It's Lit! Students of Fire 🔥

Explanatory Research to Uncover the Variables that Cause More Severe Forest Fires

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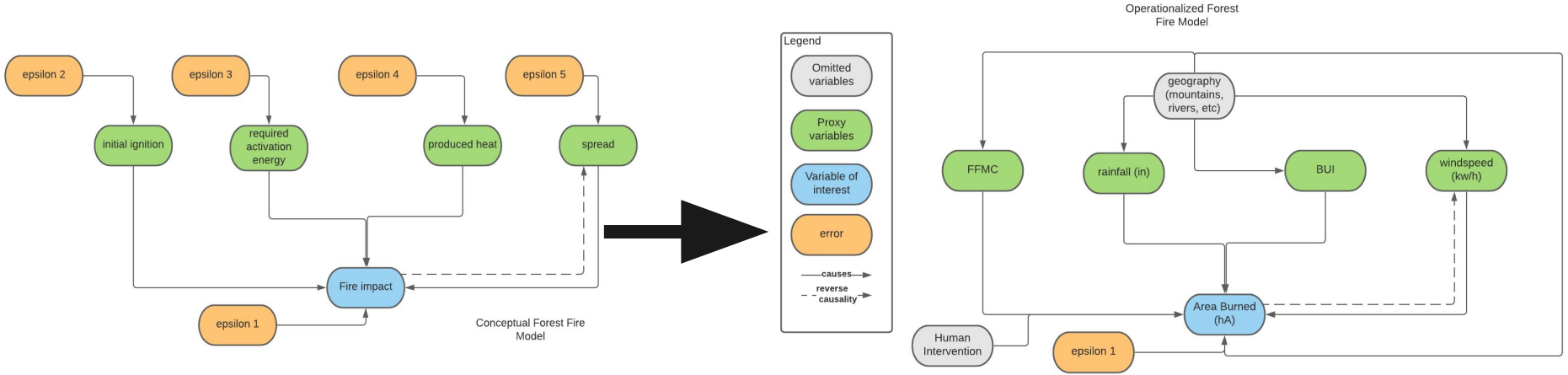
Background and Conceptualization



Dataset and Methods

- Dataset
  - Montesinho National Park in Portugal
  - January 2000 to December 2003
  - 517 Records, 13 Columns

- Methodology
  - Linear regression

Concept	Proxy Variable	Units	Range	Description	Source
Fire impact	Area Burned	Hectares (ha)	0.00 to 1090.84	the burned area of the forest	Portugal Dataset
Initial ignition	Fine Fuel Moisture Code (FFMC)	Unitless index	18.7 to 96.2	Represents fuel moisture of forest litter fuels	Portugal Dataset
Required activation energy	Rainfall	millimeters per square meter (mm/m^2)	0.0 to 6.4	Current rainfall in the environment	Portugal Dataset
Produced heat	Build Up Index (BUI)	Unitless index	2.2 to 315.6	Represents the total amount of combustible fuel	Calculated Variable
Spread	Wind speed	Kilometer per hour (km/h)	0.40 - 9.40	Current wind speed	Portugal Dataset

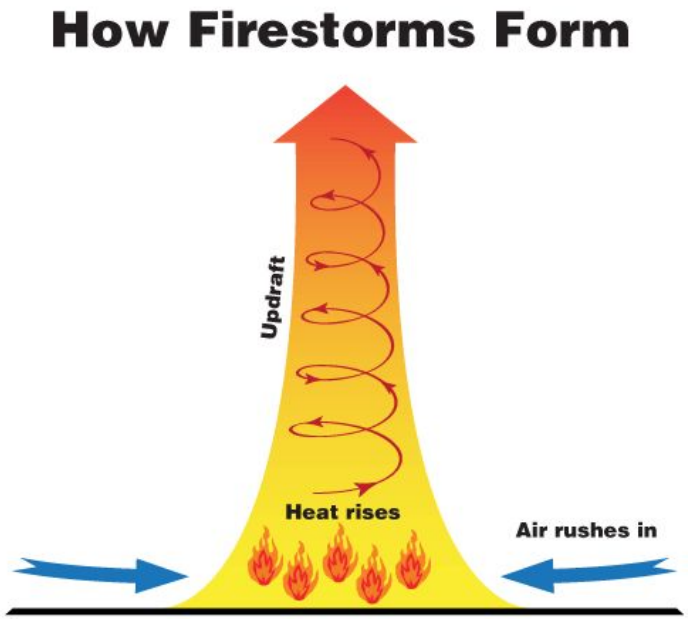
Modeling and Our Best Pick

- **Model 1 <- lm(log(area +1) ~ log(BUI))**
  - BUI represented a variable that satisfies causal theory
  - Showed No Significant coefficients
  - Failed to reject the null hypothesis
- **Model 2 <- lm(log(area +1) ~ log(BUI)) + wind + rain_binary + FFMC**
  - Included all of the variables that, we had theorized in the causal diagram
  - Only wind was a significant predictor
  - Failed to reject the null hypothesis
- **Model 3 <- lm(log(area +1) ~ wind)**
  - Learnings from the second model
  - With a p-values < 0.05 we reject the null hypothesis

	Dependent variable:		
	log(area + 1)		
	(1)	(2)	(3)
log(BUI)	0.024	0.095	
	(0.087)	(0.105)	
wind		0.096*	0.083*
		(0.042)	(0.041)
rain_binary		-0.637	
		(0.581)	
FFMC		-0.008	
		(0.016)	
Constant	0.947*	0.963	0.735***
	(0.416)	(1.267)	(0.178)
Observations	361	361	361
R2	0.0002	0.017	0.011
Adjusted R2	-0.003	0.006	0.008
Residual Std. Error	1.402 (df = 359)	1.396 (df = 356)	1.394 (df = 359)
F Statistic	0.080 (df = 1; 359)	1.509 (df = 4; 356)	4.083* (df = 1; 359)
Note:			*p<0.05; **p<0.01; ***p<0.001

Concerns and limitations

- Statistical Limitations
  - IID Violation
  - Unique BLP Exists Concerns
- Structural Limitations
  - Reverse Causality
  - Omitted Variable Bias
    - Human Intervention
    - Geography - Natural barriers or enhancers to fire spread
- Other Limitations
  - Dataset Problematic - suggestion to use log



Thank you for your time and attention.