

An aerial photograph of terraced rice fields in a mountainous region, likely in the Philippines. The terraces are filled with water, which reflects the warm, golden light of the setting or rising sun. The terraces are carved into the hillsides, creating a complex, wavy pattern of light and dark. A few small, simple houses are visible on the terraces, and a few people can be seen walking on the paths between them. The overall scene is peaceful and beautiful, capturing the essence of rural life and agriculture.

POVERTY

EE 461 Development Microeconomics, Semester 2 /2020



Understanding poverty



Voices of the Poor

- Migrant Worker Munee in rural Bihar India – from Voices of the Poor
- <https://www.youtube.com/watch?v=jaaDWRu4UfY>

Getting Beyond Static Measures

- Static poverty measures are important and useful, but they often miss important dimensions of poverty.
- Once we introduce_____, we can view poverty as a film rather than as a photo.

Getting Beyond Static Measures

- With time, it becomes important to distinguish between 'stock' and 'flow' measures. Why?

Income is a flow; Wealth and assets are both stocks.



Getting Beyond Static Measures



- *Why might it be important to distinguish different types of poverty experiences over time?*

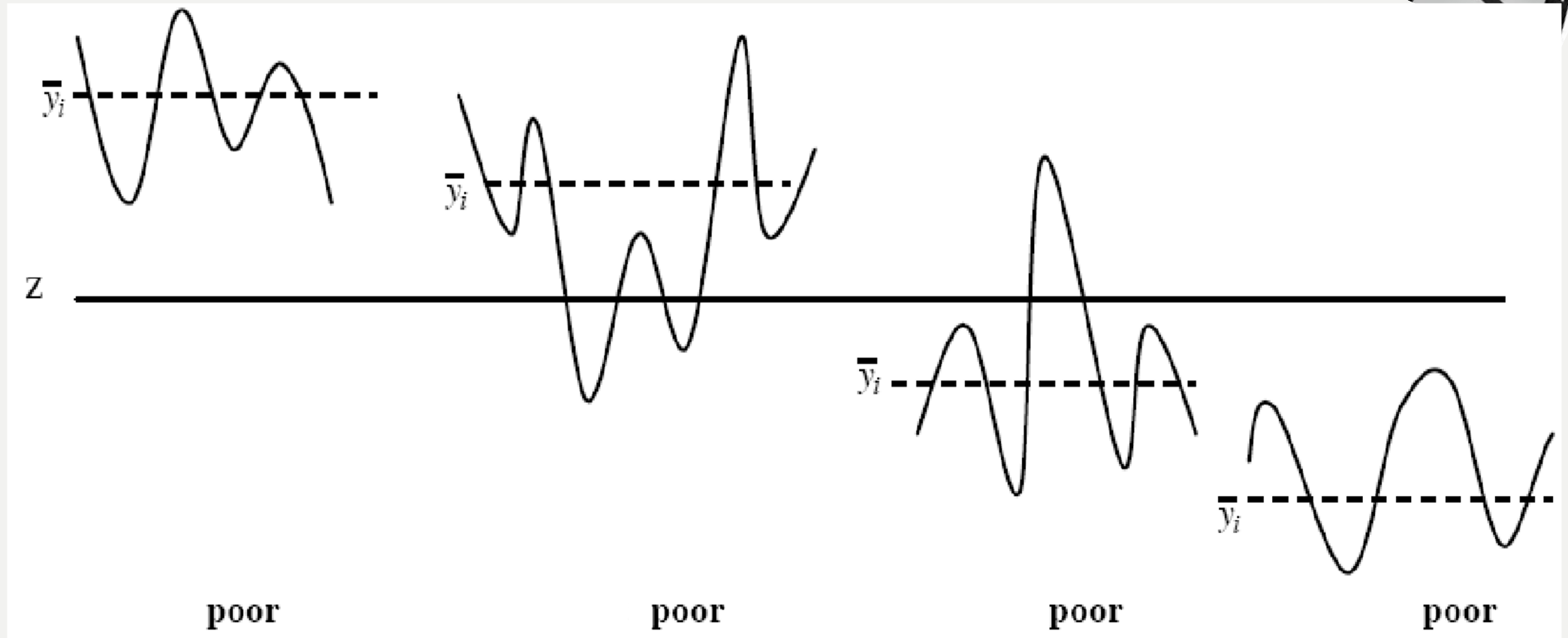
The anticipation of future poverty or desperation (i.e., vulnerability) often distorts individuals decisions and behavior in important ways – that can make it harder to escape poverty

A Poverty Transition Matrix: Comparing HH poverty status between two time periods

A Transition Matrix of Poverty Dynamics in Rural Mexico

	Poor 2007	Non Poor 2007
Poor 2002 (45.56%)	50.92%	49.08%
Non Poor 2002 (54.44%)	30.00%	70.00%

POVERTY AS A 'FILM':
POVERTY TYPES FROM SW
RURAL CHINA (1985-90)



Asset Poverty Dynamics

- *How are assets different than income?*
- *What does the term “poverty trap” mean to you?*
- Characterizing and understanding the dynamics of poverty over time is a critical area of development economics.

The Economics of Poverty Traps and Persistent Poverty: An Asset-Based Approach

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ABSTRACT *Longitudinal data on household living standards open the way to a deeper analysis of the nature and extent of poverty. While a number of studies have exploited this type of data to distinguish transitory from more chronic forms of income or expenditure poverty, this paper develops an asset-based approach to poverty analysis that makes it possible to distinguish deep-rooted, persistent structural poverty from poverty that passes naturally with time due to systemic growth processes. Drawing on the economic theory of poverty traps and bifurcated accumulation strategies, this paper briefly discusses some feasible estimation strategies for empirically identifying poverty traps and long-term, persistent structural poverty, as well as relevant extensions of the popular Foster-Greer-Thorbecke class of poverty measures. The paper closes with reflections on how asset-based poverty can be used to underwrite the design of persistent poverty reduction strategies.*

4 generations
of poverty
measurement

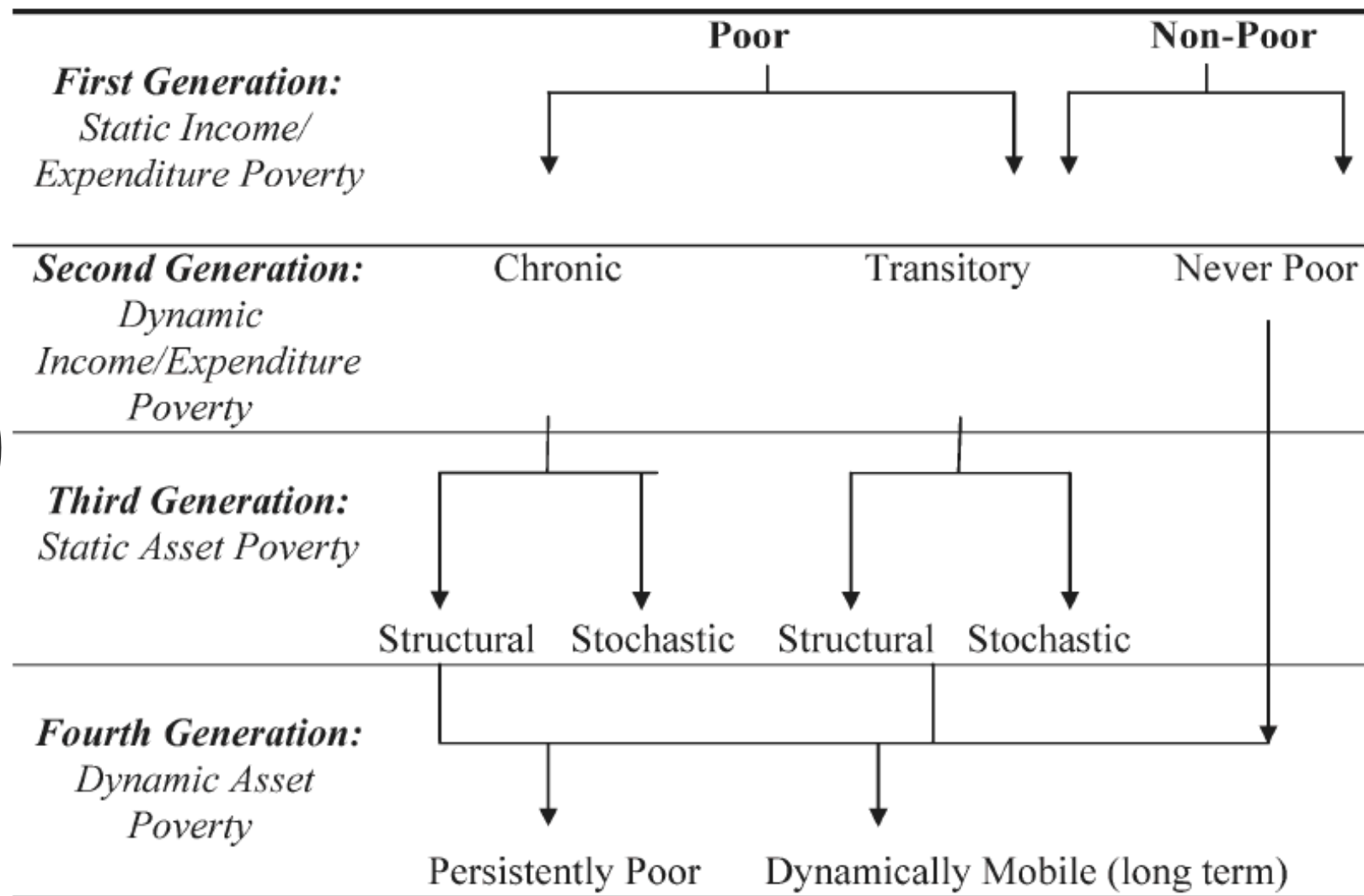


Figure 1. Alternative approaches to poverty measurement

What the 1st generation expenditure-based poverty measures can and cannot tell us

- The most common (first generation) approach to poverty measurement relies on household expenditure (or income) data from a single point in time.
- Cross-sectional poverty measurement is unable to distinguish between two very different patterns of poverty.

What the 1st generation expenditure-based poverty measures can and cannot tell us

- Consecutive cross-sectional findings of a 33 percent poverty headcount ratio could reflect a society in which _____one-third of individuals are persistently poor, period after period.
- Alternatively, repeated observations of the same headcount ratio could reflect a reality in which poverty is a _____phenomenon in which individuals routinely swap places.

4 generations
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measurement

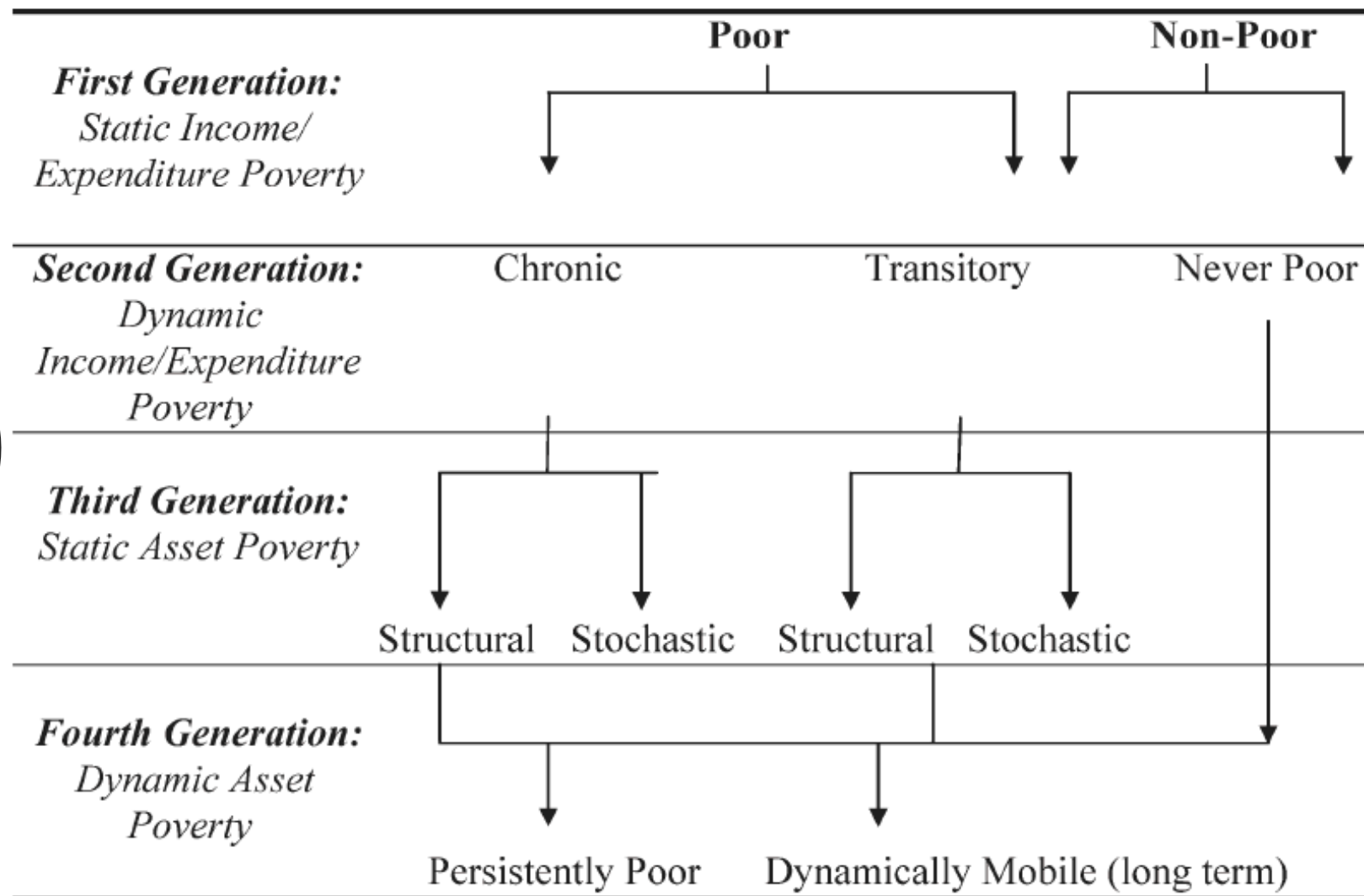


Figure 1. Alternative approaches to poverty measurement

2nd generation income/expenditure based poverty measurement

- Longitudinal or panel data, offering **repeated observations over time on a single cohort** of individuals or households, permits a further decomposition of households into three categories:
 - *the always or chronically poor;*
 - *the sometimes or transitorily poor;*
 - *the never poor.*
- Second generation poverty measures cannot distinguish between very distinctive sorts of poverty transitions.

2nd generation income/expenditure based poverty measurement

- People can move from *the poor to the non-poor* state over time due to either of two markedly different experiences.
 - Some may have been *initially poor because of bad luck*. Their transition to the non-poor state simply reflects a return to an expected non-poor standard of living. This is *a _____poverty transition*.
 - For others, the transition *may have been structural*, due to the *accumulation* of new assets, or enhanced returns to the assets that they already possessed.

2nd generation income/expenditure based poverty measurement

- Those transitorily poor individuals who move from **being non-poor to poor**, can represent a mix of experiences.
 - *For some, it could be a temporary transition caused by **bad luck** in a later survey period. For others, it could represent a return to an expected standard of living, after a brief non-poor status afforded by a spell of **good lucks**.*
 - *Finally, for yet others, it could be a _____ **move caused by the loss of assets** (due to illness, natural disaster or theft), or by a deterioration in returns to their assets brought on changes in the broader economy (for example, unemployment or declining terms of trade).*

What the 2nd generation expenditure-based poverty measures cannot tell us

- Second generation poverty analysis cannot distinguish **structural from stochastic transitions**.
- This limits its ability to describe how well an economy works for its least well off members.

An asset-based approach

- Poverty measurement that uses income/expenditure is **backward looking** in the sense that it creates a portrait of who was poor at the time survey data were collected.
- How about poverty measures that can deal with time and poverty transitions?

An asset-based approach

- Who will likely remain poor into the future?
- _____Poverty Measurement
- An asset-based approach to poverty analysis might make it possible to distinguish between persistent poverty from poverty that passes naturally with time due to systemic growth processes.

4 generations
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measurement

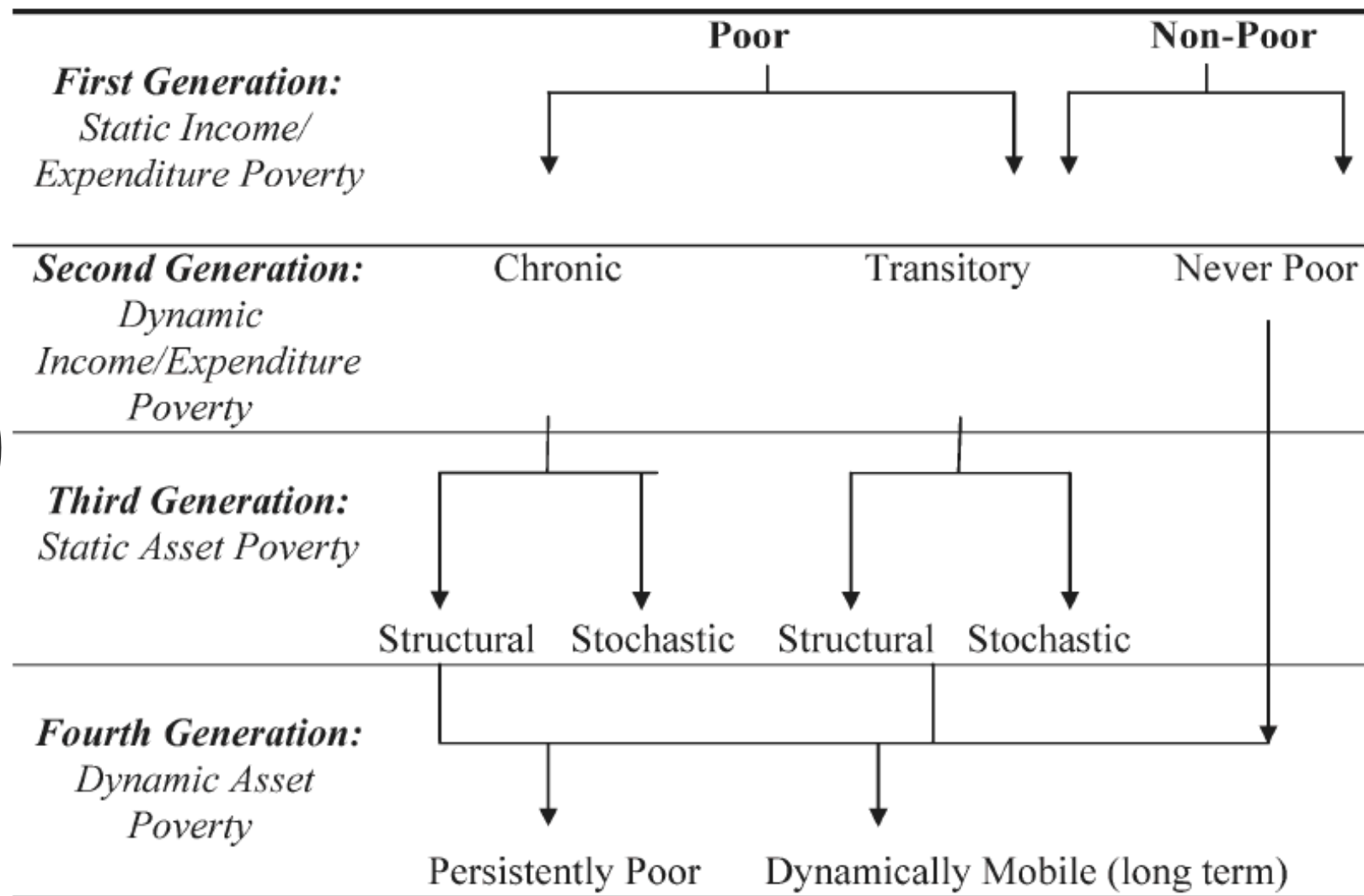


Figure 1. Alternative approaches to poverty measurement

The 3rd generation of poverty measure

- Distinguishing between stochastic and structural transitions requires information on **assets** and expected levels of well-being.

“Asset”

- The term asset is understood to broadly include conventional, privately held productive and financial wealth, as well as social, geographic and market access positions that confer economic advantage.
- Assets are multi-dimensional.
- Assets can be either tangible or intangible.

The *vertical axis* measures a standard flow indicator of achieved material well-being (or utility), typically measured as income or expenditure.

The *horizontal axis* measures the assets that generate a household's livelihood.

_____ is the conventional money metric poverty line.

The asset poverty line _____ is the level of assets that predicts a level of well-being equal to the poverty line, $\underline{u}$.

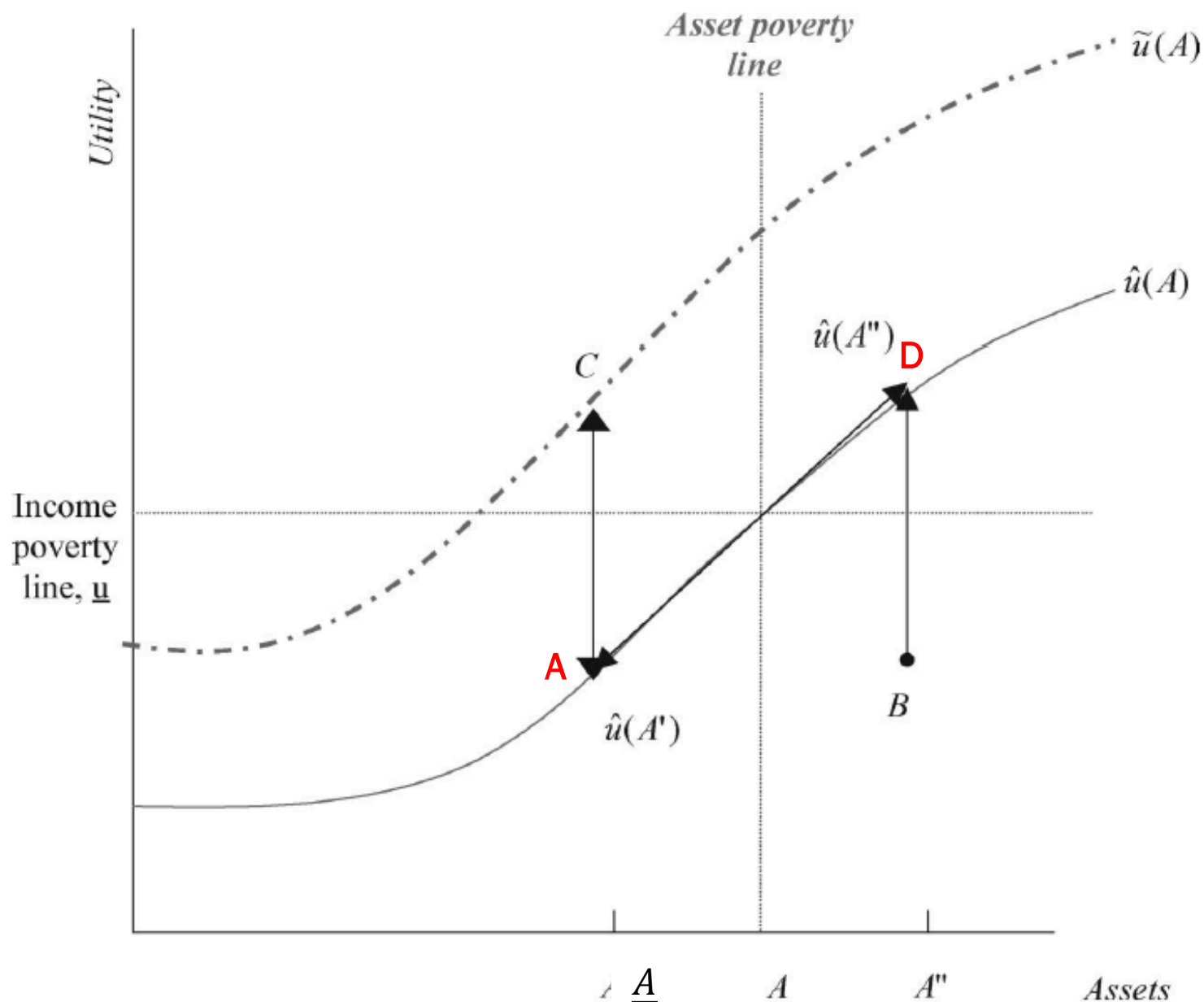


Figure 2. Single period income and asset poverty lines 25

The **(expected) livelihood function** is the relationship between assets and income, expenditures or some other flow measure of well-being.

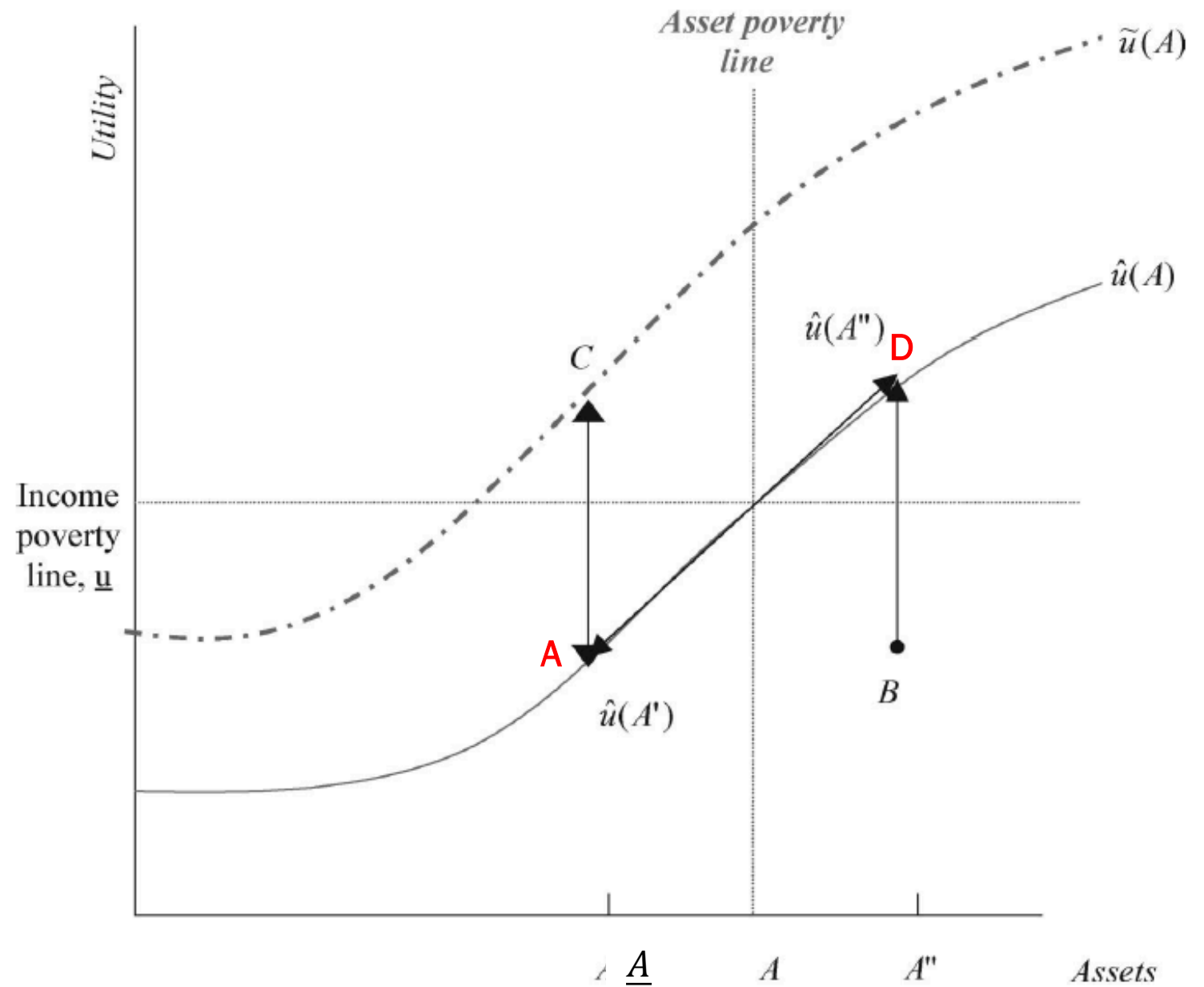


Figure 2. Single period income and asset poverty lines 26

Stochastically poor vs. Structurally poor

- In any time period, a household is stochastically poor if it holds assets worth at least $\underline{A}$ yet its realised income or expenditure falls stochastically below $\underline{u}$. >> Point_____
- The household is structurally poor if its stock of assets is less than $\underline{A}$ and its realised income or expenditure level falls, as expected, below $\underline{u}$. >> Point_____

Stochastic transition vs. Structural transition

- A **stochastic transition** back from being income nonpoor to being income poor is the transition back to its expected status based on household's assets below the asset poverty line.

>> Transition from Point_____to Point_____

- A **structural transition** from being income nonpoor to being income poor is a structural transition from above to below the asset poverty line due to a loss of assets.

>> Transition from Point_____to Point_____

Limitations of the 3rd generation of poverty measure

- The challenge in implementing these ideas results from the need to estimate a livelihood mapping between assets and expenditures (or income) statistically.
- Analysis based on the asset poverty line cannot by itself identify whether the currently structurally poor are likely to _____poor over the longer term, caught in a poverty trap, or indeed whether a subset of the structurally non-poor can sustain their positions over the longer term.

4 generations
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measurement

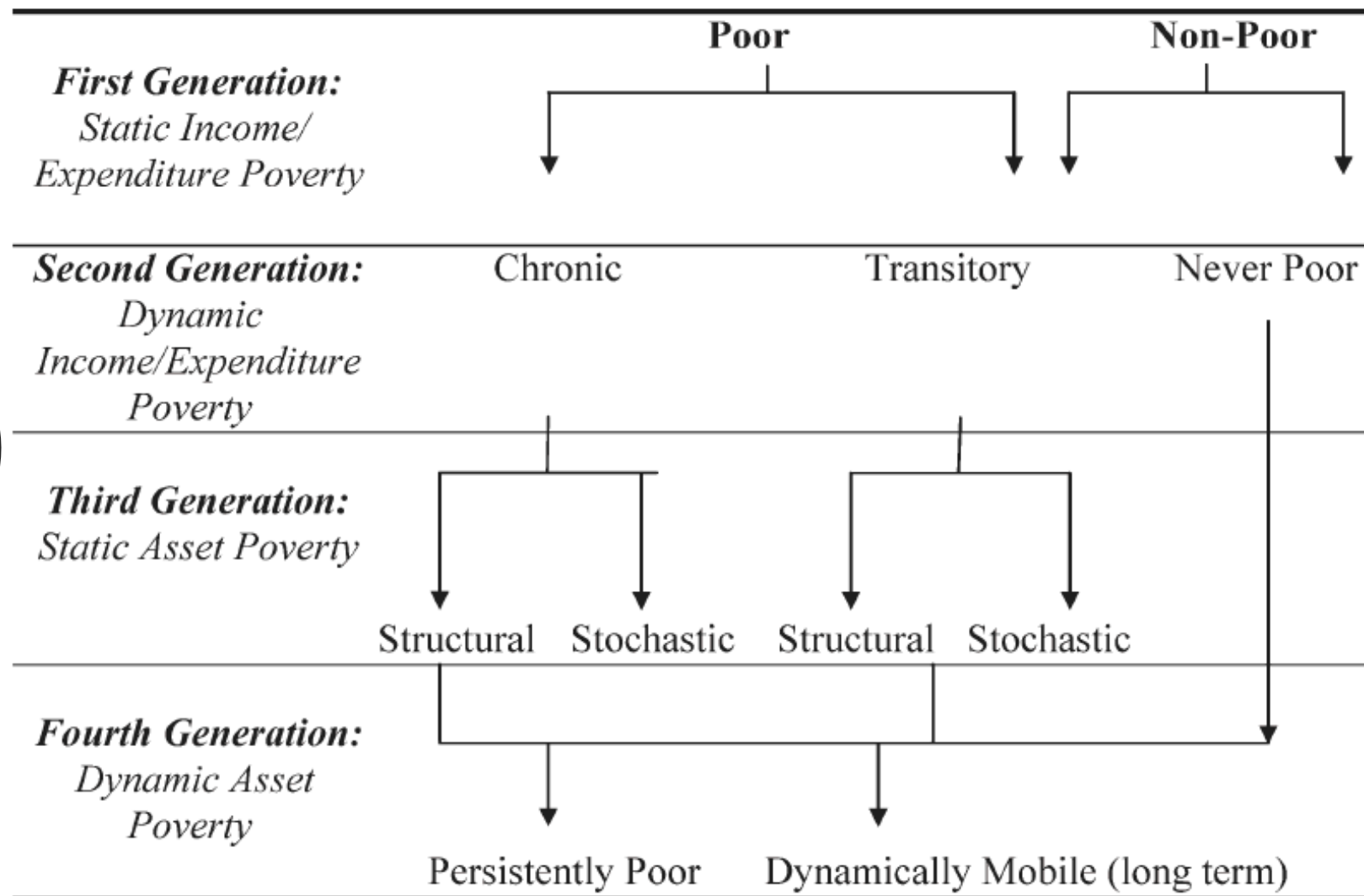
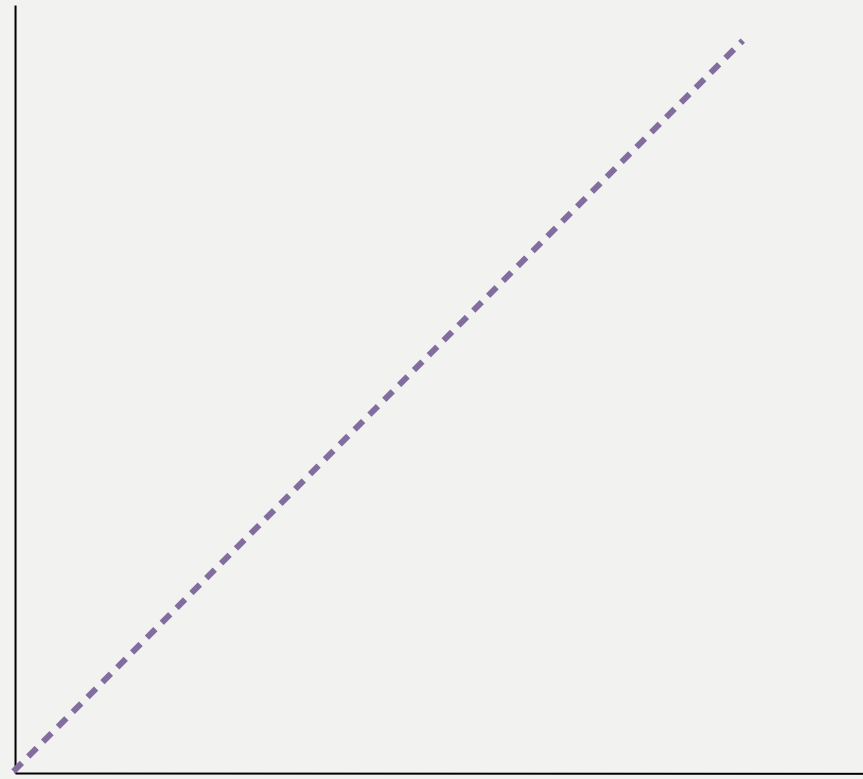


Figure 1. Alternative approaches to poverty measurement

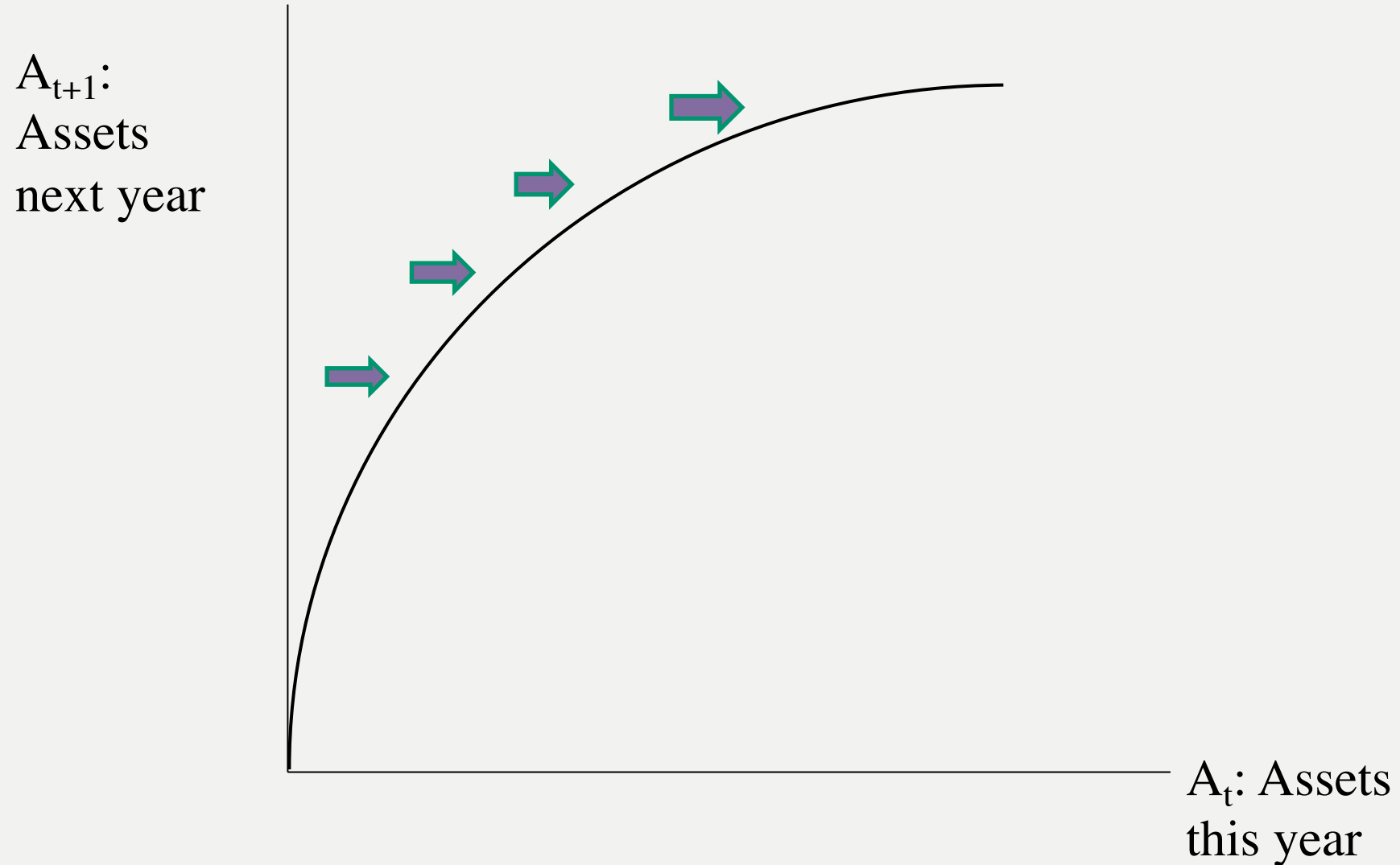
An important tool to formalize our thinking is a **Recursion Function**

A_{t+1} :
Assets
next year

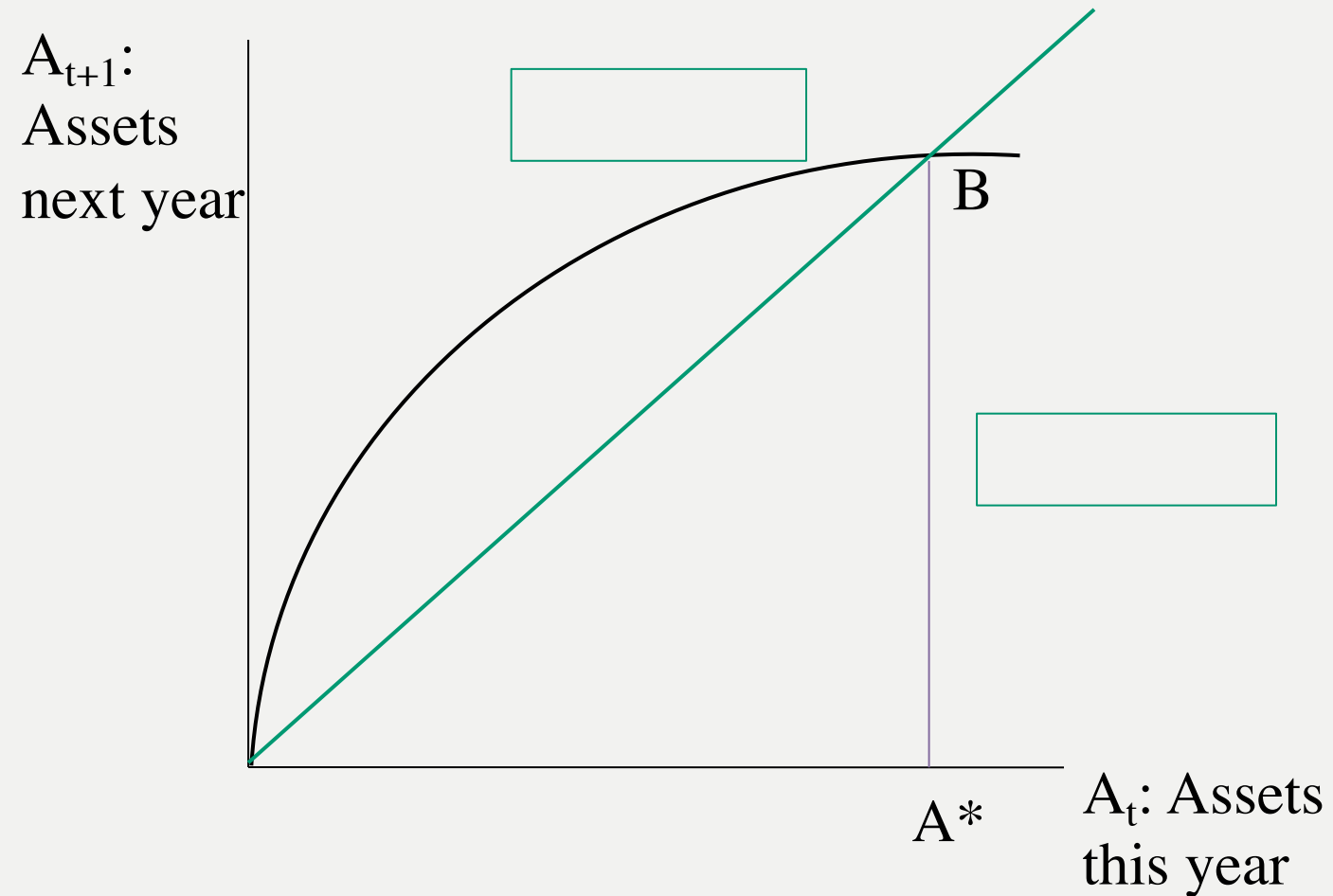


A_t : Assets
this year

Convex Asset Growth Curve

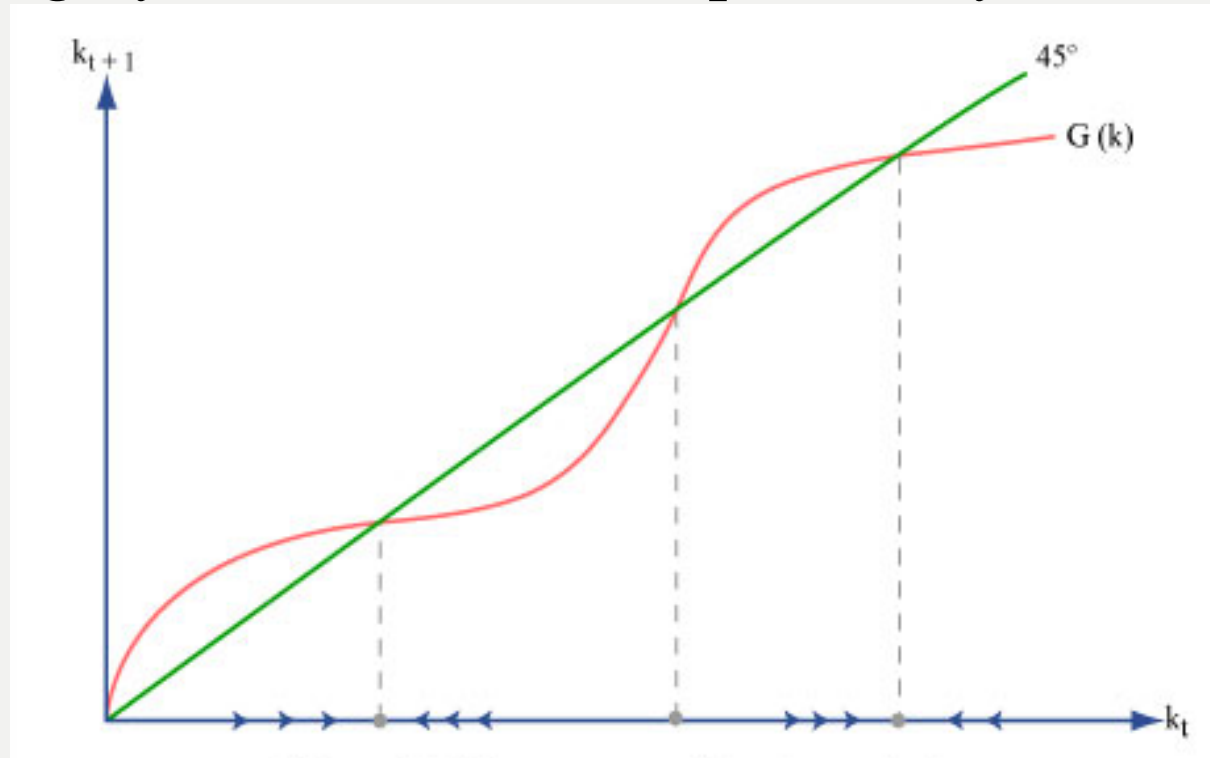


Convex Asset Growth Curve with Steady-state at B



Non-Convex Asset Dynamics

- *What is poverty trap ?*
Any self-reinforcing mechanism that causes poverty to persist (Azariadis & Stachurski, 2005)
- Well being dynamics with multiple steady states



4th generation: Poverty Traps and the Dynamic Asset Poverty Threshold

- Some mechanisms can create _____ to asset at the individual level.
- When returns are locally increasing, there will be a _____ relation between wealth (level of assets) and the marginal returns to assets.
- At the microeconomic or household level, a positive relationship between wealth and marginal returns can exist for at least three reasons:

Micro-foundations of an asset-based poverty trap

- Income process (production function) exhibits increasing returns to scale over a range either because the primal technology exhibits locally increasing returns or because **input** (output) prices, or transactions costs are **negatively** (positively) related to scale over some significant range;

Micro-foundations of an asset-based poverty trap

- Insurance and financial market imperfections and risk aversion lead poor households to choose **low return / low risk** income strategies, and to allocate assets to reduce risk exposure.

Micro-foundations of an asset-based poverty trap

- **Fixed capital requirement** / minimum project size required to make use of a higher return technology. The production function available to households is non-convex, hence making the frontier of production functions to be non-convex.

Micro-foundations of an asset-based poverty trap

- Consider the last reason
- Consider the case where a household can allocate its productive wealth to two distinct productive activities, L_1 and L_2 .
- Both activities exhibit diminishing returns to wealth.
- However, activity L_2 has a minimum scale of operation due to sunk costs of operation or of switching into L_2 .
- L_2 generates no returns if the wealth dedicated to this activity is below the minimum level

For a given set
of intrinsic
characteristics
(individual time
preferences,
technical efficiency
or skill,
and so forth).

Utility/Income

L2

L1

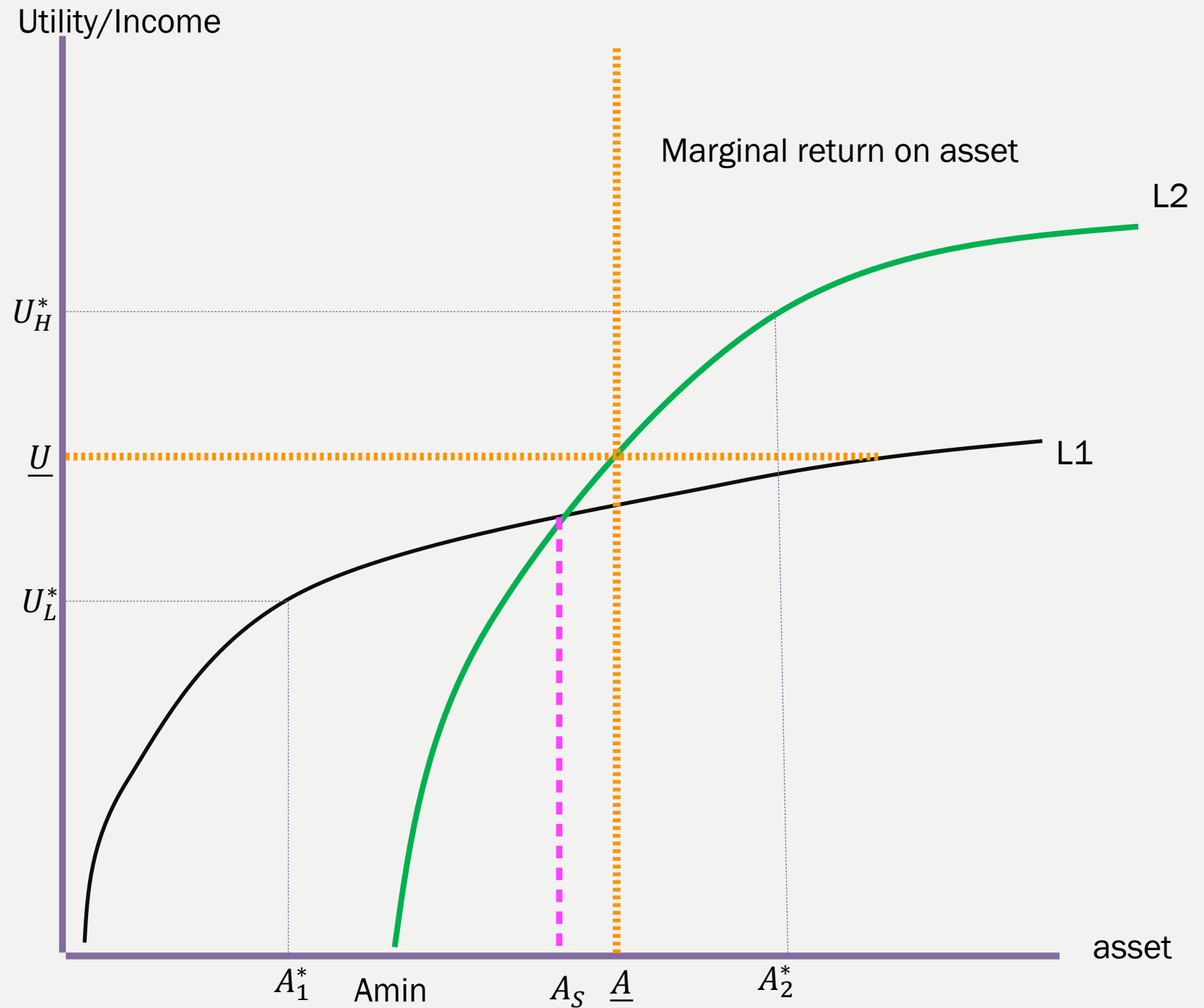
asset

Amin



The value A_1^* denotes the steady state value for a household restricted to livelihood activity L1, yielding income or material well-being level U_L^* .

The value A_2^* denotes the same thing for L2, yielding the higher level steady state income, U_H^*



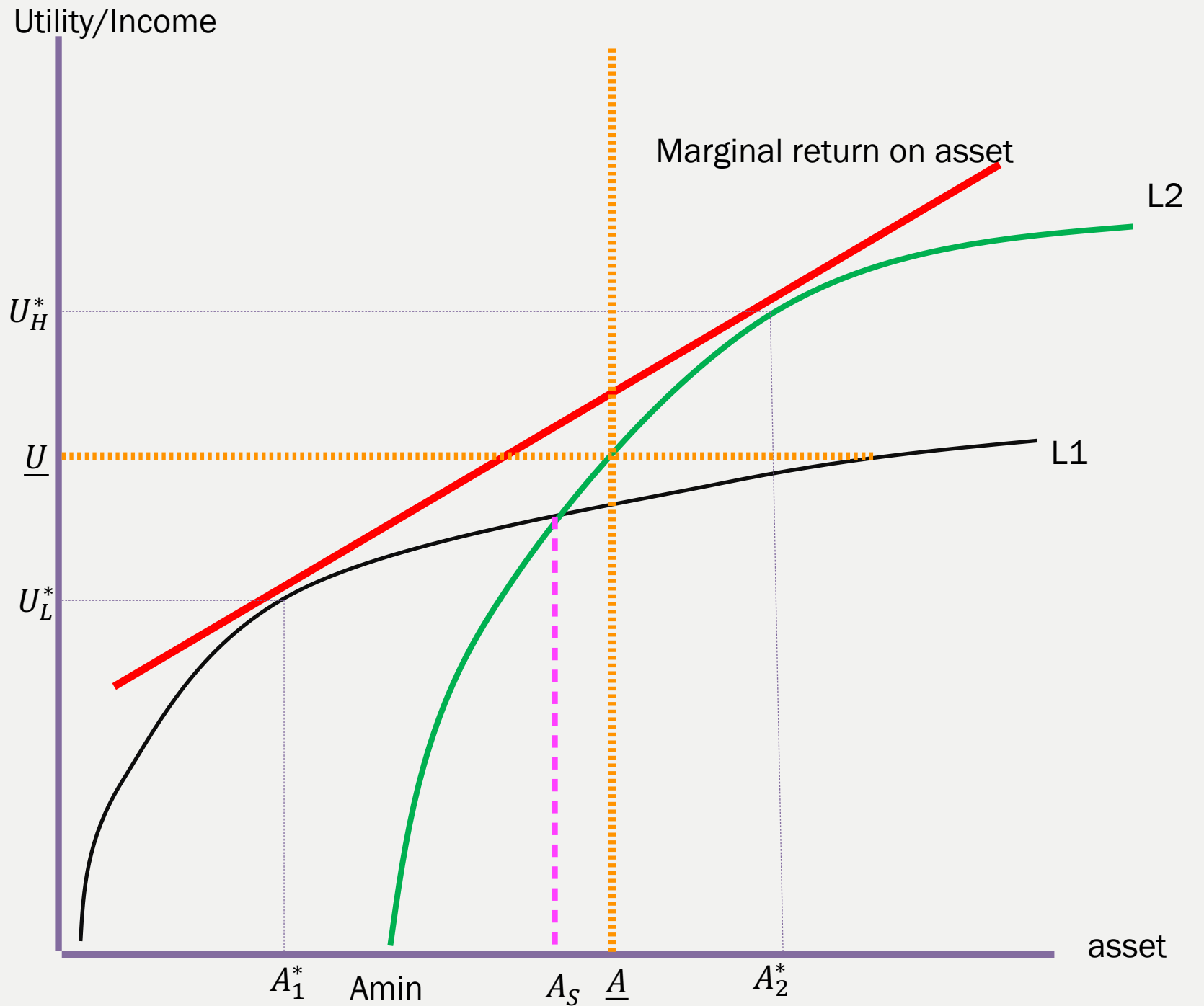
Micro-foundations of an asset-based poverty trap: examples

- Households possessing more assets adopt higher return crop varieties or agronomic practices.
- Wealthier households get skilled salaried employment rather than unskilled casual wage labor.
- Households change from poultry, small ruminants, indigenous cattle to improved dairy cattle and advanced animal husbandry practices.

Can household/individual
accumulate asset until A_S ?

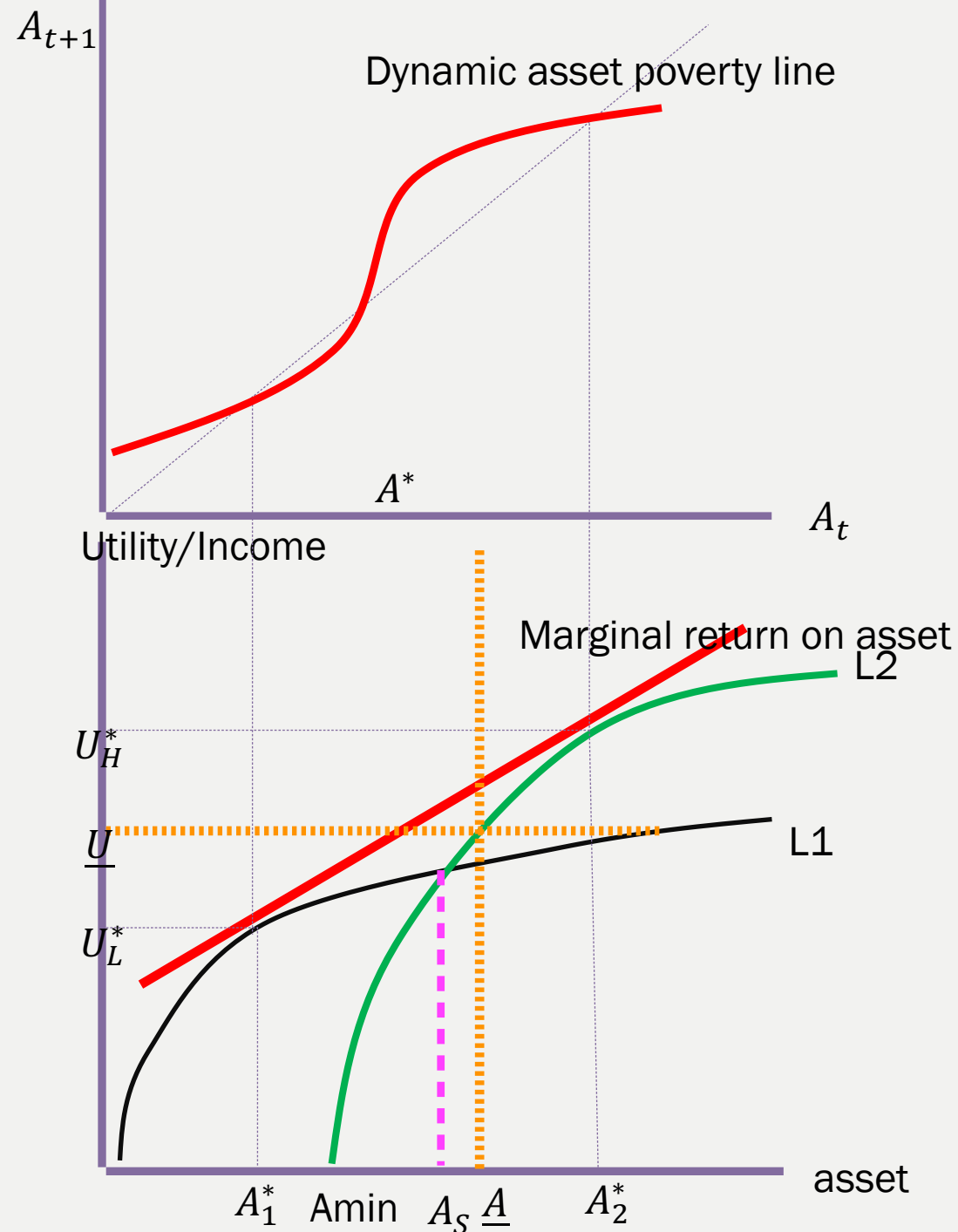
The household's first
best option would be to
borrow sufficient funds
so that it could leap
forward to a higher
return asset level.

Can household pull
through autarchic
savings strategy?



Dynamic asset poverty line(a Micawber threshold) is the critical asset threshold below which it is no longer rational or feasible to pursue the autarchic accumulation strategy.

Households whose assets place them above that threshold would be expected to escape poverty over time, while those below would not. One needs to identify this dynamic asset poverty threshold in order to disaggregate the structurally poor into those expected to escape poverty on their own over time through predictable asset accumulation and those expected to be trapped in poverty indefinitely.



A mathematical model for poverty trap from “Poverty Traps and Social Protection” by Barret, Carter, and Ikegami(2008)

- ① Heterogeneity in skills & abilities (α_i) that is unrelated to risk aversion
- ② Fixed costs barriers to moving ahead

$$f(\alpha_i, k_{it}) = \begin{cases} f_L(\alpha_i, k_{it}) = \alpha_i k_{it}^{\gamma_L} & \text{under the low technology} \\ f_H(\alpha_i, k_{it}) = \alpha_i k_{it}^{\gamma_H} - E & \text{under the high technology} \end{cases}$$

- ③ Borrowing constraints (autarchic accumulation if move ahead)

$$c_{jt} \leq [f(\alpha_j, k_{jt}) + (1 - \delta)\theta_t k_{jt}]$$

$$i_{jt} = f(\alpha_j, k_{jt}) - c_{jt}$$

- ④ Negative asset shocks, but no insurance (formal or informal)

$$k_{it+1} = \theta_t [i_t + (1 - \delta)k_{it}],$$

Dynamic choice problem

$$\begin{aligned} & \max_{\vec{c}, \vec{i}} E_{\tau} \sum_{t=\tau}^{\infty} \beta^{t-\tau} u(c_t) \\ \text{s.t. } & c_t \leq [f(\alpha, k_t) + (1 - \delta)\theta_t k_t] \\ & i_t = f(\alpha, k_t) - c_t \\ & k_{t+1} = \theta_t [i_t + (1 - \delta)k_t] \\ & k_{\tau} \text{ given} \end{aligned}$$

Multiple equilibria poverty trap

- A story when there are multiple steady states and thresholds in asset level at which initial condition in asset or shocks matters in determining which steady state households are going to converge to.

Poverty traps: various mechanisms



Non-convex livelihood functions/production functions



Coordination failures / multiple market failures that underlie “Big push” theories of development



Hunger- or nutrition-based poverty traps



Occupational poverty traps where lumpy investments + borrowing constraints prevent some household-based businesses from growing beyond subsistence.



When network is formed through indirect means such as occupation and education.



Poverty perpetuates itself by aggravating self-control problem.

Empirical Strategies to Identify Poverty Dynamics and Critical Asset Thresholds

- Estimation of the asset dynamics to test for the existence of a **dynamic asset poverty threshold** confronts basic problems.
- The relationship is potentially highly **non-linear**,
- The dynamic asset poverty threshold is an **unstable** equilibrium, away from which households move over time. This means that we would expect few observations in the neighbourhood of the threshold itself in any data set and an unstable equilibrium can easily be mistaken for heteroskedastic errors.
- Most households possess a portfolio comprised of multiple assets. Estimation of asset dynamics must somehow deal with this **dimensionality problem**.

Micro evidence

“Welfare dynamics in Rural Kenya and Madagascar”

Barrett et al. (2006)

Journal of Development Studies

Empirical test of the model from Carter and Barrett

- Panel data sets from Kenya and Madagascar
- Sample stratified on market access and agro-ecology
- 301 households in total
- Panel length varies from 1989-2002 to 2000-2002

RESEARCH SITES



Kenya



- 1 = Madzuu (Vihiga)
- 2 = Ng'ambo (Baringo)
- 3 = Dirib Gombo (Marsabit)

Madagascar



- 4 = Fianarantsoa
- 5 = Vakinankaratra

Figure 1. Survey sites in rural Kenya and Madagascar

Dynamic income-based poverty

Table 1. Ultra-poverty transition matrices
As measured against \$0.50/day per capita real income ultra-poverty line

	Poor in subsequent period		Non-poor in subsequent period	
Poor in initial period	2000–2002 Dirib Gombo 100.0%	1989–2002 Madzuu 60.7%	2000–2002 Dirib Gombo 0.0%	1989–2002 Madzuu 20.2%
	<u>70.8%</u>	1997–2002 Fianarantsoa 82.8%	<u>11.2%</u>	1997–2002 Fianarantsoa 10.3%
	2000–2002 Ng'ambo 86.5%	1997–2002 Vakinankaratra 58.5%	2000–2002 Ng'ambo 9.0%	1997–2002 Vakinankaratra 7.4%
Non-poor in initial period	2000–2002 Dirib Gombo 0.0%	1989–2002 Madzuu 10.1%	2000–2002 Dirib Gombo 0.0%	1989–2002 Madzuu 9.0%
	<u>11.3%</u>	1997–2002 Fianarantsoa 6.9%	<u>6.8%</u>	1997–2002 Fianarantsoa 0.0%
	2000–2002 Ng'ambo 0.0%	1997–2002 Vakinankaratra 22.3%	2000–2002 Ng'ambo 4.5%	1997–2002 Vakinankaratra 11.7%

There exists one unstable dynamic equilibrium between these two stable dynamic equilibria.

This nonparametric regression suggests that household-level herd dynamics bifurcate at 5–6 TLU per capita.

Above that level, the herd size naturally grows toward the higher equilibrium of 10 TLU per capita.

But below the unstable equilibrium, household herd sizes tend to collapse toward the low-level equilibrium of less than one TLU per capita.

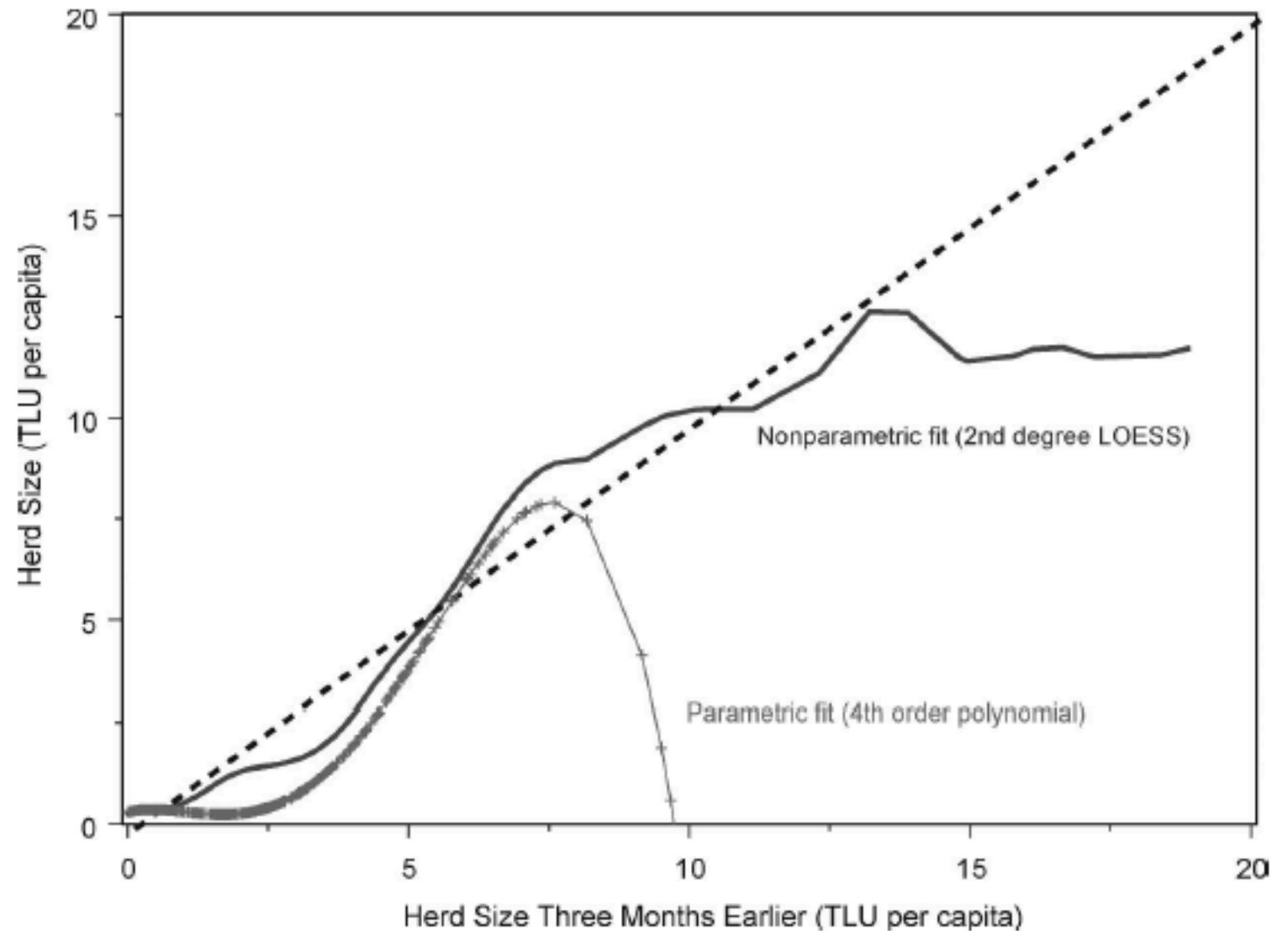


Figure 3. Herd dynamics in Northern Kenya

The TLU represents a standardised measure of metabolic liveweight in animals, enabling aggregation across species according to the formula 1 TLU=1 cattle.0.7 camels.10 goats.11 sheep

Testable asset dynamics (parametric)

$$A_{i,t} = \beta_0 + \beta_1 A_{i,t-1} + \beta_2 A_{i,t-1}^2 + \beta_3 A_{i,t-1}^3 + \beta_4 A_{i,t-1}^4 + \gamma_1 Z_{i,t} + \gamma_2 Z_{i,t} A_{i,t-1} + T_t + \alpha_i + \varepsilon_{i,t}$$

Micro evidence

“Stochastic wealth dynamics and risk management
among a poor population”

Lybbert et al. (2004)

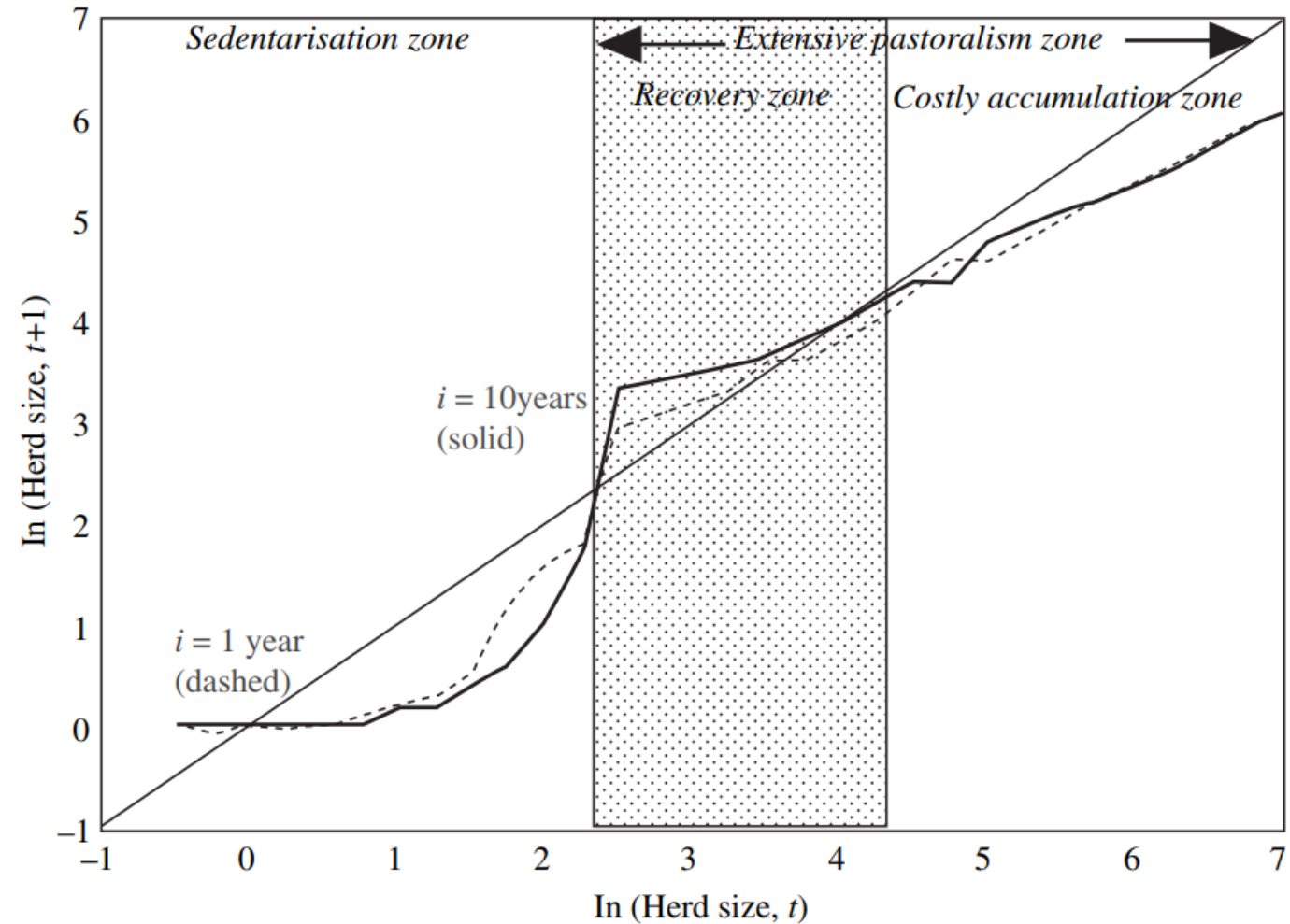
Economic Journal

17-year panel in southern Ethiopia

Major productive asset is livestock.

Livestock dynamics was estimated using a non-parametric kernel estimator.

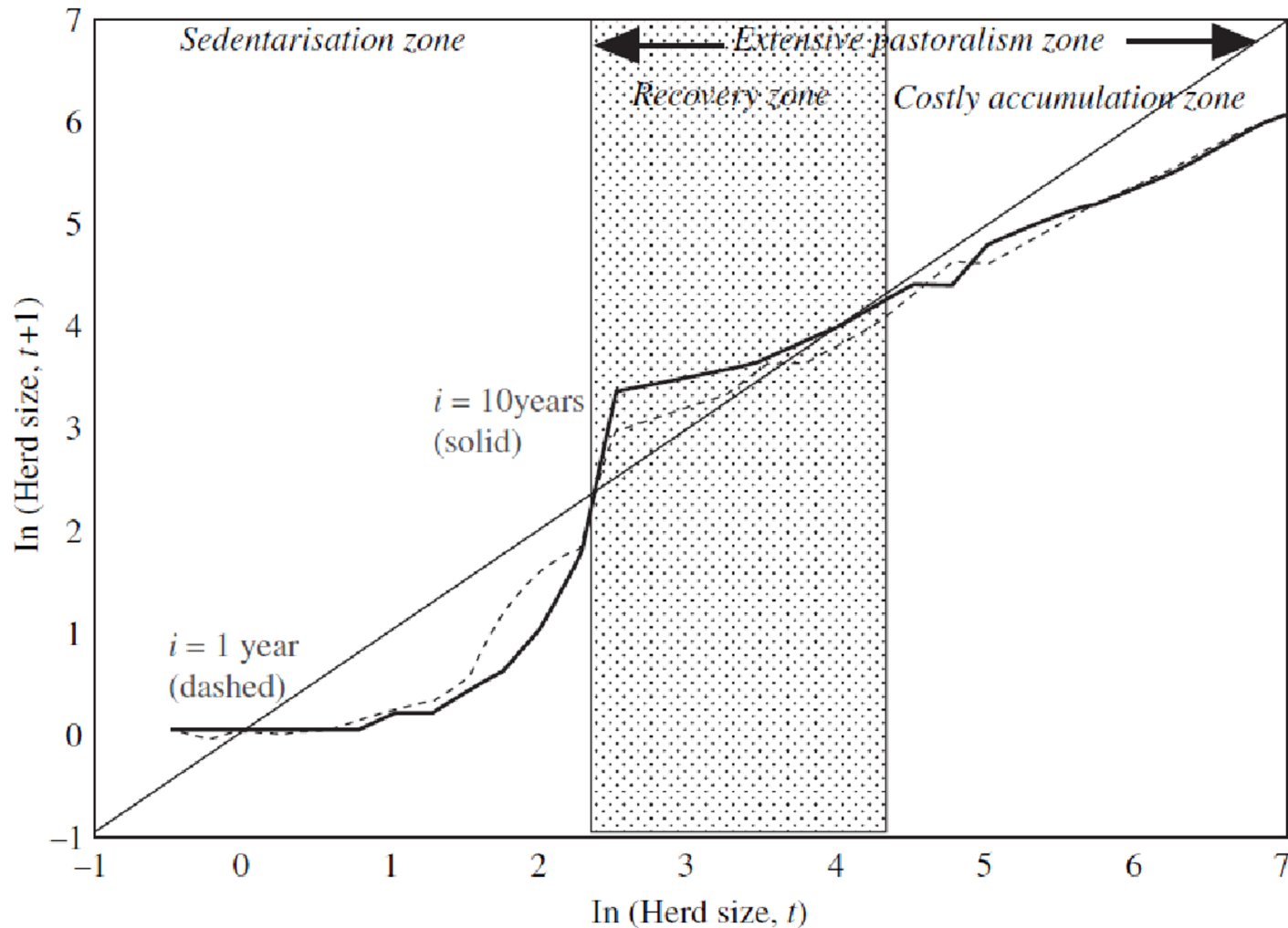
This estimator is sufficiently flexible to capture high-order non-linearities.



Nadaraya-Watson estimates using Epanechnikov kernel with bandwidth ($h = 1.5$)

Fig. 4. *Nonparametric Estimates of Expected Herd Size Transition Functions*

Meet the Borana Pastoralists of East Africa: 90%+ of their wealth is their livestock



Increasing the mobility of people and resources often enhances opportunities

[“Development on a Bike” TEDx Davis](#)

Thoughts on poverty trap

- These are some of the strongest positive findings of poverty traps
- Jalan and Ravallion (2002 JAE) find evidence of geographic poverty traps in a different setting (rural China)
- At least one systematic review is more skeptical of multiple equilibrium models of poverty traps (Kraay and McKenzie 2014).
- This is an area ripe for more work using theory and thoughtful analysis of existing data

Do Poverty Traps Exist? Assessing the Evidence[†]

Aart Kraay and David McKenzie

In 1960, per capita incomes in Burundi, Haiti, and Nicaragua were \$347, \$1,512, and \$2,491, respectively. Despite the sevenfold difference in incomes between Nicaragua and Burundi, all three countries were poor by developed-country standards. Nicaragua's per capita income was just 16 percent of the level enjoyed by citizens of the United States at the time, while Burundi's income was a paltry 2 percent of US levels. Fifty years later in 2010, per capita incomes in these three countries were basically unchanged, at \$396, \$1,411, and \$2,289 respectively

- One should be skeptical of claims that microfinance will be the solution to poverty traps caused by the interaction of financial constraints and lumpy investment technologies or that there are many workers for whom receiving more calories will be the difference between them being stuck working at low productivity or not.

Recap

Three basic steps to measuring poverty

1. *Characterize “welfare,” typically as the value of consumption*
 2. *Determine what level of welfare (consumption) serves as a meaningful “poverty line”*
 3. *Compute the population measure of welfare relative to this line that is most useful*
- FGT family provides the basic menu of measures: $\{FGT_0, FGT_1, FGT_2\}$
 - These are static measures that give a ‘snap shot’ of poverty at a specific time
 - Important dimensions of poverty, however, play out over time
 - *A Transition matrix compares poverty status of HH at two points in time*
 - *With multiple time periods, we can see poverty as a ‘film’ – e.g., **Vulnerability***
Transitory, Chronic, Persistent poverty are each distinct experiences with different implication
 - *With poverty dynamics, poverty today can be determined partly by past poverty*
Like a poverty film with a narrative that explains how characters and circumstances evolve over time
A recursion function is a quantitative tool for describing this narrative