

# Wealth Analysis: Introduction to Household Portfolios

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VIIth Winter School on Inequality and Social Welfare  
Alba di Canazei, January 9-12, 2012

# Outline

- ▶ Concept of wealth-why important?
- ▶ Research topics
  - ▶ Portfolio selection (overall, housing)
  - ▶ Other topics
  - ▶ Poverty and distribution
- ▶ Data sources

## What is wealth?

- ▶ Income is a flow of resources in a current period  $t$
- ▶ Wealth is a stock of resources  $W_t = (1 + r)W_{t-1} + (Y_t - C_t)$
- ▶ Wealth is central to a households economic security.
- ▶ Assets can be used to pay for education, to buy a house, to maintain a decent standard of living after retirement.

## Importance of Wealth

Source of power

Can be used at times of economic hardship to smooth consumption

Alternative source of funding during retirement

Can generate current services such as accommodation

Contribute income (rent, interest and dividends)

Provide collateral when credit is required

Can satisfy motivations to leave a bequest

## Main components of household's wealth portfolio (net worth)

Wealth=Assets-Liabilities

Assets=Financial Assets+Non-Financial Assets

Non-Financial Assets= Main Residence +Investment Real Estate+Unincorporated Businesses+Durable Goods+Collectibles

Financial Assets= Deposit Accounts+Savings Accounts+Shares+Bonds+Investment Funds+ Life Insurance+Pension Funds+Other financial Assets

Liabilities=Mortgages+Business loans+Vehicle loans+Education loans+Other liabilities

# Household portfolios

Figure: Portfolio composition (percentage share of total assets)

Wealth components	Canada	Finland	Germany	Italy	Sweden	UK	US P	US S
<b>Non-financial assets</b>	<b>78</b>	<b>84</b>	<b>87</b>	<b>85</b>	<b>72</b>	<b>83</b>	<b>67</b>	<b>62</b>
Principal residence	64	64	65	68	61	74	52	45
Real estates	13	20	22	17	11	9	14	17
<b>Financial assets</b>	<b>22</b>	<b>16</b>	<b>13</b>	<b>15</b>	<b>28</b>	<b>17</b>	<b>33</b>	<b>38</b>
Deposit accounts	9	10	n.a.	8	11	9	10	10
Bonds	1	0	n.a.	3	2	n.a.	n.a.	4
Stocks	7	6	n.a.	1	6	n.a.	23	15
Mutual funds	5	1	n.a.	3	9	n.a.	n.a.	9
<b>Total assets</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Total debt</b>	<b>26</b>	<b>16</b>	<b>23</b>	<b>4</b>	<b>35</b>	<b>21</b>	<b>22</b>	<b>21</b>
of which: Home secured	22	11	19	2	n.a.	18	n.a.	18
<b>Total net worth</b>	<b>74</b>	<b>84</b>	<b>77</b>	<b>96</b>	<b>65</b>	<b>79</b>	<b>78</b>	<b>79</b>

## Household Portfolios

Some background information:

- ▶ 1990s financial markets move toward greater international integration, coordination, liberalization and product innovation
- ▶ changing portfolio behavior of people: (stockholder base expands, growth in mutual fund participation)
- ▶ increasing importance of private pension funds
- ▶ More data becomes available on portfolio composition, attitudes toward savings, borrowing, risk taking and liquidity through household surveys fueling new frontiers of research

## Household portfolios

### Questions to be answered

- ▶ *How is financial wealth accumulated over the life-cycle?*
- ▶ How do households decide whether to invest in risky assets?  
Why so many do not have direct holdings of risky assets?
- ▶ How do households allocate their wealth across asset categories? Are shares chosen consistently with the participation decision?

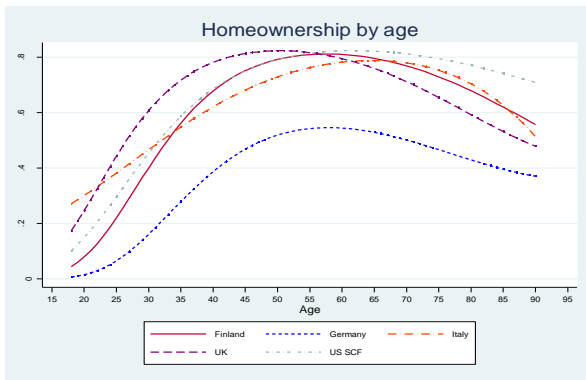


## Accumulation over the life-cycle

This has been widely examined

- ▶ consists of plotting age profiles of some measure (mean, percentile) of wealth or participation.
- ▶ Biggest issue: identification of cohort effects and correction for nonrandom attrition (differential mortality by wealth)

# Accumulation over the life-cycle



## Accumulation over the life-cycle

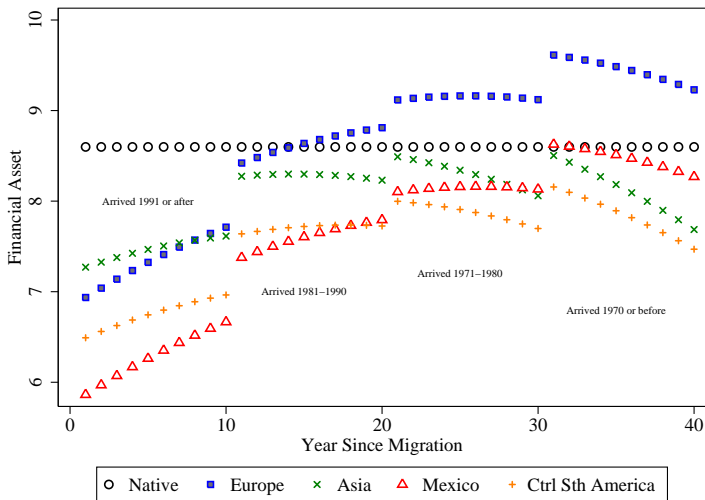
cross-sectional wealth age profile gives a misleading picture of age profiles (Shorrocks (1975))

- ▶ if earlier generations are lifetime poorer, their wealth holdings will be lower than the wealth holdings of later generations (false impression of decumulation)
- ▶ if there is differential mortality by wealth (wealthy live longer) then the average wealth of survivors may increase with time even if each surviving individual is decumulating (false evidence against decumulation)

Solution: pooling cross-sections over a long-time period (Deaton and Paxson 1994) and producing wealth-age profiles for year of birth cohorts.

Solution to the latter is more complex: needs assumptions regarding the relation between mortality and wealth.

## Household portfolios



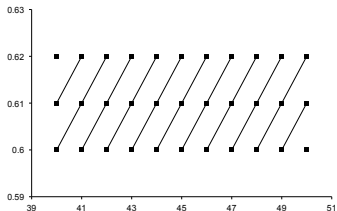
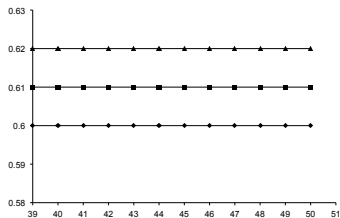
## Example: Ameriks and Zeldes 2004

Let's look at a hypothetical example. Information is collected on asset allocation of households over time.

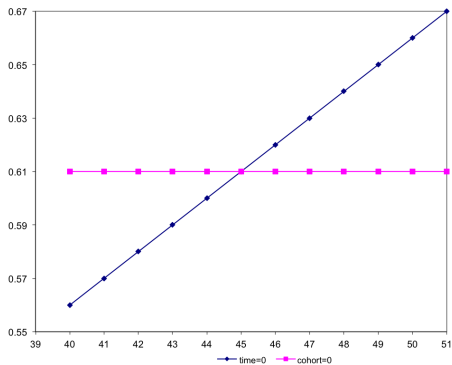
We show the difficulty in identifying age, birth and cohort effects.

- ▶  $a_{it} = t - b_i$
- ▶ We have the same data (asset information by age for  $t$ ,  $t + 1$  and  $t + 2$ ), but make different assumptions.

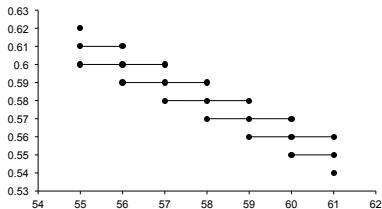
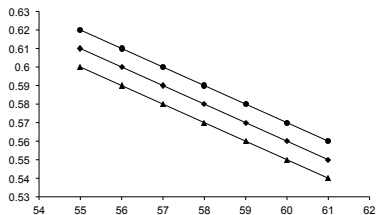
## ex. 1. Cross-section vs. cohort view



## ex. 1. Predicted shares and age effects

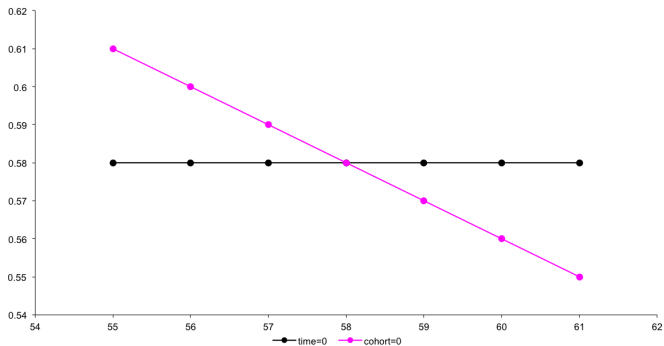


## ex. 2. Cross-section vs. cohort view

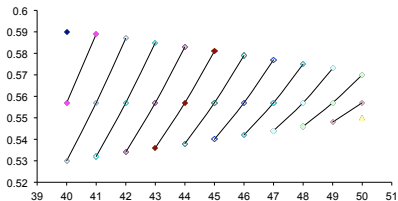
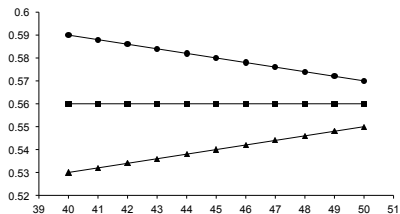




## ex. 2. Predicted shares and age effects



## ex. 3. Cross-section vs. cohort view



## Solution

- ▶ Impose additional identifying restrictions
- ▶ generate a set of parametric restriction on age, time and/ or cohort effects
- ▶ use criterion of parsimony-simpler specifications are better e.g. explanation based on cohort effects is more parsimonious than a combination of time and age effects
- ▶ In portfolio choice theory:
  - ▶ time effects exist if hhlds perceive changes over time in risks
  - ▶ age effects exist if older hhlds have shorter investment horizons than younger ones (or less human wealth)
  - ▶ cohort effects caused by different labor market experiences (unlikely)
- ▶ Assumption: cohort effects=0 (Campbell (2006) and others)

## Household portfolios

### Questions to be answered

- ▶ How is financial wealth accumulated over the life-cycle?
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Why so many do not have direct holdings of risky assets?*
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## Investing in risky assets

- ▶ Need theory why participation in risky assets are limited (e.g. transaction costs, informational barriers)
- ▶ Econometrically: since large number of hhlds do not invest use tobit, censored quantile regressions

## Household portfolios

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## Household allocation of assets

- ▶ Preliminary findings with LWS (descriptive and initial institutional context)
- ▶ Estimation strategy
- ▶ Summarize findings on the determinants of portfolio allocation
- ▶ Selected studies explaining differences in portfolio choice across countries

## Household portfolios

Figure: Asset participation

Wealth components	Austria	Canada	Cyprus	Finland	Germany (Italy)	Norway	Sweden	United Kingdom	United States P	United States S	
	2004	1999	2002	1998	2002	2002	2002	2002	2000	2001	2001
Non-financial assets	-	64	76	68	43	72	72	57	70	65	70
Principal residence	56	60	74	64	39	69	64	53	69	64	68
Investment real estate	-	16	17	27	13	22	30	14	8	-	17
Financial assets	99	90	86	92	50	81	99	79	80	83	91
Deposit accounts	99	88	78	91	-	81	99	59	76	82	91
Bonds	11	14	44	3	-	14	-	16	-	-	19
Stocks	16	11	40	33	-	10	22	36	-	30	21
Mutual Funds	11	14	1	3	-	13	38	58	-	-	18
Debt	39	68	65	52	30	22	80	70	59	68	75
Home secured debt	28	41	-	28	-	10	-	-	39	-	46



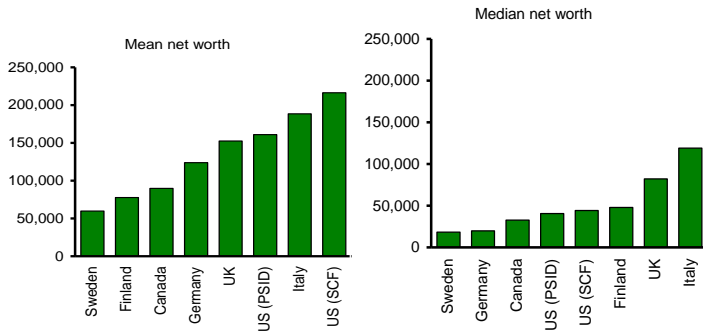
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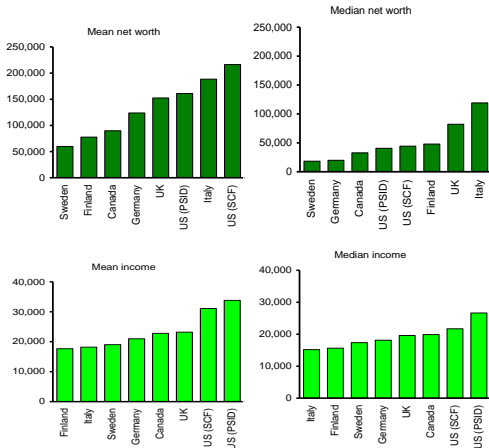
# Household portfolios

Figure: Wealth levels



# Household portfolios

Figure: Wealth and income levels



## Estimation of household portfolios

There are two decisions that need to be modeled:

- ▶ participation decision (probability of holding)
- ▶ share decision (in total or financial wealth)

## Participation decision

Let's assume we don't observe the level, but can only study ownership probability  $P(d_{it} = 1)$

$$d_{it} = \begin{cases} 1 & \text{if } w_{it}^* > 0; \\ 0 & \text{if } w_{it}^* \leq 0. \end{cases}$$

Assume ownership is independent over time then

- ▶ (1)  $P(d_{i1} \dots d_{iT}) = \prod_{t=1}^T P(d_{it})$  and can use standard cross-section discrete models, where number of observations = NT and not N.
- ▶ (2)  $P(d_{it} = 1 | d_{it-1} = 1) = P(d_{it} = 1)$  implied by the independence assumption

This may fail because households are characterized by unobserved variables for example, those that affect their risk aversion & state dependence.

Assume level/share of assets  $w_{it}^*$  is a linear function of strictly exogenous variables  $x_{it}$

$$w_{it}^* = \beta' x_{it} + \gamma w_{it-1} + \epsilon_{it}$$

$w_{it-1}$  - actual ownership at time  $t - 1$

Then  $\gamma = 0$  assume no state dependence

Let's introduce individual heterogeneity  $\epsilon_{it} = \alpha_i + u_{it}$

- ▶ If  $x_{it}$  exogenous wrt  $\alpha_i$  then the cross-sectional estimates of  $\beta$  give the partial effect of a change in  $x$
- ▶ If individual heterogeneity correlates with  $x_{it}$  at any point in time then the c-s estimates give the total effect of a change in  $x$

- ▶ If we assume  $u_{it}$  are serially independent then there is no true state dependence (static model)
- ▶ If  $u_{it}$  are serially correlated or there is true state dependence we use a dynamic model

Now assume information on the level/share  $w_{it}^*$  is available

- ▶  $w_{it} = w_{it}^*$  is not observed across all hhlds
- ▶ participation is correlated with the level of assets
- ▶ So if we want to make inference on the distribution of assets ( $f(w_{it}^*)$ ) we need to take into account the conditional distribution ( $f(w_{it}^* | d_{it} = 1)$ )



- Let's assume fixed participation costs  $c$ . Then we observe  $w_{it}^*$  if  $w_{it}^* > c$  and  $(f(w_{it}^* | d_{it} = 1)) = \frac{f(w_i^* t)}{P(w_i^* t > c)}$ 
  - ▶ if data only on owners (bank data) use truncated models
  - ▶ If data on owners and non-owners -> censored regression models
- Non-participation could be a problem of lack of information, for example, or some other characteristic then we model as a sample selection model

$$w_{it} = \begin{cases} w_{it}^* & \text{if } d_{it} = 1; \\ \text{unobserved} & \text{otherwise} \end{cases}$$

$$d_{it} = \delta' z_{it} + v_i$$

$$w_{it}^* = \beta' x_{it} + \epsilon_{it}$$

## Results: determinants of portfolio allocation

	Ownership				Shares			
	Risky Assets		Financial	Total Assets	Risky Assets		Financial	Total Assets
	Italy	Germany	US	US	Italy	Germany	US	US
Age	+	-	+	+	+	-	-	
Age2	-	+	-	-	-	+	+	
Female head			+	-			-	-
Male	+				+			
Married	-	+	+	+	-	-	-	-
Education	+	+	+	+	+	-	+	-
DPI	+	+	+	+	+	+	-	-
DPI2	-	-			-			
Fin wealth	+				+			
Fin wealth2	-				-			
wealth		+	+	+		+	+	+
wealth2		-						
Family size	-	+			-	-		
No. child	+	-			+			

Source: Guiso, Haliassos, Jappelli 2001

## Summary: determinants of portfolio allocation

	Participation	Shares
Age	(+)	(-)
Age2	(-)	
Married	(+) not in Italy	(-)
Education	(+)	(+) in It and US (RA)
DPI	(+)	(+) in IT and GE and (-) in US
DPI2	(-)	
wealth	(+)	
wealth2	(-)	
Family size	(-) in IT (+) in GE	(-)

## Explaining cross-national differences in portfolio choice

The availability of data allowed for cross-national comparisons. Next step, explain observed differences. (eg. low debt in Italy, high share in mutual funds in Sweden)

- ▶ cultural differences (household structure Bover 2010, gender equality Badunenko et al 2010)
- ▶ institutional differences (Christelis et al 2012, Guiso, Haliassos, Jappelli 2002)

## Explaining cross-national differences: household structure

Bover 2010 studies link between culturally inherited hhld structure and wealth distribution by estimating various counterfactual distributions for the US and Spain

- ▶ lower part of the distribution: explains most of the differences
- ▶ differences driven by: older couples and very young single women and couples
- ▶ top of the distribution: if US has Spanish hhld structure US would be more wealthy

## Explaining cross-national differences in portfolio choice

- ▶ Badunenko et al 2010 find only gender differences in portfolio allocation of risky assets in countries with high gender inequality (e.g. Italy)
- ▶ Other studies focus more in institutions

## Explaining cross-national differences in portfolio choice

Christelis et al 2011 forthcoming in Restat

- ▶ Decompose the decision to participate in a given asset into the covariate and coefficient effect
- ▶ try to explain differences in participation and levels by institutions
- ▶ US households have greater participation probabilities than their European counterparts
- ▶ At comparable distribution points: European investors invest smaller amounts in stocks and private businesses and larger amounts in the primary residence than US households
- ▶ A larger share of US elderly have mortgages
- ▶ Europeans substitute homeownership for stock investment.

## Christelis et al 2011

### Technical details

- ▶ do not control for selection
- ▶ chose a base country and look at the deviation or participation probs of others
- ▶ regress probability differences on select economic indicators (n=14)
- ▶ data allows for a analysis on households 50 and over



## Guiso et al 2002

Examine whether differences in stockholding across Europe and the US can be attributed to household characteristics

- ▶ Differences in stockholding remain large even after controlling for demographic characteristics
- ▶ UK, US and Sweden-more participation; France Germany and Italy - less
- ▶ high correlation between participation education and wealth; not so with asset shares
- ▶ Investigation leads to participation costs as being consistent with observed pattern of stockholding (examine indicators of benefits and costs of stockholding, characteristics of mutual funds industry)

## Other examples of research topics in household portfolios

- ▶ Housing (Sedo and Kossoudji 2004) examine differences in homeownership, home value and home equity by gender, race and family type
- ▶ Wealth by family type (Yamakoski and Keister 2006, Sierminska et al 2011)
- ▶ Wealth and family events (marriage, divorce, childbearing) (Schmidt and Sevak 2006, Mohanty 2009)
- ▶ Asset gap (gender, race, immigrant status) (Cobb-Clark and Hildebrand 2006, Choe, Hildebrand and Sierminska 2012)
- ▶ Distribution of wealth within the household (Sierminska, Grabka and Frick 2010, Grabka, Marcus and Sierminska 2012)

## Research topics at the winter school

- ▶ poverty measurement-asset poverty
- ▶ wealth distribution
- ▶ wealth inequality

## Other research areas

- ▶ effect of wealth on consumption
- ▶ joint distribution of income and wealth
- ▶ household indebtedness
- ▶ retirement income, consumption and pensions reforms
- ▶ access to credit and credit constraints

## Data

- ▶ microdata: household surveys
- ▶ there are other type of wealth data: administrative: tax records
- ▶ institutional data important as results for one country cannot be easily generalized for other countries.

## microdata: household surveys

- ▶ country surveys for the whole population: Australia (HILDA), Canada (SCF), New Zealand, Germany (SOEP), Italy (SHIW) Spain, UK (BHPS, WAS Wealth and Asset Survey), US (SCF, PSID, SIPP)
- ▶ age specific survey: UK (ELSA) US (NLSY, HRS)
- ▶ ex-post harmonization: LWS
- ▶ ex-ante harmonization: SHARE (age 50+) EHFCS (ECB)

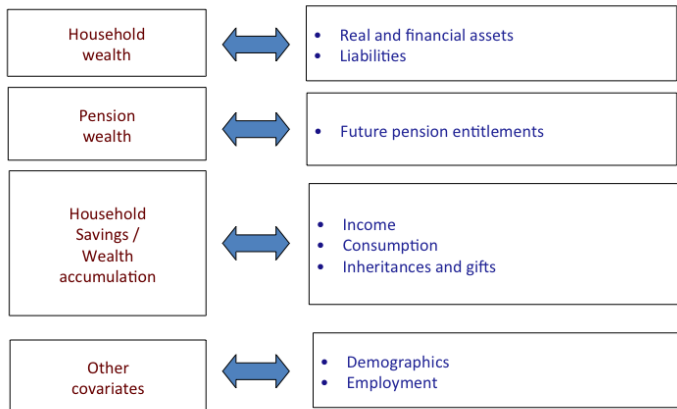
Check <http://www.ecineq.org> website under Data Sources

## European Household Finance and Consumption Survey (EHFCS)

- ECB coordinates / ensures common methodology:
  - Probability sampling
  - Multiple imputation
  - Re-weighting / calibration to external sources
  - Variance estimation/replicate weights
- Ex-ante commitment on output harmonisation (common definitions / output variables / blueprint questionnaire) → no precedent for wealth surveys!

HFCS *unique case*: joint data collection on euro area household income, consumption and wealth via a single survey tool

# European Household Finance and Consumption Survey (EHFCS)





## Other wealth data

- ▶ administrative data for countries that levy a wealth tax (e.g. Sweden till 2007, Norway)
- ▶ estate tax records -individual
- ▶ investment income method- from income tax returns

## Institutional data useful for wealth research

Use of various indicators to help explain cross-national differences. Indicators affecting housing, stock market participation, investment behavior

- ▶ stock market participation costs (Guiso et al 2002)
- ▶ stock market and housing price indices
- ▶ housing market indicators: Study on the Financial Integration of European Mortgage Markets Mercer Oliver Wyman (2003)
- ▶ Institutions that Build Economic Security and Asset Holdings Database (2008) (LIS/LWS)
  - ▶ Income-Related Institutions (pensions)
  - ▶ Wealth, Inheritance And Property (taxation)
  - ▶ Housing Policies And Practices (taxation, policies and institutions)
  - ▶ Health, Disability And Life Expectancy (long-term care and housing assistance)
  - ▶ Employment and Demographic Indicators
  - ▶ Macroeconomic Indicators

## Summary

- ▶ With the development of household surveys household portfolios continues to be a vibrant field of research
- ▶ The inclusion of wealth as an additional measure of economic well-being also continues to develop.
- ▶ Income captures current state of inequality, wealth has the potential for examining accumulated inequality (Headey 2008)

Thank you.