quad Y_{i1}^{*} = \beta_1 X_{i1} + \varepsilon_{i1} > 0 \\ 0 & \text{(otherwise)} \quad \text{if} \quad Y_{i1}^{*} \le 0 \end{cases}$$

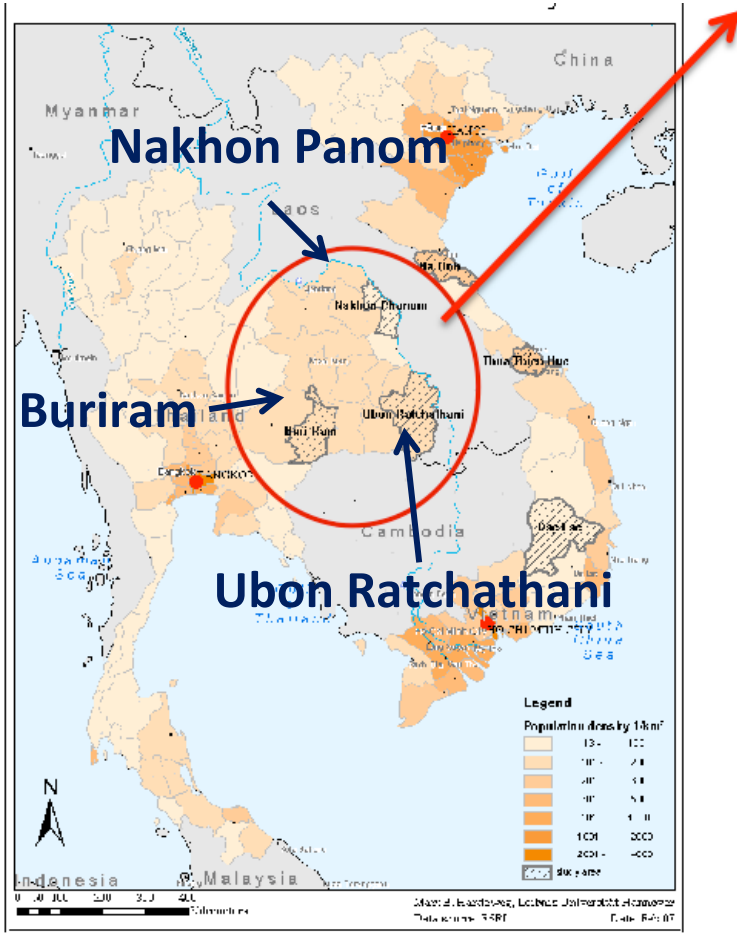
$$Y_{i2} = \begin{cases} 1 & \text{(coping activity 2)} \quad \text{if} \quad Y_{i2}^{*} = \beta_2 X_{i2} + \varepsilon_{i2} > 0 \\ 0 & \text{(otherwise)} \quad \text{if} \quad Y_{i2}^{*} \le 0 \end{cases}$$

$$\mathrm{M}$$

$$Y_{ij} = \begin{cases} 1 & \text{(coping activity J)} \quad \text{if} \quad Y_{ij}^{*} = \beta_j X_{ij} + \varepsilon_{ij} > 0 \\ 0 & \text{(otherwise)} \quad \text{if} \quad Y_{ij}^{*} \le 0 \end{cases}$$

$$\text{for } i = 1,\ldots,n; \;\; j = 1,\ldots,J$$

Data



Household survey
Wave 1: May 06 - Apr 07
Wave 2: May 07 - Apr 08

Total surveyed households
Wave 1: 2,183 HHs
Wave 2: 2,129 HHs

Households with shock experience
Wave 1 (Jan 06 – Apr 07): 684 HHs
Wave 2 (May 07 – Apr 08): 1280 HHs

Number of shock incidents
Wave 1 (Jan 06 – Apr 07): 868 shocks
Wave 2 (May 07 – Apr 08): 2390 shocks

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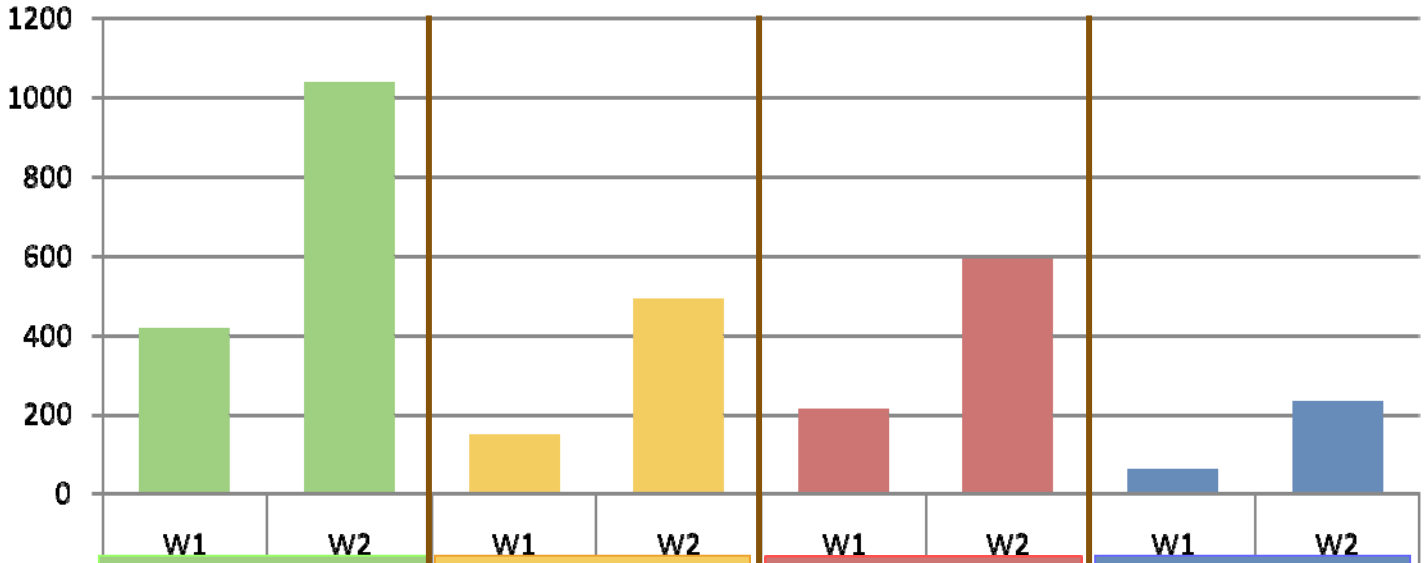
Results

Shock incidents



Ecological	Economic	Health	Social
• Drought • Flood/Heavy rainfall • Crop pests • Livestock diseases • Property damage •Land erosion	• Price shock • Credit/Financial problems • Job/Business loss • Remittances stopped	• Illness • Death • Accident	• Crime/Conflicts •Social obligation • Migration • Jail/Law suit • Divorce/Cheating

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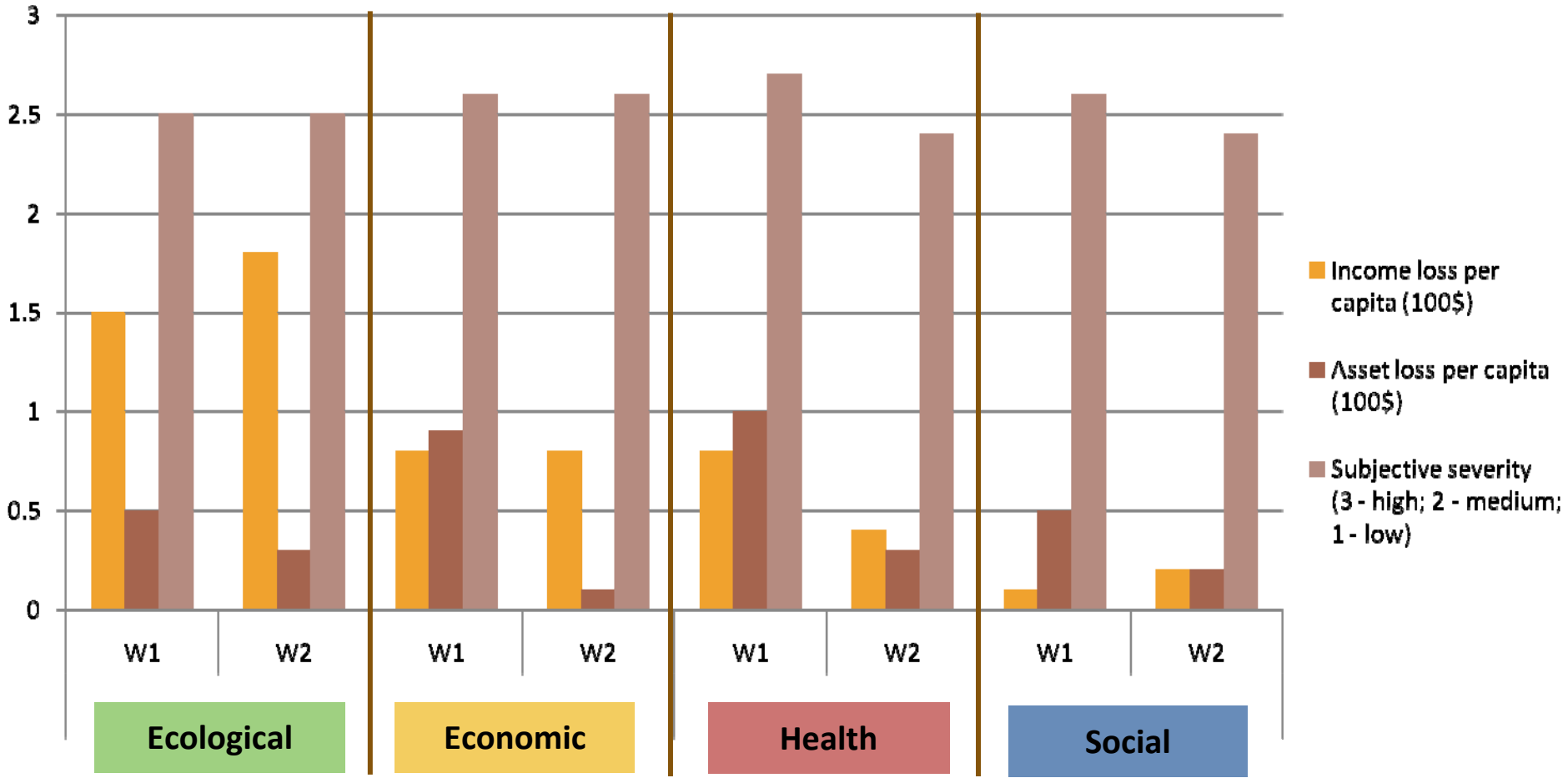
Results

Shock effects on income, asset and subjective severity



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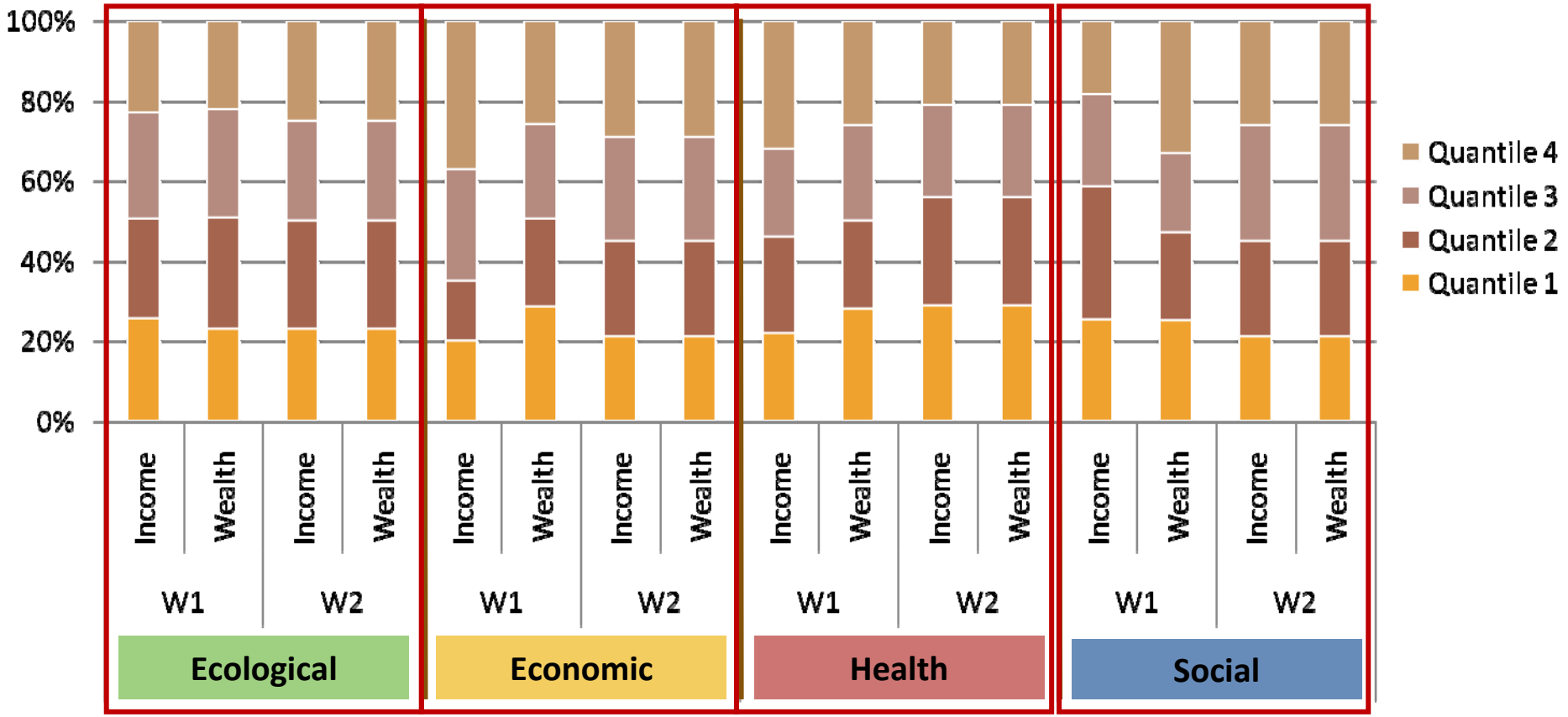
Results

Relative shock frequency by income and wealth per capita

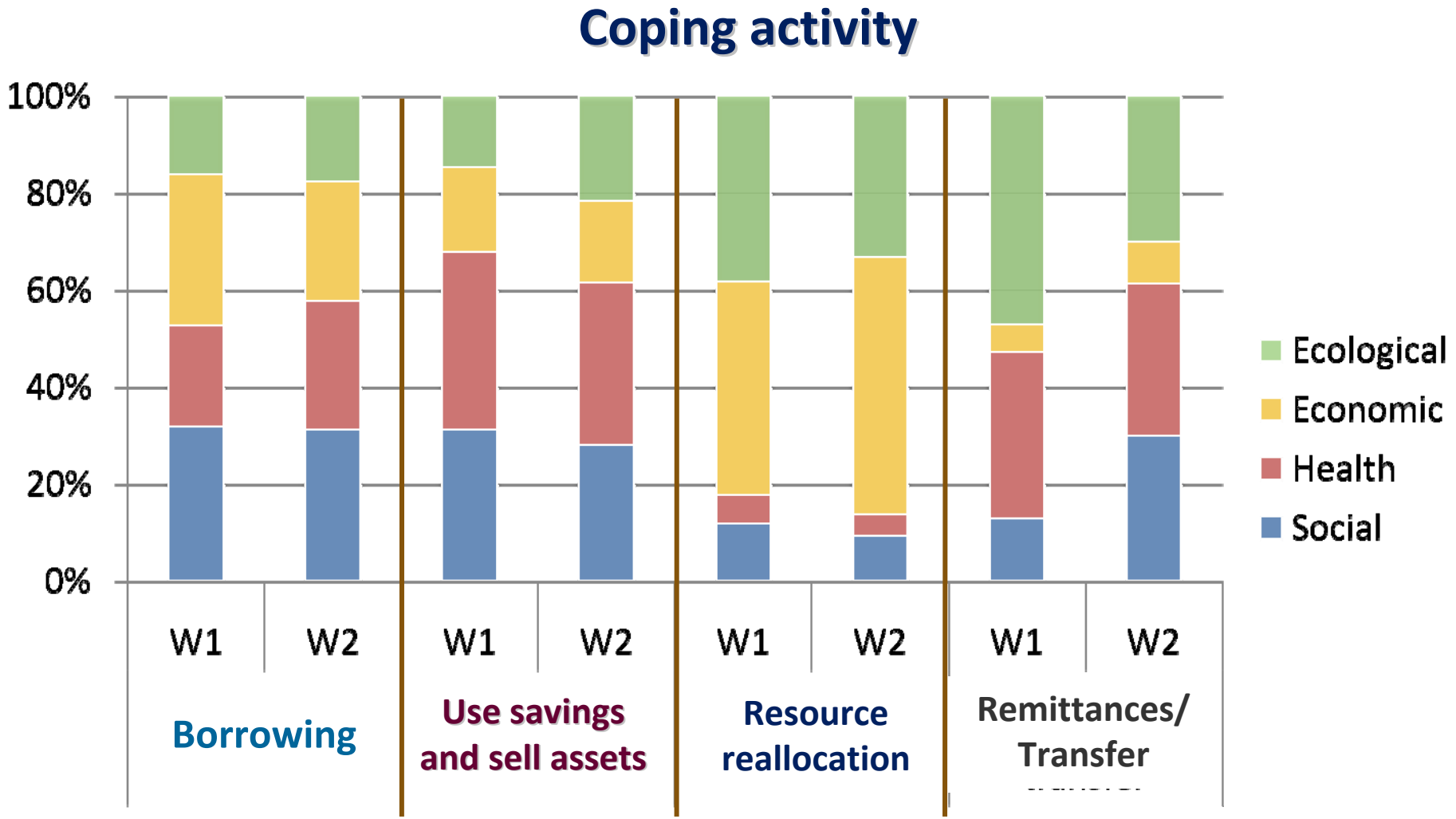


Results

Coping action (% of shock incidents)

Shock type	Wave 1	Wave 2
Ecological	58%	31%
Economic	80%	62%
Health	86%	70%
Social	68%	63%
Total	70%	51%

Results


Coping activity
100%
80%
60%
40%
20%
0%
W1
W2
W1
W2
W1
W2
W1
W2
Borrowing
Use savings and sell assets
Resource reallocation
Remittances/ Transfer
Ecological
Economic
Health
Social

Results: Coping action

Model 1: Univariate Probit	Wave 1		Wave 2	
Explanatory variables	**Coefficient**	**Mean (Std.Dev.)**	**Coefficient**	**Mean (Std.Dev.)**
Household characteristics				
Income per capita *(100 PPP$)*	-	21.6 (24)	+	22.5 (38.1)
Wealth per capita *(100 PPP$)*	-**	156.1 (227.1)	-	139.3 (173.7)
Maximum years of schooling	-	8.4 (3.6)	-	8.8 (3.7)
Ratio of agricultural members	+	0.5 (0.3)	-***	0.5 (0.3)
Number of migrant member	+	0.9 (1.3)	+*	1.1 (1.5)
Shock characteristics				
Income loss per capita *(100 PPP$)*				
Ecological shock	+	1.5 (3)	-*	1.8 (5.4)
Economic shock	+*	0.8 (3.6)	+**	0.8 (8.1)
Health shock	+*	0.8 (4.1)	+*	0.4 (2.6)
Social shock	+**	0.1 (0.9)	+	0.2 (1.8)
Asset loss per capita *(100 PPP$)*				
Ecological shock	+	0.5 (3.1)	+***	0.3 (1.8)
Economic shock	+	0.9 (5.3)	+***	0.1 (1.4)
Health shock	+**	1.0 (5.0)	+***	0.3 (2.9)
Social shock	+	0.5 (3.2)	+	0.2 (2.3)
Village characteristics				
Distance to provincial capital *(km)*	+	0.8 (0.4)	-	0.8 (0.4)
Travelling time to market *(minutes)*	-	57.3 (33.3)	-**	57.6 (33.3)
Province dummy *(1=Buriram, 0 = other)*	+	14.1 (14.3)	-***	15.2 (14.1)
Province dummy *(1=NakhonPanom, 0 = other)*	+*	23 (13.6)	-**	22.8 (12.8)
Constant	+*		+	
Observed probability	0.75		0.64	
Predicted probability	0.82		1.00	

Wave 1: N = 684, Wald chi2 (19) = 29.29, Pseudo R2 = 0.0780, Log-likelihood = -198618.84**

Wave 2: N = 1280, Wald chi2 (19) = 148.05*, Pseudo R2 = 0.1006, Log-likelihood = -422698.74**

***Significant at the 10% level, **Significant at the 5% level and ***Significant at the 1% level**

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Results: Choice of coping activity

Model 2: Multivariate Probit	Borrowing		Use savings/ Sell assets		Resource reallocation		Remittances/ Transfer	
Explanatory variables	**Wave 1**	**Wave 2**	**Wave 1**	**Wave 2**	**Wave 1**	**Wave 2**	**Wave 1**	**Wave 2**
Household characteristics								
Income per capita *(100 PPP$)*	-	-	-	+	-	-	+	+
Wealth per capita *(100 PPP$)*	-	-***	+	+***	-	-	-	-
Maximum years of schooling	-	-	+	-	+**	+***	-	-
Ratio of agricultural members	+	+	+	-**	-	+	-	-
Number of migrant member	+	+	+	-	-	+	+	+*
Village characteristics								
Distance to provincial capital *(km)*	+	-	-	+*	-	-*	+	-
Travelling time to market *(minutes)*	-	+**	+	-	+	+	-	-
Province dummy *(1=Buriram)*	+*	-**	-	-	-*	+*	-**	+**
Province dummy *(1=NakhonPanom)*	+***	-	+	-	-	+*	-***	-

Wave 1: N = 514, Wald chi2 (19) = 203.44*, Log pseudolikelihood = -604757.72, SML, # draws = 24**
Wave 2: N = 814, Wald chi2 (19) = 186.07*, Log pseudolikelihood = -1033705.1, SML, # draws = 30**
Likelihood ratio test of rho21 = rho31 = rho41 = rho32 = rho42 = rho43 = 0: chi2 (6) = 1.2e+06* (Wave 1), chi2 (6) = 2.1e+06*** (Wave 2)**
***Significant at the 10% level, **Significant at the 5% level and ***Significant at the 1% level**

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Results: Choice of coping activity

Model 2:Multivariate Probit	Borrowing		Use savings/ Sell assets		Resource reallocation		Remittances/ Transfer	
Explanatory variables	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2
Shock characteristics								
Income loss per capita *(100 PPP$)*								
Ecological shock	-	+***	-**	-	+***	+**	+	-
Economic shock	+*	+*	-	-*	+*	+	-***	-
Health shock	+	+**	+	+	-	+	+	+
Social shock	+	+	-	-	+**	+	+	+
Asset loss per capita *(100 PPP$)*								
Ecological shock	+	+	-	-	-	+	+	+**
Economic shock	+	-	+	+	+	-	-**	-
Health shock	+	-	+**	+	-	+	+	-
Social shock	+	+*	+***	+	-	+	-	-*
atrho21	-***	-***		rho21	-***	-***		
atrho31	-***	-***		rho31	-***	-***		
atrho41	-***	-***		rho41	-***	-***		
atrho32	-***	-***		rho32	-***	-***		
atrho42	-***	-***		rho42	-***	-***		
atrho43	-***	-***		rho43	-***	-***		

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***Significant at the 10% level, **Significant at the 5% level and ***Significant at the 1% level**

Conclusion

- Income and asset poor households are more fragile to health shocks.
- Wealthier households are more vulnerable to economic and social shocks.
- Health, economic and social shocks are coped with more than ecological shocks.
- Diversification of coping actions is common.
- Major determinants: shock types and severity, economic, demographic and location.

- Next steps:
  - Separation between covariate and idiosyncratic shocks
  - Relationship between coping actions and vulnerability to poverty


Thank you for
your attention