Policy Analysis at the Intersection of Constraints and Nutrition

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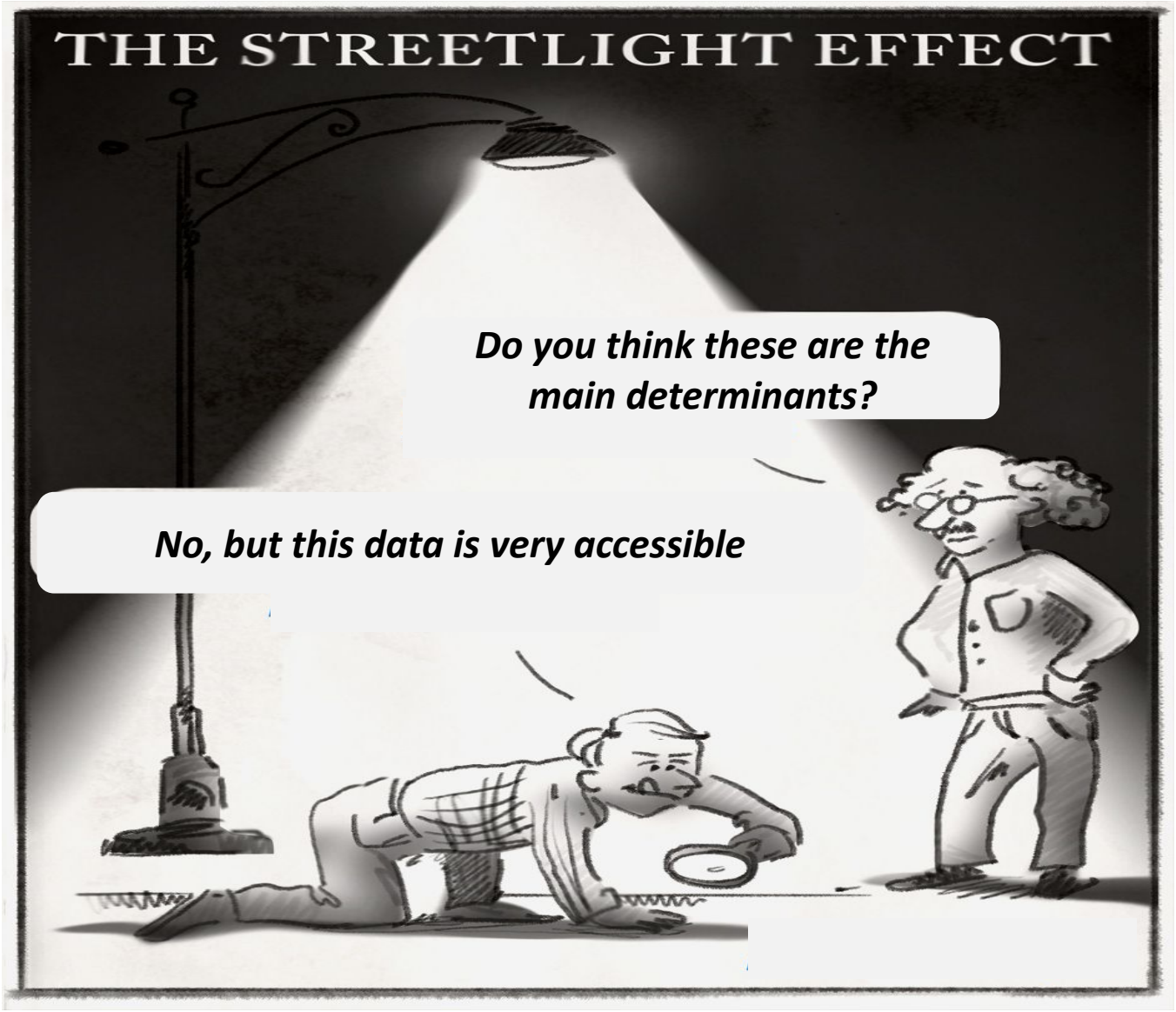
A Self-Test

How do you approach research?

What is your research philosophy, with 5 mixed metaphors?

Q1. Do you like (acknowledge) elephants?

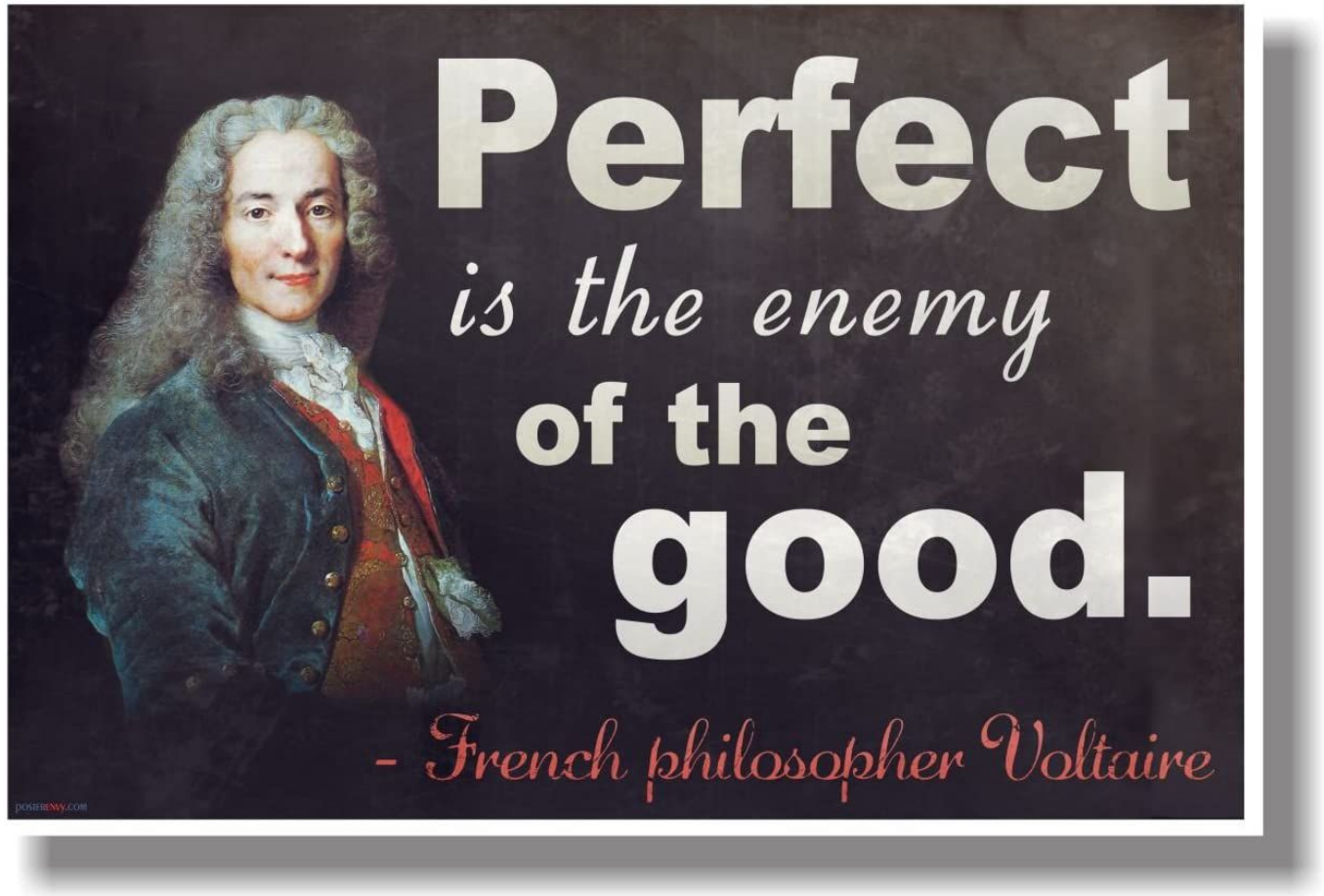
Q2. Are you afraid of the dark?



Q3. Are you paralyzed by perfection?

(Prefer not looking to looking carefully,

Prefer ignorance, incompleteness to inaccuracy)



Q4. Are you more enthralled with data and methods than problems?

Q5. Are you a mature modeler?

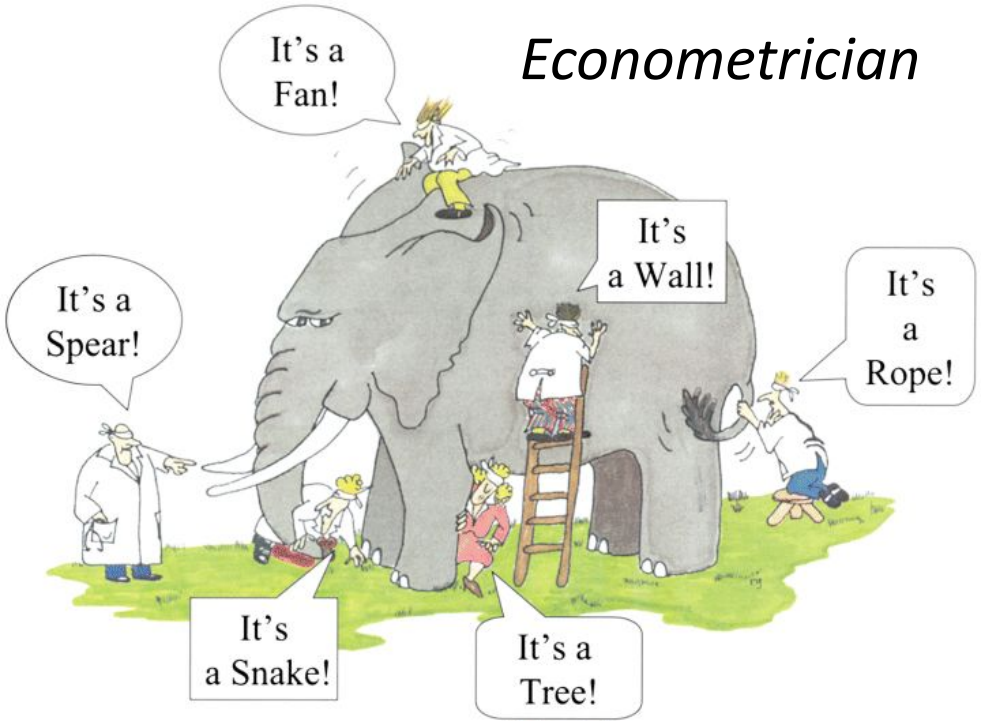
"It does require maturity to realize models are to be used but not to be believed."

Henri Theil, Econometrician

"A 'true' model is an oxymoron if there ever was one!"

Dale Poirier,

Econometrician



What is My Problem? The Elephant in a Venn Diagram

U = All Possible Diets

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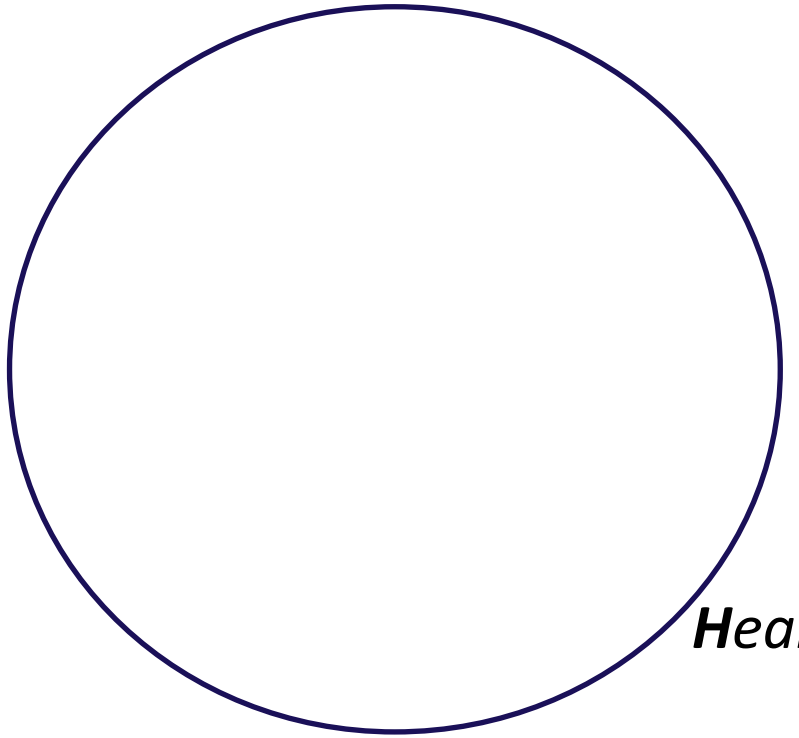
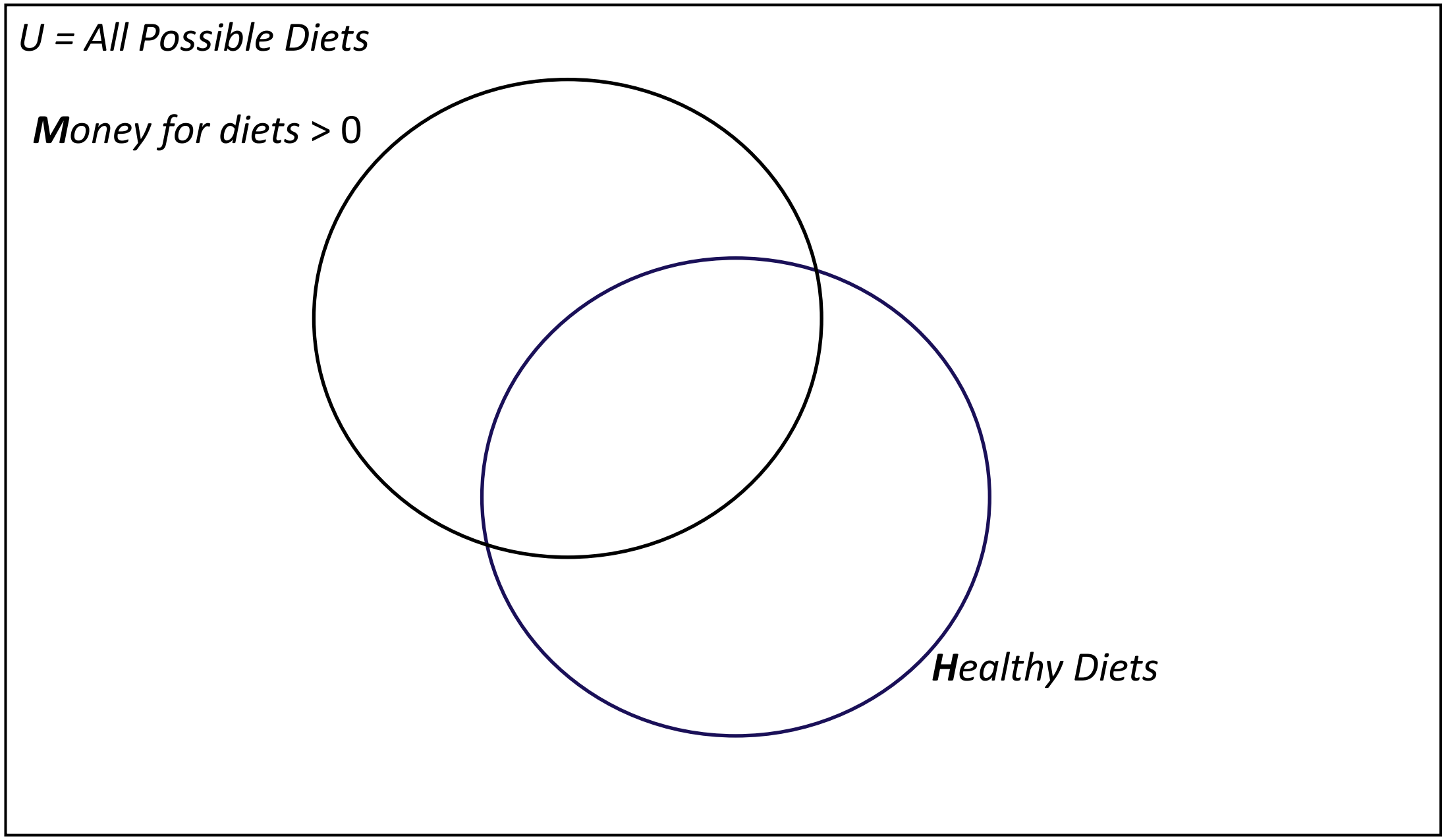
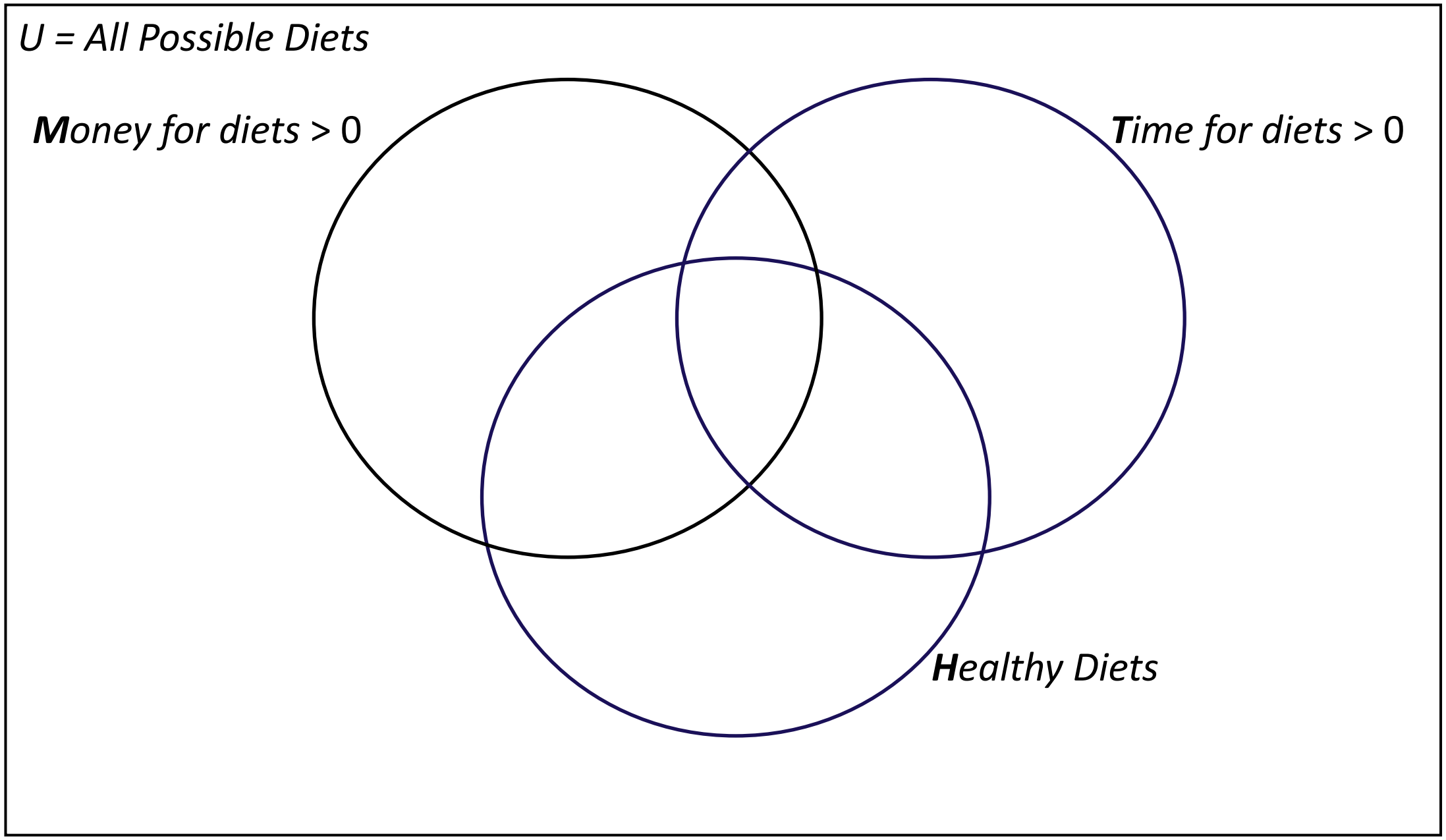


***H**ealthy Diets*


U = All Possible Diets
Money for diets > 0
Healthy Diets


U = All Possible Diets
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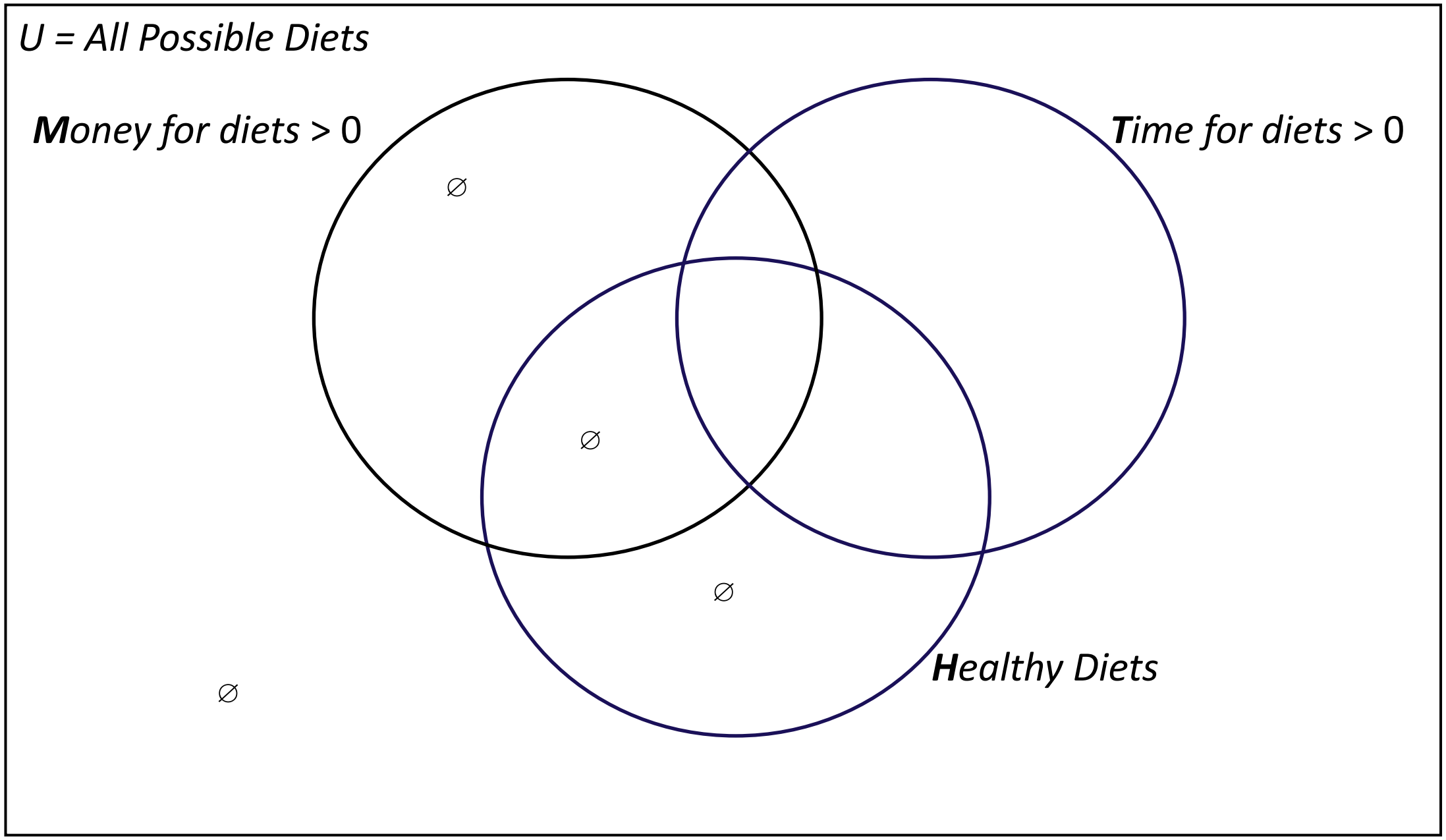
Time for diets > 0
Healthy Diets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∅
∅
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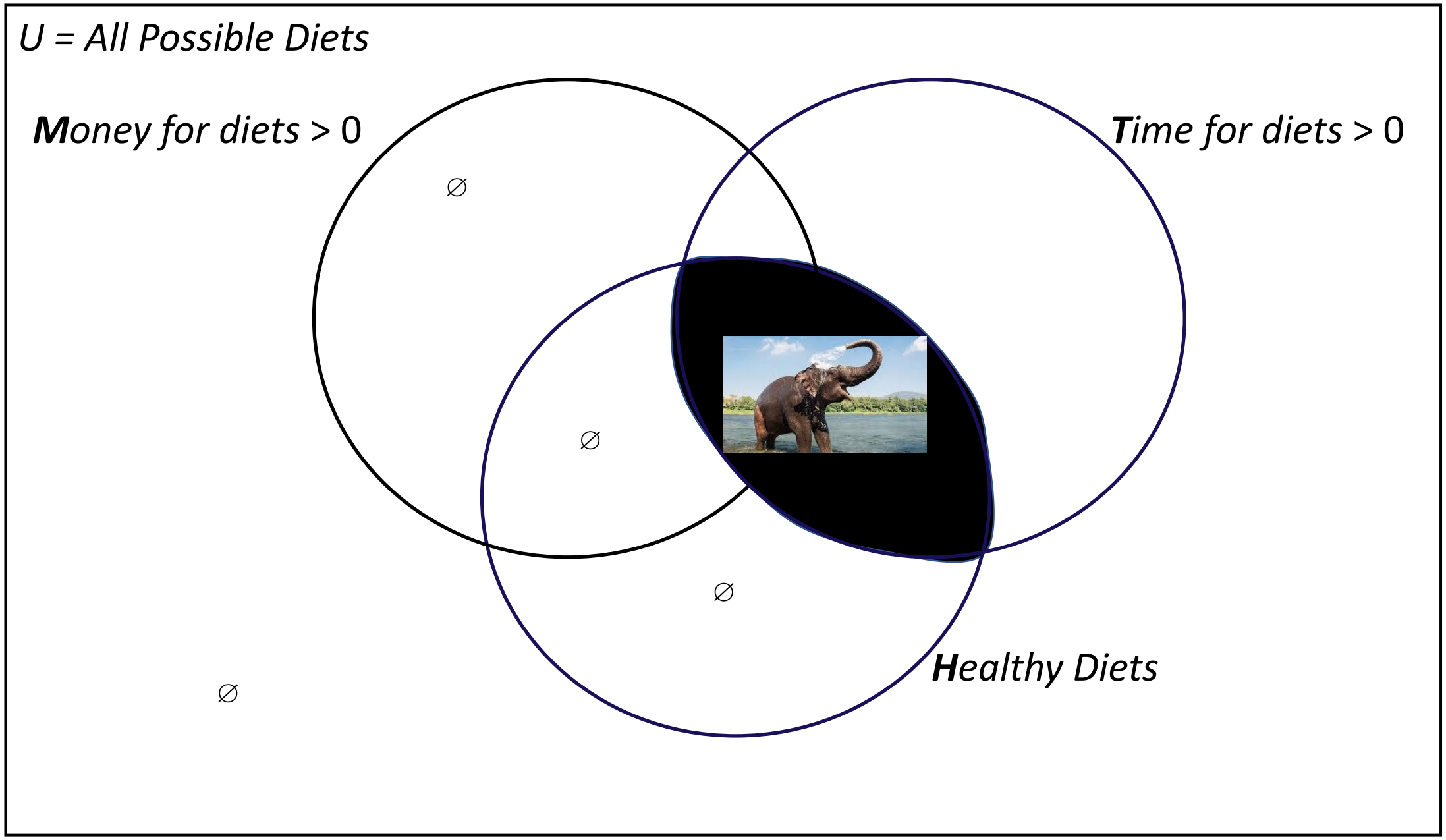
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***M**oney for diets* > 0

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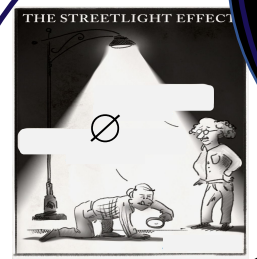


***H**ealthy Diets*

Why is this elephant important for nutrition policy?

- Nutrition policy requires an accurate estimate of the **cost** of a nutritious diet.
- Supplemental Nutrition Assistance Program (SNAP) benefits are based on an estimate of the **cost** of a nutritious diet.
- *Procedures* for calculating the cost of any product will not vary by location: add up input costs.
- The model used for estimating the cost of a nutritious diet for SNAP, the Thrifty Food Plan (TFP), does **NOT** include labor cost…only groceries!

Two Key Points from Literature Past 20 Years and Limitations

- Ignoring labor cost ⇒ diet cost is *underestimated*, SNAP effectiveness *overestimated*.

- We know much more about money and nutrition, than time and nutrition, and even less about the intersection of all three.

Why? Data limitations.

Holy Grail of Data and Methods vs Actual Data and Methods

Vectors of variables desired:

H = Health measures, nutrient intake, food purchases

M = Income, expenditures, price measures

T = Time use in all activities, especially food

Z = Demographics, geospatial, etc..

H^0, M^0, T^0 threshold values for nutritious diet

Holy Grail

- Data: joint multivariate distribution: $f(M,T,Z,H)$
- Method: conditional distribution: $g(M,T,Z \,;\, H^0)$
- Thresholds M^0 and T^0 could be estimated from conditional distribution.
- Thresholds could vary by Z as well as H: $M^0(Z; H^0)$, $T^0(Z; H^0)$

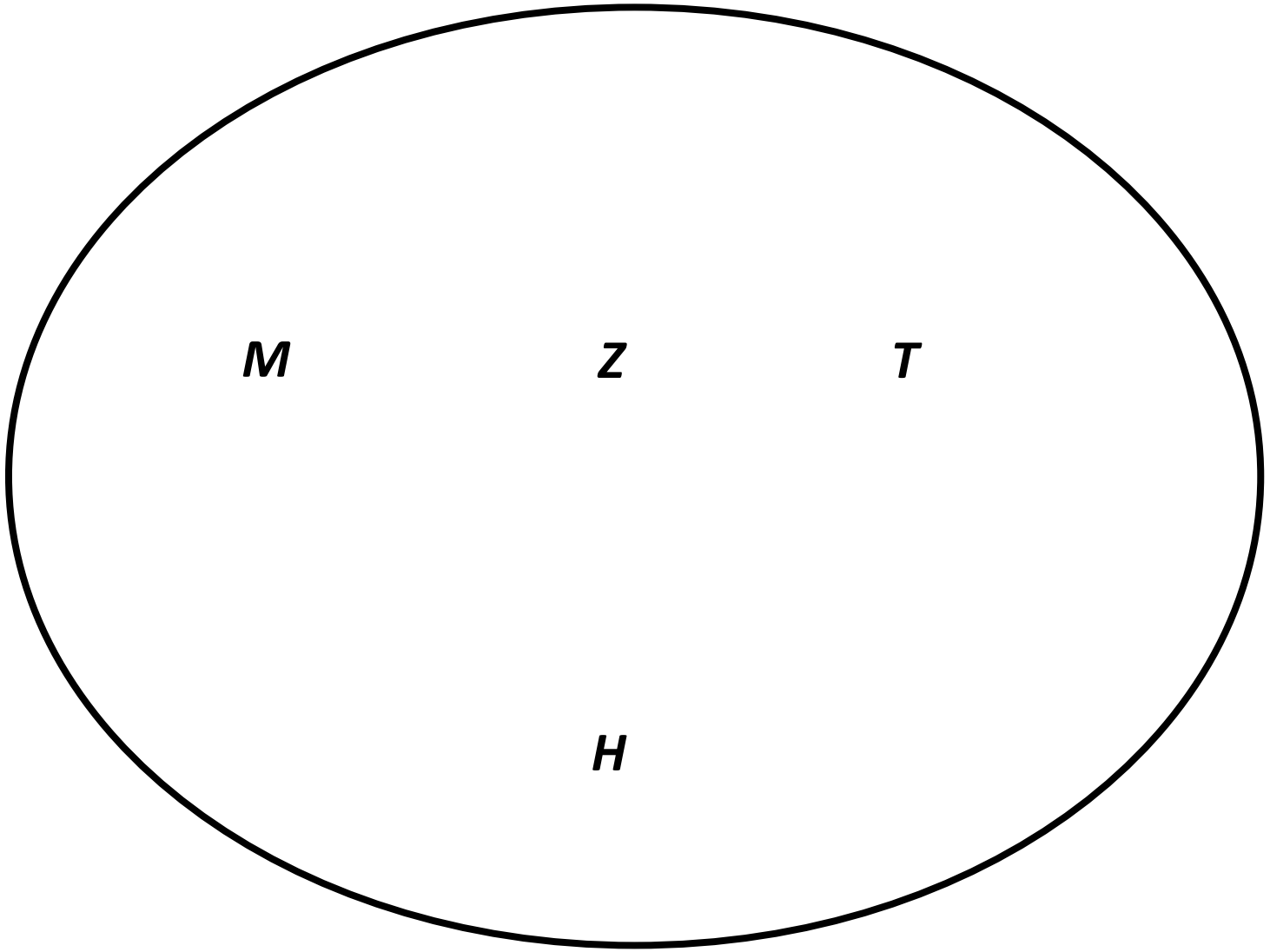
Currently with Data Limitations

	Thresholds
Money	Math Programming Model (TFP)
Time	Math Programming Simulation Model (Davis & You 2011)
Nutrition	Mainly Empirical Distributions (e.g., RDIs)

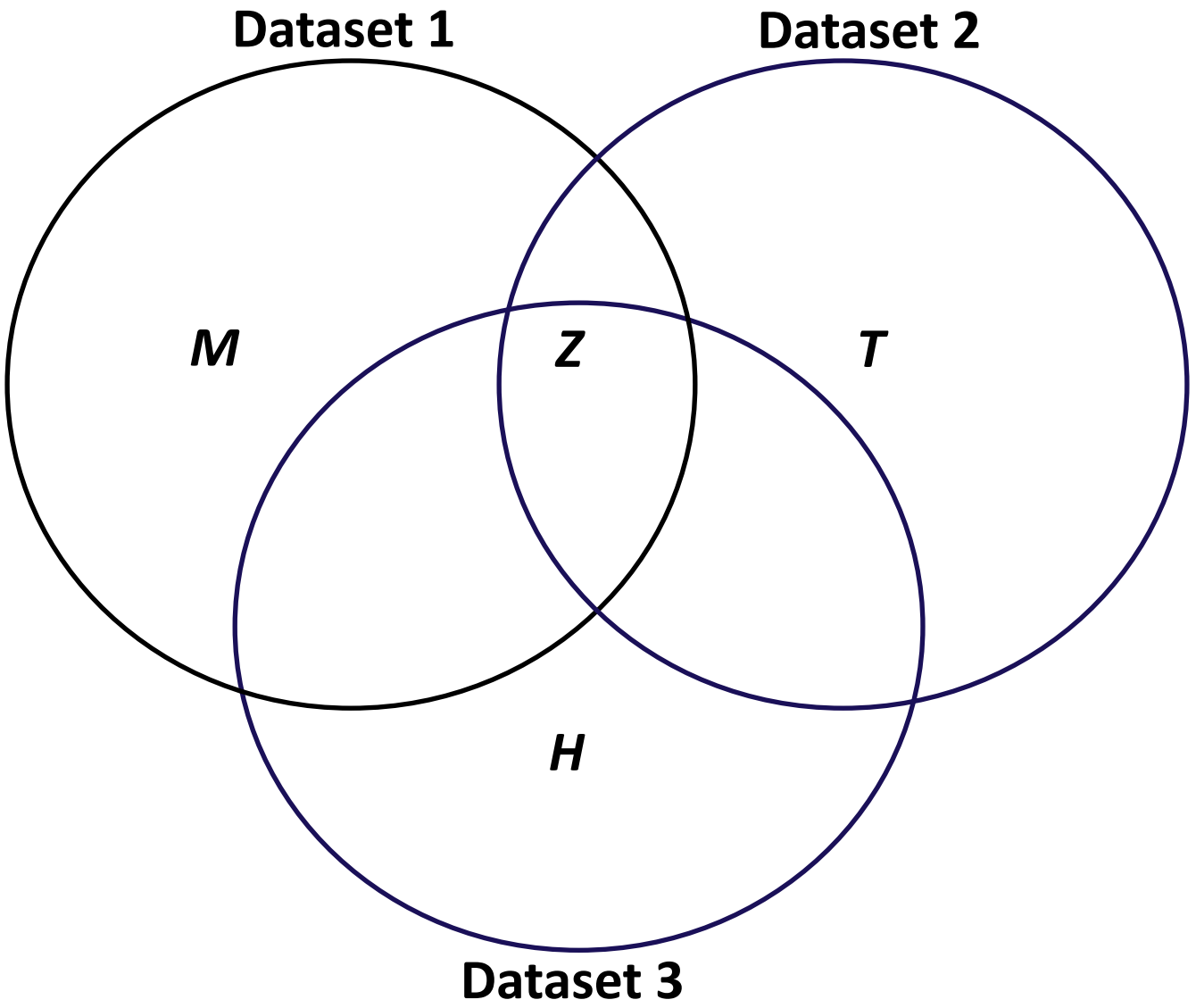
Currently with Data Limitations

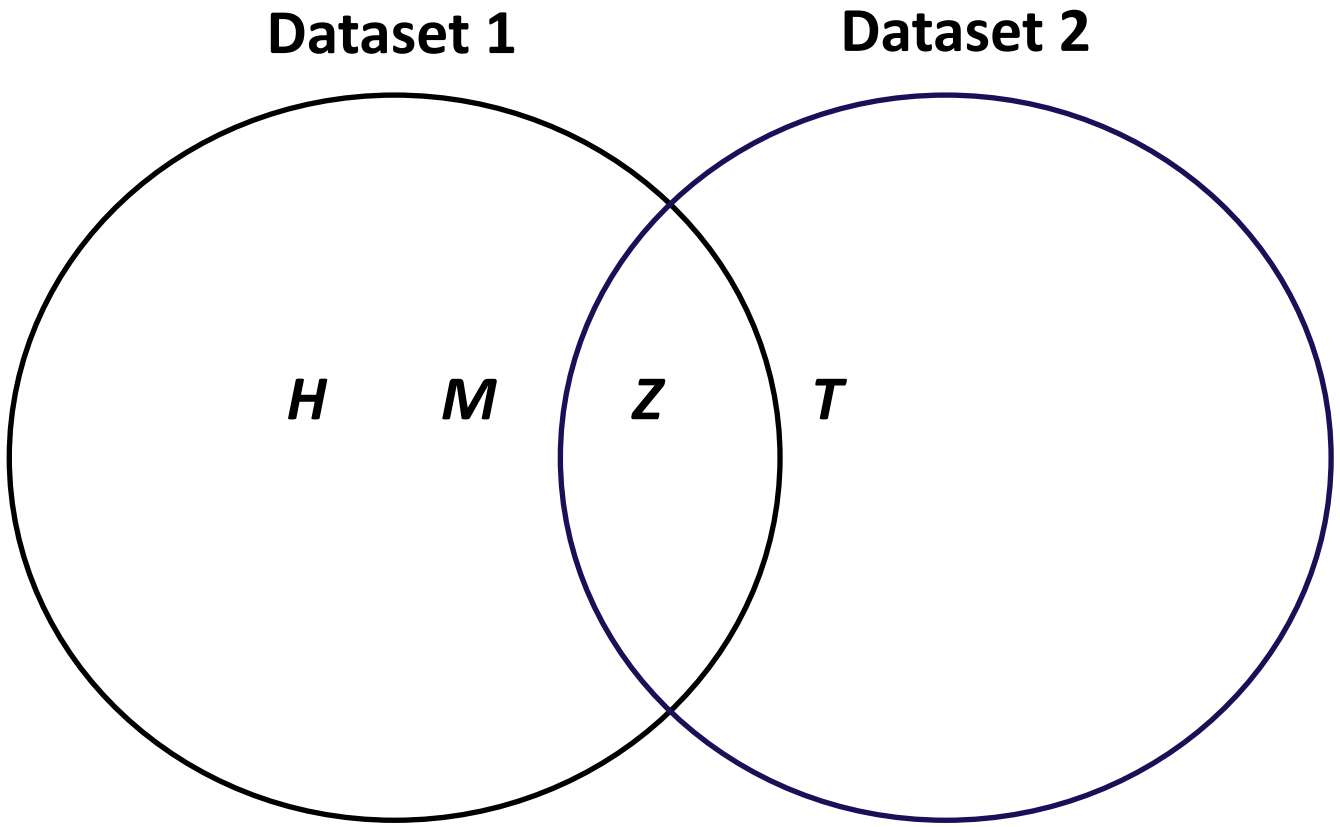
	Thresholds	Actual
Money	Math Programming Model (TFP)	Empirical Distributions (various surveys)
Time	Math Programming Simulation Model (Davis & You 2011)	Empirical Distributions (ATUS/EHM)
Nutrition	Mainly Empirical Distributions (e.g., RDIs)	Empirical Distributions (various surveys, NHANES)

Holy Grail Dataset



Actual Datasets




Dataset 1
Dataset 2
H
M
Z
T

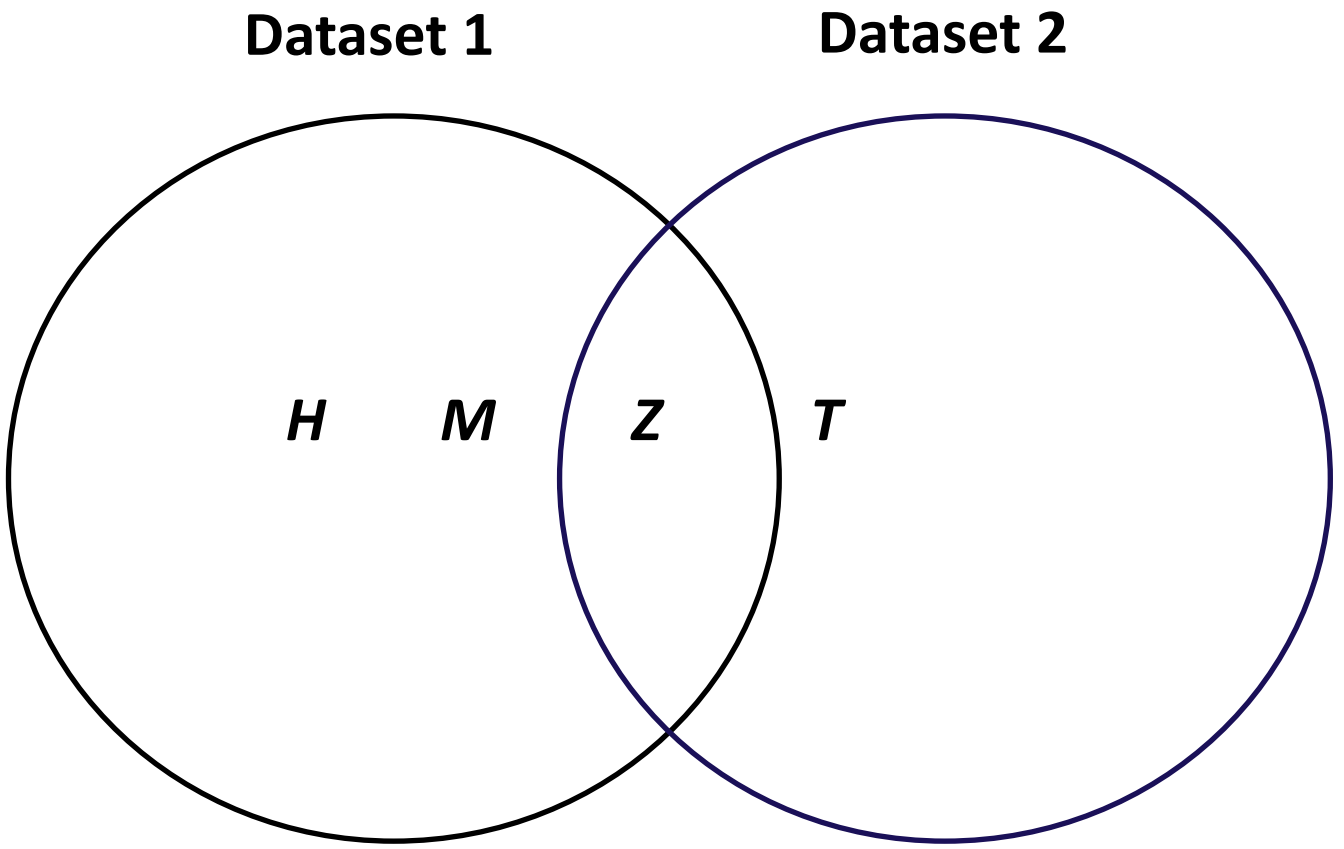
Method:

2SIV (e.g. Angrist and Krueger)

$$T_2 = f(Z_2;\theta_2)$$

$$\hat{\theta}_2 = h(Z_2, T_2)$$

$$\hat{T}_1 = f(Z_1;\hat{\theta}_2)$$



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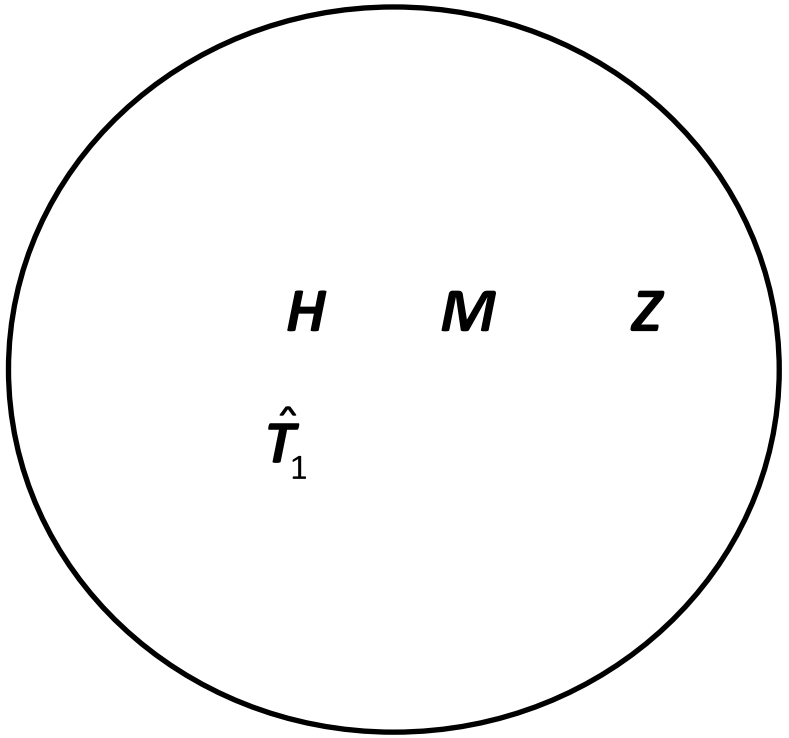
Psuedo-Holy Grail



	Dataset 1 = FoodAPS	Dataset 2 = ATUS/EHM	TFP Money Amount	TFP Time Amount
Unit level	Household	Main Meal Preparer	Household	Household
Years	2012-2013	2006-2008, 2014-2015		
Frequency	Weekly	Weekly	Weekly	Weekly
Healthy Eating Index (HEI)	HEI as calculated by USDA			
Food Expenditures	Food-At-Home (FAH) Expenditures as classified by USDA		Programming model	Simulation Model
Time Expenditures		All food production categories (e.g. Food prep and cleanup, grocery shopping).		
Demographics	HH characteristics (e.g., age, children, employment, education, SNAP)	HH characteristics (e.g., age, children, employment, education, SNAP)		

Food-At-Home Summary Stats

	HEI (purch/wk)	Money ($/wk)	Time (hrs/wk)
Mean	50.02	49.74	5.26
SD	15.73	53.94	2.22

Food-At-Home Means: Conditional on an HEI Threshold

HEI	Money ($/wk)	Time (hrs/wk)
HEI >80	66.76	5.60

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HEI >80	66.76	5.60
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Food-At-Home Means : Conditional on an HEI Threshold

HEI	Money ($/wk)	Time (hrs/wk)
HEI >80	66.76	5.60
HEI >70	65.80	5.26
HEI > 60	64.72	5.52

Food-At-Home Medians: Conditional on Thresholds

Threshold-Type	Actual Money Expenditure ($/wk)
TFP (USDA Model)	37.6
HEI>70 (Emp. Distribution)	37.6
	Actual Time Expenditure (hr./wk)
TFP (Davis & You 2011 Model)	4.99
HEI>70 (Emp. Distribution)	4.99

Food-At-Home Medians: Conditional on Thresholds

Threshold-Type	Actual Money Expenditure ($/wk)	Money Expenditure Threshold ($/wk)
TFP (USDA Model)	37.6	44.64
HEI>70 (Emp. Distribution)	37.6	67.68
	Actual Time Expenditure (hr./wk)	Time Expenditure Threshold (hr./wk)
TFP (Davis & You 2011 Model)	4.99	13.13
HEI>70 (Emp. Distribution)	4.99	5.32

Food-At-Home Medians: Conditional on Thresholds

Threshold-Type	Actual Money Expenditure ($/wk)	Money Expenditure Threshold ($/wk)	Money Surplus
TFP (USDA Model)	37.6	44.64	**−** 7.04
HEI>70 (Emp. Distribution)	37.6	67.68	**−** 30.08
	Actual Time Expenditure (hr./wk)	**Time Expenditure Threshold (hr./wk)**	**Time Surplus**
TFP (Davis & You 2011 Model)	4.99	13.13	**−** 8.14
HEI>70 (Emp. Distribution)	4.99	5.32	**−** 0.33

Food-At-Home Medians *SNAP Participants*: Conditional on Thresholds

Threshold-Type	Actual Money Expenditure ($/wk)	Money Expenditure Threshold ($/wk)	Money Surplus
TFP (USDA Model)	64.31	45.84	18.47
HEI>70 (Emp. Distribution)	64.31	101.11	− 36.80
	Actual Time Expenditure (hr./wk)	**Time Expenditure Threshold (hr./wk)**	**Time Surplus**
TFP (Davis & You 2011 Model)	7.39	13.13	− 5.74
HEI>70 (Emp. Distribution)	7.39	6.58	0.81

Food-At-Home Medians *SNAP Ineligible* Conditional on Thresholds

Threshold-Type	Actual Money Expenditure ($/wk)	Money Expenditure Threshold ($/wk)	Money Surplus
TFP (USDA Model)	72.01	44.64	27.37
HEI>70 (Emp. Distribution)	72.01	101.11	− 29.10
	Actual Time Expenditure (hr./wk)	**Time Expenditure Threshold (hr./wk)**	**Time Surplus**
TFP (Davis & You 2011 Model)	6.03	13.13	− 7.10
HEI>70 (Emp. Distribution)	6.03	6.58	− 0.55

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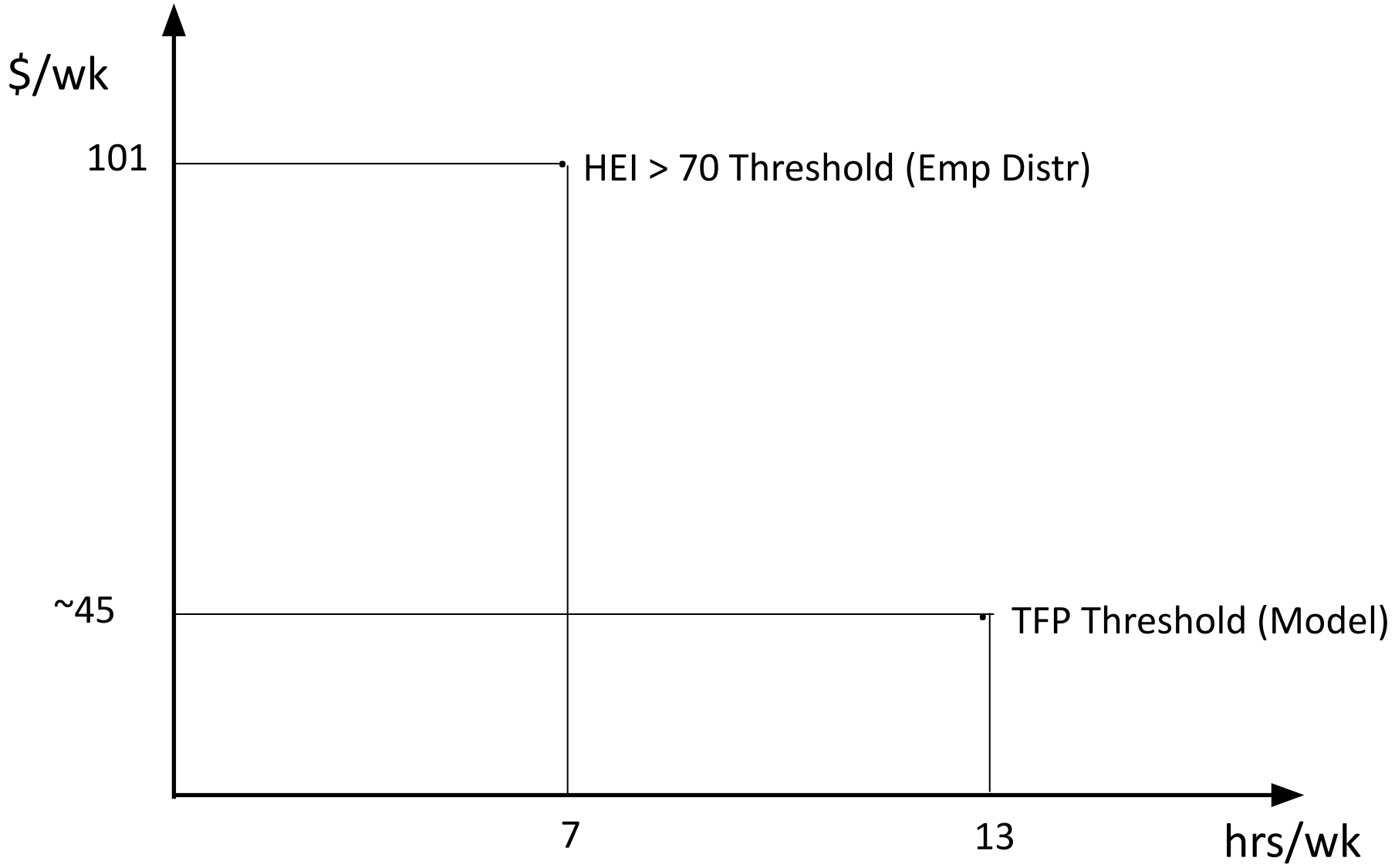

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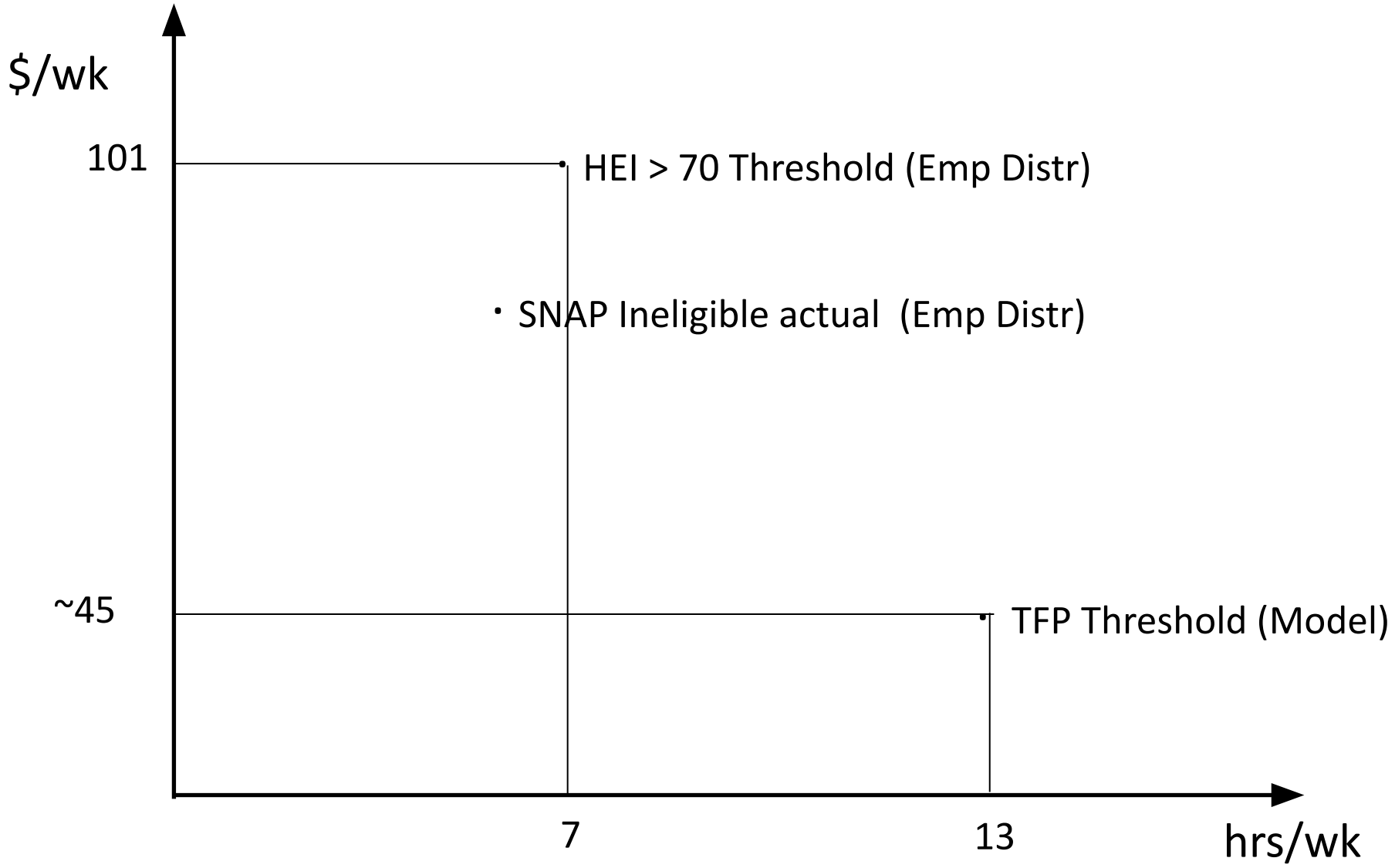

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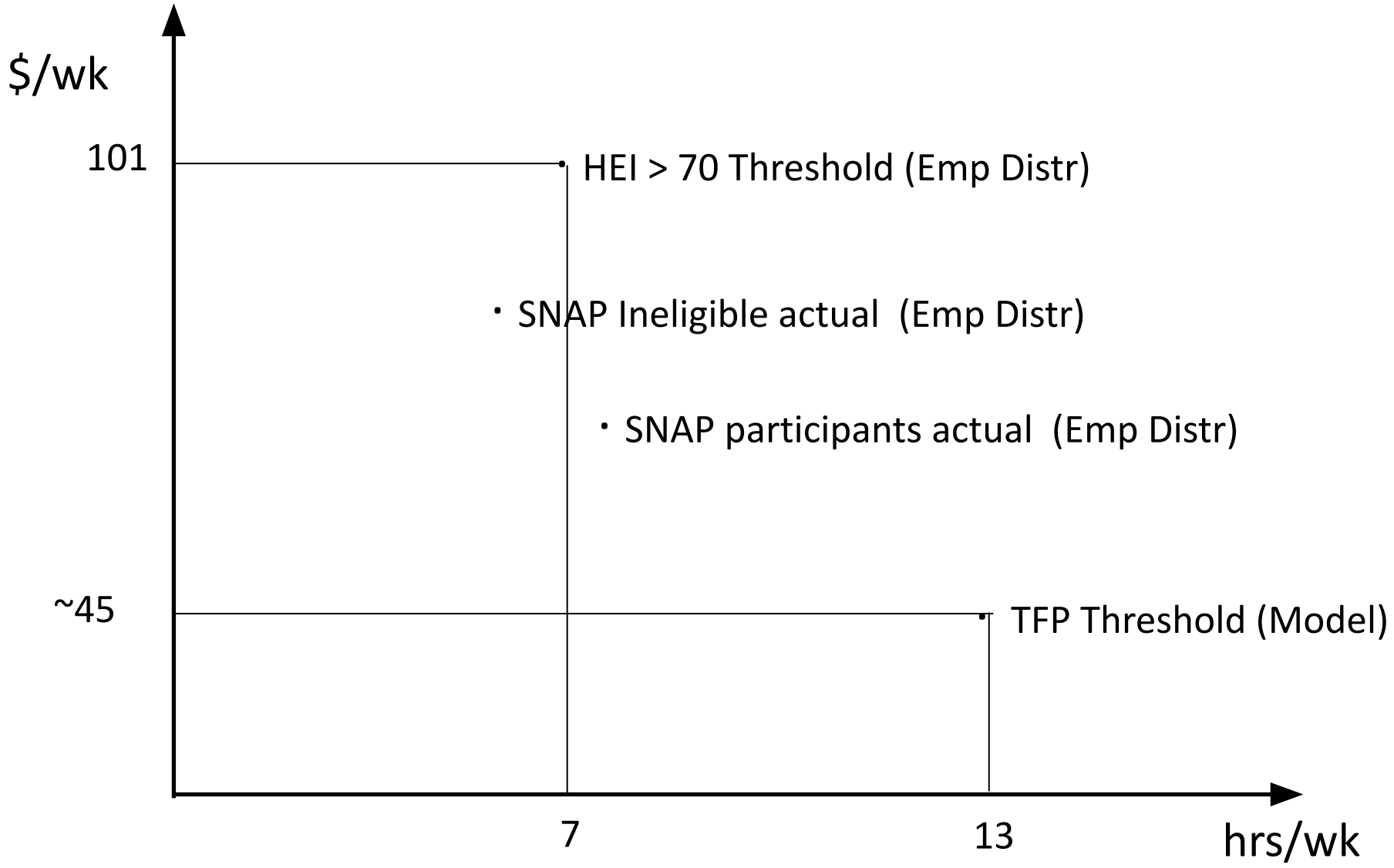

Policy Implications for SNAP households:

TFP Model based Thresholds: Money spending is *sufficient*, Time is *insufficient*

HEI Conditional Distribution Thresholds: Money spending is *insufficient,* Time is *sufficient*

A Few Issues: There are others

- What is appropriate conditioning variable? HEI Intake? Food Security? Self-reported health status? BMI?
- What is the appropriate *value* for the conditioning variable?
- Sample size and representativeness

Conclusions Regarding Data Linkages:

- Look for elephants
- Take a flashlight…look carefully
- Don’t be paralyzed by perfection
- Data and methods are tools, inputs, not outputs
- Be a mature modeler