Wealth and Poverty Measures: the Bank of Italy's experience

C4D2 TRAINING
ROME | CENTER FOR DEVELOPMENT DATA

Designing Household Surveys to Measure Poverty

Perugia, Italy
November 2017

Outline of the presentation

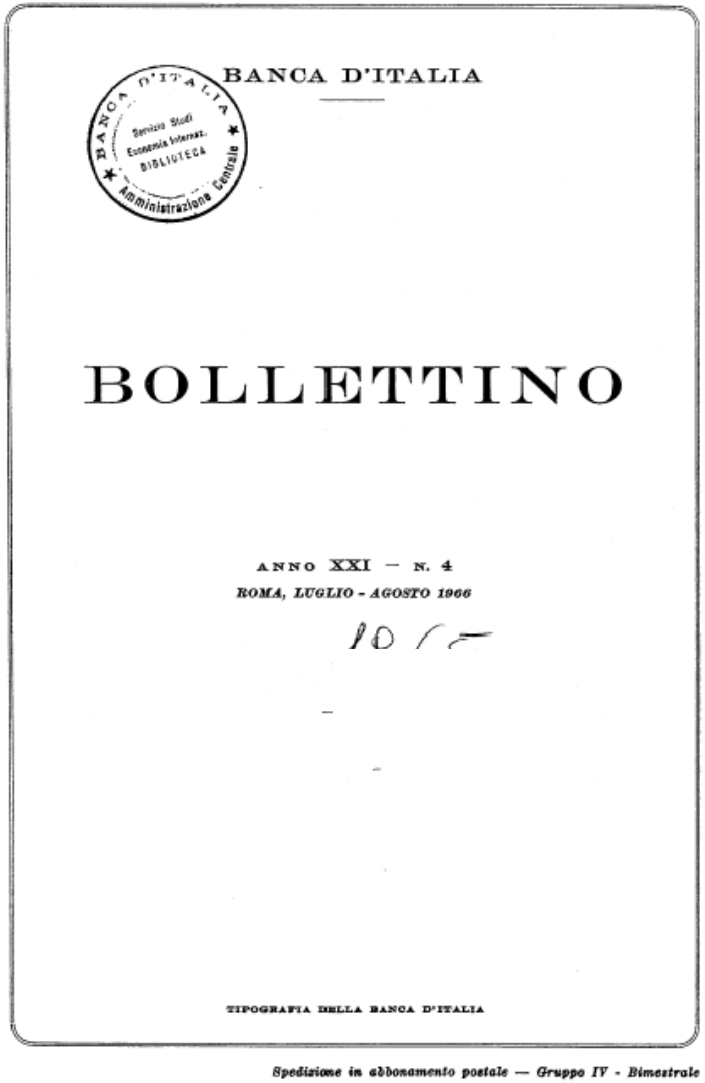
- Main characteristics of SHIW
- Definition and characteristics of net wealth
- Collecting data on net wealth
- Quality issues and measurement errors
- Descriptive results

- Wealth variations: definition and data collection issues
- Some results on wealth variations

The Survey on Household Income and Wealth (SHIW)

Main characteristics of the survey

- Since 1966 (yearly up to 1986; since 1987 every two years)
- Sample of 8.000 households (about 20.000 individuals)
- Face to face interview (use of CAPI)
- Micro data freely available on the Internet (data from 1977 on)



BANCA D'ITALIA

BOLLETTINO

ANNO XXI — N. 4

ROMA, LUGLIO - AGOSTO 1966

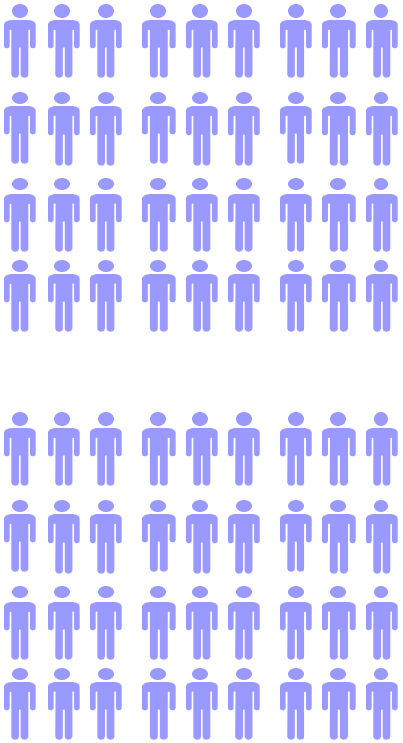
TIPOGRAFIA DELLA BANCA D'ITALIA

Spedizione in abbonamento postale — Gruppo IV - Bimestrale

The Survey on Household Income and Wealth (SHIW)

The sample design: a two-stage stratified sample

First stage: selection of 300 municipalities



Stratification by region and demographic size of municipalities

- Cities with more than 40.000 inhabitants are always selected
- Smaller cities are selected with a probability proportional to size

Second stage: selection of 8.000 households

(random sample from official registers of residents of the selected municipalities)

The Survey on Household Income and Wealth (SHIW)

The sample design: a two-stage stratified sample

Have all the units of the population the same probability to be extracted (as in SRS - Simple Random Sample)?

NO

Unbiased estimators are obtained by using weights

Weights are defined as the inverse of the probability of inclusion (the lower the probability to be selected, the higher the weight in the sample)

Design weights are adjusted (i.e. post-stratification) to take into account non-response and other external information (i.e. known margins)

The Survey on Household Income and Wealth (SHIW)

The sample design: a two-stage stratified sample

Is this sampling design efficient? (Standard errors of estimates obtained on such a sample are greater, equal or lower than those you had obtained on a simple random sample of the same size?) The answer is …

Stratification leads (almost always) to a gain (lower s. error)

NO

Two (or more) stages leads (almost always) to a loose (higher s. error)

Design effect index - Deff = $s.e_{DES}/s.e._{SRS}$ = around 1.5-2.0

So, if we loose efficiency, why do we use this design? personal interviews

Always use weights and take into account sampling design

The Survey on Household Income and Wealth (SHIW)

The panel

Until 1987 the survey was conducted with **time-independent samples** (cross sections) of households.

In order to facilitate the analysis of the evolution of phenomena over time, since 1989 part of the sample (40-50%) has comprised households interviewed in previous surveys (panel households)

Panel data allow:

- the analysis of **gross flows**
- **more efficient estimators of changes (and means)**
- **econometrics analysis** (unobservable variables)

The management of a panel can be **costly**. Moreover, the **attrition** may lead to biased estimates

The Survey on Household Income and Wealth (SHIW)

The panel: example of gross flows

Mobility of household among income classes, 1993-1995

	Income 1995					
Income 1993	1 quintile	2 quintile	3 quintile	4 quintile	5 quintile	Total
1 quintile	73.9	18.5	5.7	1.0	0.8	100.0
2 quintile	18.6	49.5	24.8	5.1	2.0	100.0
3 quintile	5.1	22.3	41.6	26.7	4.3	100.0
4 quintile	1.4	6.7	22.3	47.5	22.2	100.0
5 quintile	1.0	2.8	5.7	19.7	70.8	100.0
Total	20.0	20.0	20.0	20.0	20.0	100.0

The Survey on Household Income and Wealth (SHIW)

Panel data: efficiency of estimators

$$\sigma^2(Y_t - Y_{t-1}) = \sigma^2(Y_t) + \sigma^2(Y_{t-1}) - 2\,\rho\,\sigma(Y_t)\,\sigma(Y_{t-1})$$

Greater efficiency in estimating variations (depending on the correlation coefficient ρ)

As $\sigma^2(Y_t) = \sigma^2(Y_{t-1})$ approximately holds

Independent samples: $\sigma^2(Y_t - Y_{t-1}) = 2\,\sigma^2(Y_t)$

Panel samples: $\sigma^2(Y_t - Y_{t-1}) = 2\,\sigma^2(Y_t)\,(1-\rho)$

For household income and wealth, ρ = 0.6-0.8

The variance of a ratio between two variables has a similar structure

$$\sigma^2(\overline{Y}_t / \overline{Y}_{t+1}) = \frac{1}{Y_t^2}\left[\sigma^2(\overline{Y}_{t+1}) + R^2\sigma^2(\overline{Y}_t) - 2RCov(\overline{Y}_{t+1}, \overline{Y}_t)\right]$$

Also greater efficiency in estimating levels

The Survey on Household Income and Wealth (SHIW)

The questionnaire: permanent sections

A. **Structure of the household** at the end of the year (number of components, sex, age, education, place of birth,…)

B. **Employment and incomes** (job-status, hours at work, wages, incomes from self-employment, from pensions)

C. **Payment instruments** and forms of **saving** (current accounts, credit cards, financial assets ….)

D. **Principal residence and other property** (tenure, value, rent, owner, size, location, …)

E. Non durable and durable **consumer goods**

F. Forms of **insurance**

G. **Assessment of the interview** (to be provided by the interviewer)


I BILANCI DELLE FAMIGLIE ITALIANE NEL 2004

QUESTIONARIO CAPOFAMIGLIA

Variable sections: Inheritances, Capital Gains, Risk Aversion, Housework, Intergenerational Mobility, Use of Public Services, Social Capital, Tax Evasion, Income and Employment Expectations, Retirement Expectations, Financial Choices, New Technologies

The variable sections are sometimes submitted to random sub-samples (i.e. those born in a odd year answer to the section A while those born in a even year answer to the section B)

This technique is very useful to limit the respondent burden but provides data on smaller samples and does not allow for the joint use of the responses to the alternative sections A and B

The Survey on Household Income and Wealth (SHIW)

SHIW, HFCS, LIS and LWS

The Bank of Italy actively supports projects to improve the international comparability of survey data:

- Household Finance and Consumption Survey (HFCS) is a comparable framework of households surveys developed by most National Central Banks of the Euro Area and the Europeean Central Bank

- SHIW data are included in the LIS and LWS database. The LIS (Luxembourg Income Study) and the LWS (Luxembourg Wealth Study) are comparable datasets containing income and wealth variables to enable cross-country comparisons

Definition and characteristics of net wealth

What is wealth and why is it important?

Wealth is the whole amount of material and immaterial goods with a market value that can be changed against money or other goods

- *Savings (origin)* → ***Wealth*** → • *Consumption (destination)*
  → • *Capital income*

It is important to consider its …

- Amount (vulnerability, well-being, tax base, finance)
- Composition (preferences/effects of policies)
- Distribution (cohesion/opportunities)

Today even more (greater variability of income, population aging, immigration)

Definition and characteristics of net wealth

Wealth components

Net wealth = *Real assets + Financial assets - Financial liabilities*

Net wealth can be negative!

- **Real assets** (houses, other buildings, land, valuables)
- **Financial assets** (Deposits, bonds, shares)
- **Financial liabilities** (Mortgages and other bank debts, debts towards other families or companies)

- Components usually not included : public pension wealth, human capital)

- Private wealth and public debt

Definition and characteristics of net wealth

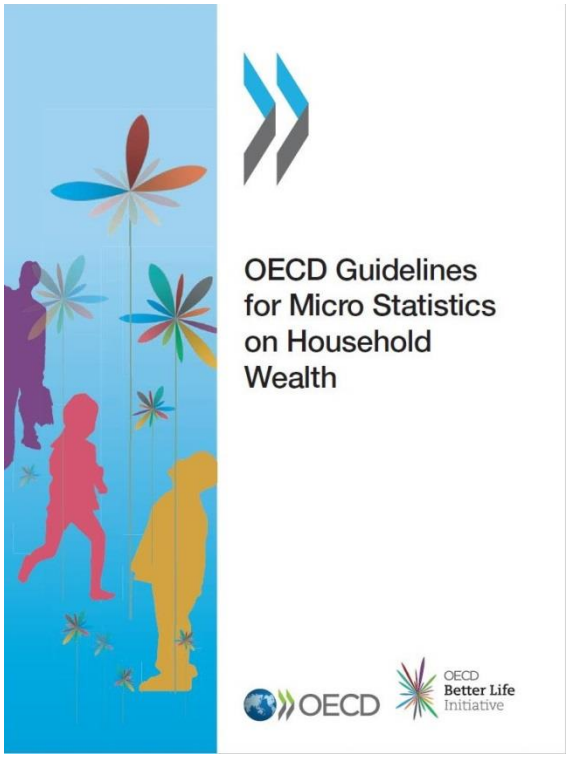
Consumer Durables (CD)

A CD (i.e. a car) is a good that may be used for purpose of consumption repeatedly over a period of 1 year or more (SNA)

SNA explicitly excluded CD from assets

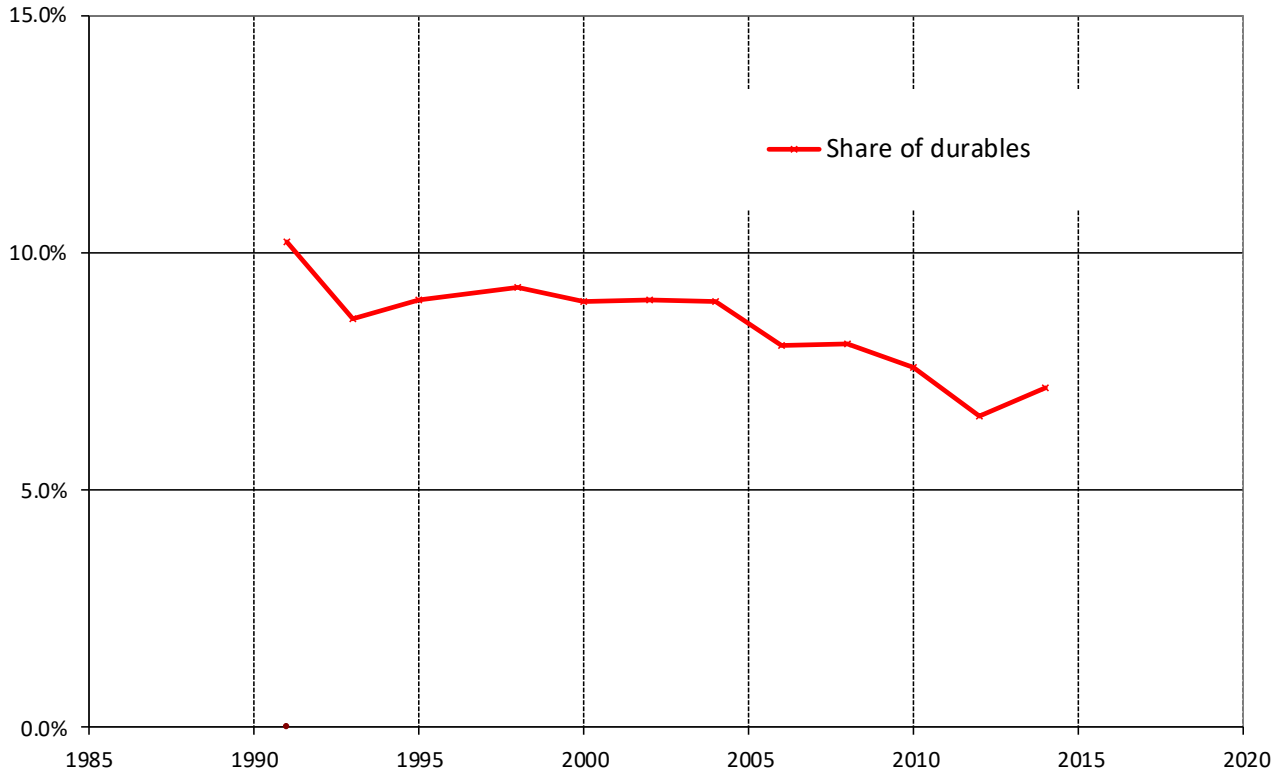
However OECD guidelines for microdata on wealth suggest to include CD in the wealth

Be consistent with other accounts (only depreciation should be included in consumption)



Definition and characteristics of net wealth

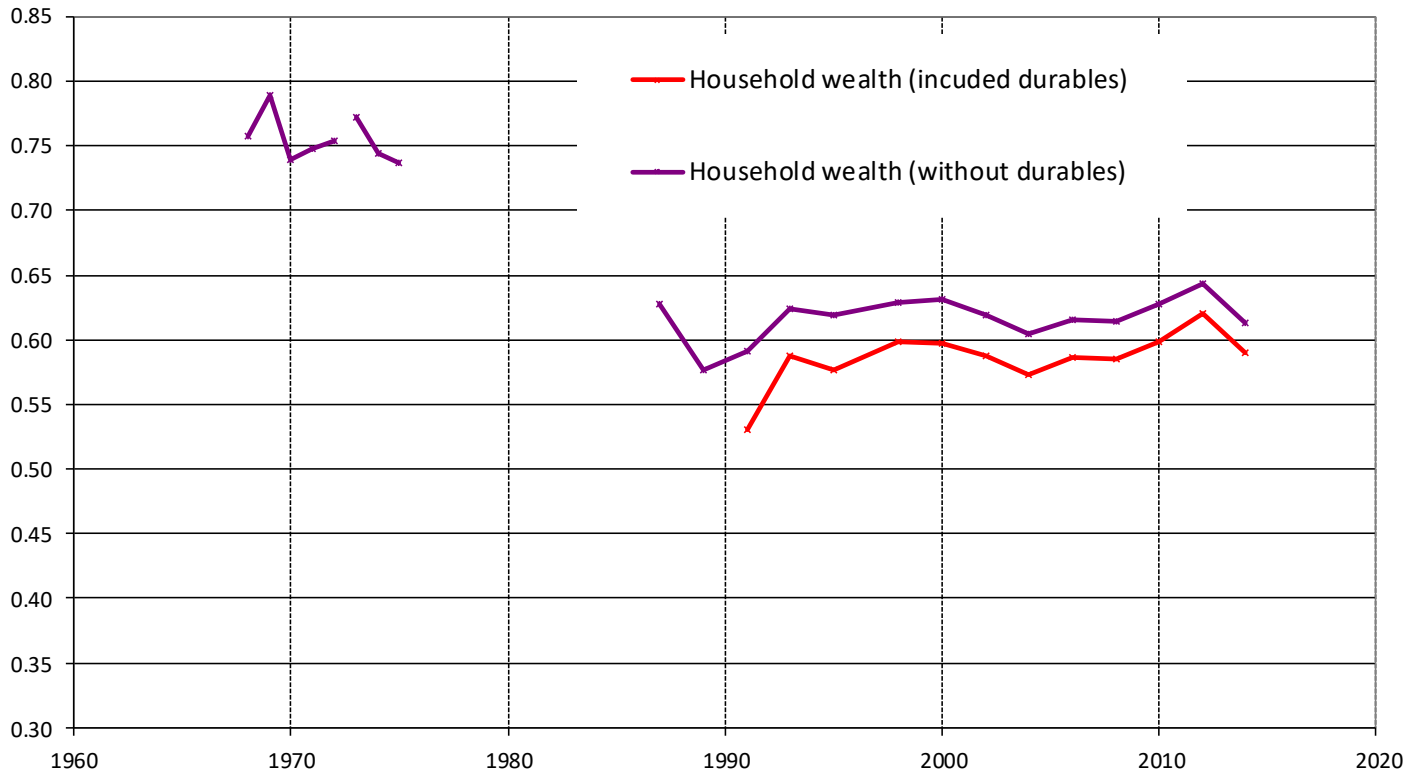
Share of Consumer Durables (CD) on net wealth



The inclusion of CD in the net wealth has an impact on the amount of net wealth (+7-10%). The share is decreasing over time

Definition and characteristics of net wealth

Impact of Consumer Durables (CD) on inequality (Gini index)



The inclusion of CD in the net wealth has an impact on the concentration index too (from 0.61 to 0.59 in 2014)

The impact is decreasing over time (0.06 in 1991 vs 0.02 in 2014)

Collecting data on wealth

Houses held

Valuation: current value in the market (general SNA framework)

In your opinion, how much is your house/flat worth (unoccupied)? In other words, what price could you ask for it today (including any cellar, garage or attic)? Please give your best estimate.

€ |__|__|,|__|__|__|,|__|__|__|

Collecting data on wealth

Houses held

Hypothetical questions

"Asking most people to imagine what if- what might have happened in their lives if things had been otherwise, or what they might do if – confronts them with a special task that is likely to be difficult"

(Converse and Presser, Survey questions, p. 23 1986)

Collecting data on wealth

Houses held

Allow item non-response → *model imputation*

Check the coherence between the amount provided and data on its characteristics (location, size, …), original acquisition price, imputed rents…

Collecting data on wealth

Financial assets

Strategy for complex and sensitive questions: **stepwise selection** of respondents meeting criteria + use of **unfolding brackets** technique

Let us now talk about some form of savings, often used by households (*SHOW CARD A*). This is a list of different forms of saving and investment. Did the household **have** … (form of saving or investment) at 31-12-2016? *(Code in column code 1=Yes or 2=No)*

(*SHOW CARD B*) - (*For each form of saving or investment held at 31-12-2016*). What was the value on 31 December 2016? Answer using one of the **ranges** on this card. (*Write in column the code for the value range*)

Collecting data on wealth

Financial assets

(For each form of saving or investment held at 31-12-2016) Can you tell us the **approximate value** on 31 December 2016? *(Enter the value in column)*

(If no value is given) Could you at least tell me whether the value of the household's savings or investments was closer to …. (**lower bound**), to …. (**upper bound**) or about half way between the two? *(Interviewer, enter the code: I=lower, C=middle, S=upper in column)*

Collecting data on wealth

Valuables and consumer durables

Can you give an estimate, even a rough one, of the value of all the goods owned by the household at the end of 2016 in the following categories: valuables, means of transport, furniture/furnishings/household appliances? (SHOW CARD)

(Interviewer, prompt if necessary) *Think of what you would have received in 2016 if you had sold them.*

- ***Valuables*** *(jewellery, ancient or gold coins, works of art, antiques)*

€ |__|__|,|__|__|__|,__|__|__|

- ***Cars*** € |__|__|__|,|__|__|__|

- ***Other means of transport*** *(motorcycles, caravans, motor boats, boats, bicycles)*

€ |__|__|__|,|__|__|__|

- ***Furniture, furnishings, household appliances, sundry equipment*** *(furniture, furnishings, rugs and carpets, lamps, small household appliances, washing machine, dishwasher, vacuum cleaner, floor polisher, TV, PC, fridge, cooker, heater, air conditioner, radio, video-recorder, CD player, HI-FI equipment, mobile phone, fax machine, camera, camcorder, etc.)* € |__|__|__|,|__|__|__|

Collecting data on wealth

Timing of interview and evaluation of assets

Wealth component evaluation should refer to a common point in time (usually **end of year**). It improves the comparability across surveys and with aggregate statistics

In the SHIW the stock variables (household composition and net wealth) refer to the end of the year, while the flow variables (income and consumption) refer to the year preceding the interview

There are some exceptions to the general rule (i.e. houses values: hypothetical questions usually refer to the time of interview)

Collecting data on wealth

Timing of interview and evaluation of assets

It is important to consider:

a) how long it takes the **field** (in SHIW 4-5 months)

b) the dynamic of asset **prices**

c) if you can rely on **documents** (i.e. bank statements)

The bias in the evaluation induced by the time lag between the interview and the reference point can be ex post adjusted (knowing the **date of interview** and information on asset price dynamic)

Quality assessment

Comparison of sample estimates with estimates derived from **other reliable sources** (i.e. National Accounts or Census)

Internal coherence

Randomized experiments (i.e. unmatched count technique)

Measurement errors: panel data for time-invariant variables, through models for time-varying variables

Interviewer judgements and comparisons with **other sources**

Quality assessment

Example of comparison of sample to aggregate estimates

Year	Survey estimates	Census	Ratio (percent)
	Houses held by households	Houses held by households	
2010	21,034,915	28,840,727	72.9
2012	21,546,953	29,372,670	73.4
2014	21,294,400	29,790,201	71.5

Example of internal coherence (both sample estimates)

Year	Tenants living in households whose owner is another household	Houses declared by owners rented to other households	Ratio (percent)
2010	3,646,078	1,205,595	33.1
2012	3,850,413	1,225,610	31.8
2014	3,391,587	1,083,131	31.9

Quality assessment

A randomized experiment (unmatched count technique) - 2010

GROUP 1

This card (SHOW CARD) makes a series of statements about your household's actions. I do not want to know which of them are true and which are false. Instead, would you please be so kind as to tell me just **how many of them are true**?

|__| V1

In the last five years, you or another member of your household have

1. …made purchases online (on the Internet)
2. …changed municipality of residence
3. **…had to ask for a loan from a usurer**
4. …participated actively in social, cultural, sporting-recreational groups or associations
5. …spent some time on holiday outside Italy

GROUP 2 (as above but without the item 3) |__| V2

E(V1) – E(V2) = share of households who had to ask for a loan from a usurer

Measurement errors

The reliability index

Let's imagine we measure a variable X with an error e:

$Y = X + e$

The measure Y differs from the true value X due to a random error that we can assume to have the following properties (**uncorrelated errors**):

$$E(e) = 0 \qquad E(X, e) = \sigma_{X,e} = 0 \qquad E(e, e) = \sigma^2_e$$

In such a case the mean of the measure Y in unbiased,

$$E(Y) = E(X)$$

but the variance is inflated by measurement errors.

If we measure twice the same variable X, the **reliability index** is the correlation between the two measures $r = \lambda_x$

Measurement errors

Comparing the answers provided by the same panel households on the size of (the same) residence houses, 2012-2014 (squared meters)

Obs	2012	2014			
1	160	160	16	85	85
2	120	120	17	250	250
3	80	100	18	150	155
4	180	180	19	70	70
5	80	90	20	100	100
6	45	45	21	104	110
7	96	90	22	200	140
8	120	120	23	100	110
9	90	90	24	58	55
10	80	90	25	80	80
11	100	100	26	75	75
12	95	100	27	85	80
13	107	107	28	118	118
14	60	60	29	80	80
15	300	200	30	108	108

Reliability index (the correlation between the two measures) = 0.8

Measurement errors

Why does it matter?

This type of measurement errors **inflates standard errors.**

Determines **attenuation in correlation and regression analysis:** in presence of uncorrelated measurement errors on X, the correlation between two variables X and Z is $r = \lambda_x \rho$, i.e. the coefficient is attenuated according to the reliability index of X. If also the variable Z is measured with error: $r = \lambda_x \lambda_y \rho$.

Increased variance due to measurement errors implies **higher poverty rates and inequality indexes**

Measurement errors

Reliability for time-varying variables: the Heise index

Defined X_1, X_2 e X_3 the true values of the same variable X at the times 1, 2 e 3 respectively and Y_1, Y_2 e Y_3 the corresponding observed vaues:

$Y_t = X_t + e_t \ \forall t$, where for each error term e_t is assumed zero mean, constant variance and no correlation among errors and among errors and true variables X_t.

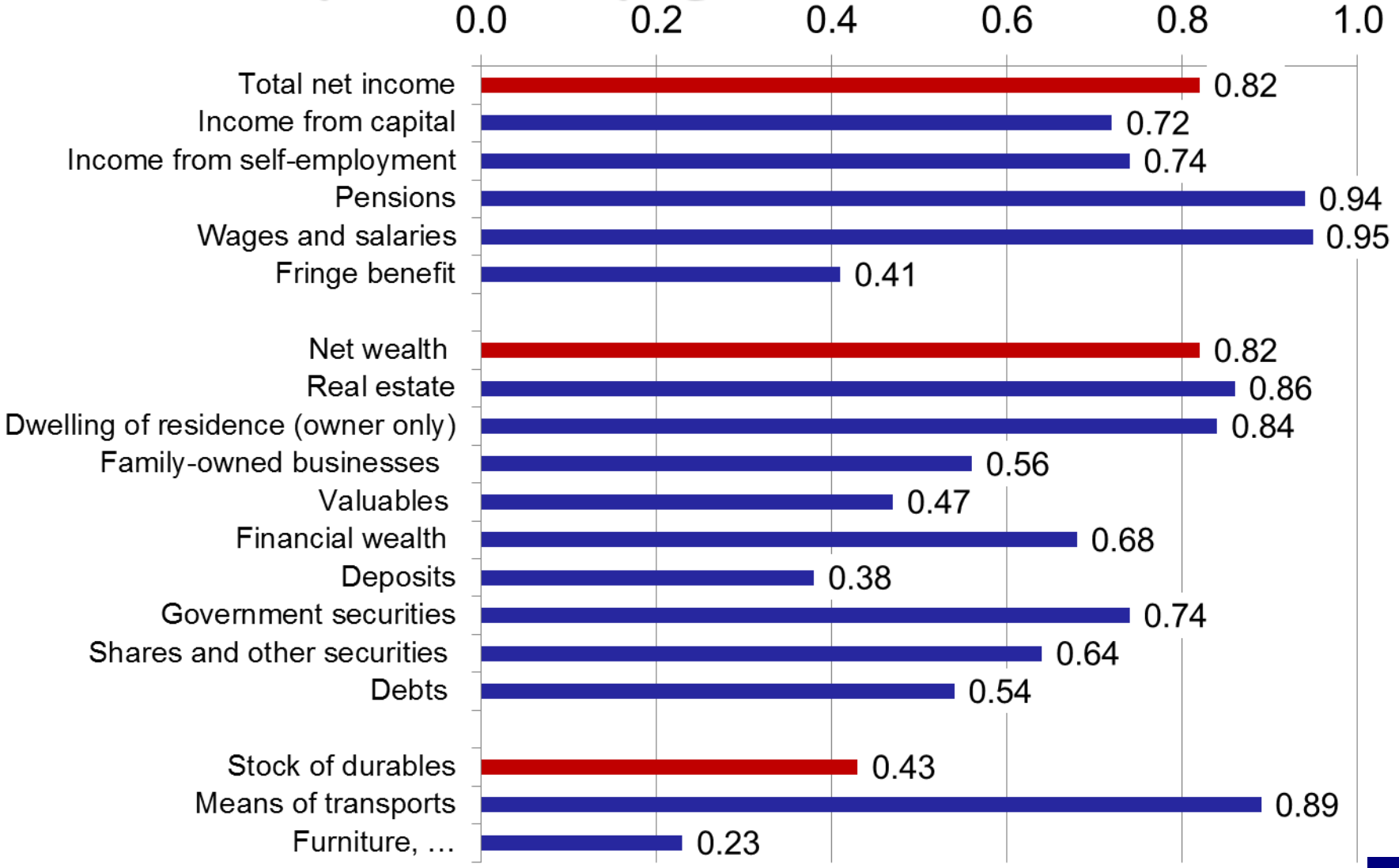
The true values X_1, X_2 e X_3 are assumed to be pairwise related through independent, first-order autoregressive models, which do not need to be stationary: $X_1=\delta_1$; $X_2=\beta_{21}X_1+\delta_2$; $X_3=\beta_{32}X_2+\delta_3$

where $\beta_{t+1,t}$ is the autoregressive coefficient and δ_t the innovation term of the process; innovations are uncorrelated pairwise.

Under the above hypotheses, assuming a constant reliability across the measures: $\lambda^2 = r_{12}\, r_{23} / r_{13}$

Measurement errors

Reliability for time-varying variables: the Heise index



Quality assessment

Interviewer judgements

How do you rate the reliability of the information on income and wealth provided by the interviewee? (score from *1 to 10*)

The score of interviewers is based on a comparison between the information provided and objective evidence available to them (neighbourhood and type of dwelling occupied by the household, standard of living implied by the quality of furnishings, etc.).

Although the level of **credibility** is satisfactory on the whole, it is not **uniform** across the sample.

Higher values are found for households whose head has high educational qualifications or is employee; lower scores are found for self-employed.

Characteristics of the household head	Credibility of answers
Age	
Up to 30 years	7,6
From 31 to 40 years	7,6
From 41 to 50 years	7,8
From 51 to 65 years	7,6
Over 65 years	7,4
Educational qualification	
None	7,2
Primary school	7,3
Lower secondary diploma	7,6
Upper secondary diploma	7,8
University degree	7,9
Occupational status	
Employee	7,8
Self-employed	7,3
Not-employed	7,5
Total	7,6

Quality assessment

Comparisons with other sources – Statistical matching adjustments

Data from a reliable source (i.e. a bank)

Assets and liabilities held on average by groups of households (by geographical area and other characteristics

Survey data

Financial assets and liabilities declared in the survey

Comparing the two sources

- Evaluating differences among the two sources
- Estimating model addressing under-reporting behaviour
- Applying models for adjusting survey data

Non-response and biased estimators

Non response is a problem if respondents have characteristics different from those of non-respondents.
If we divide 2 sub-groups of the population, respondents (r) and non-respondents (nr), the expected value of a variable y can be decomposed as:

Negletting non-respondents you have biased estimates

(unless the two groups have the same mean)

$$\hat{\bar{y}} = \frac{N_r}{N}\bar{y}_r + \left(1 - \frac{N_r}{N}\right)\bar{y}_{nr}$$

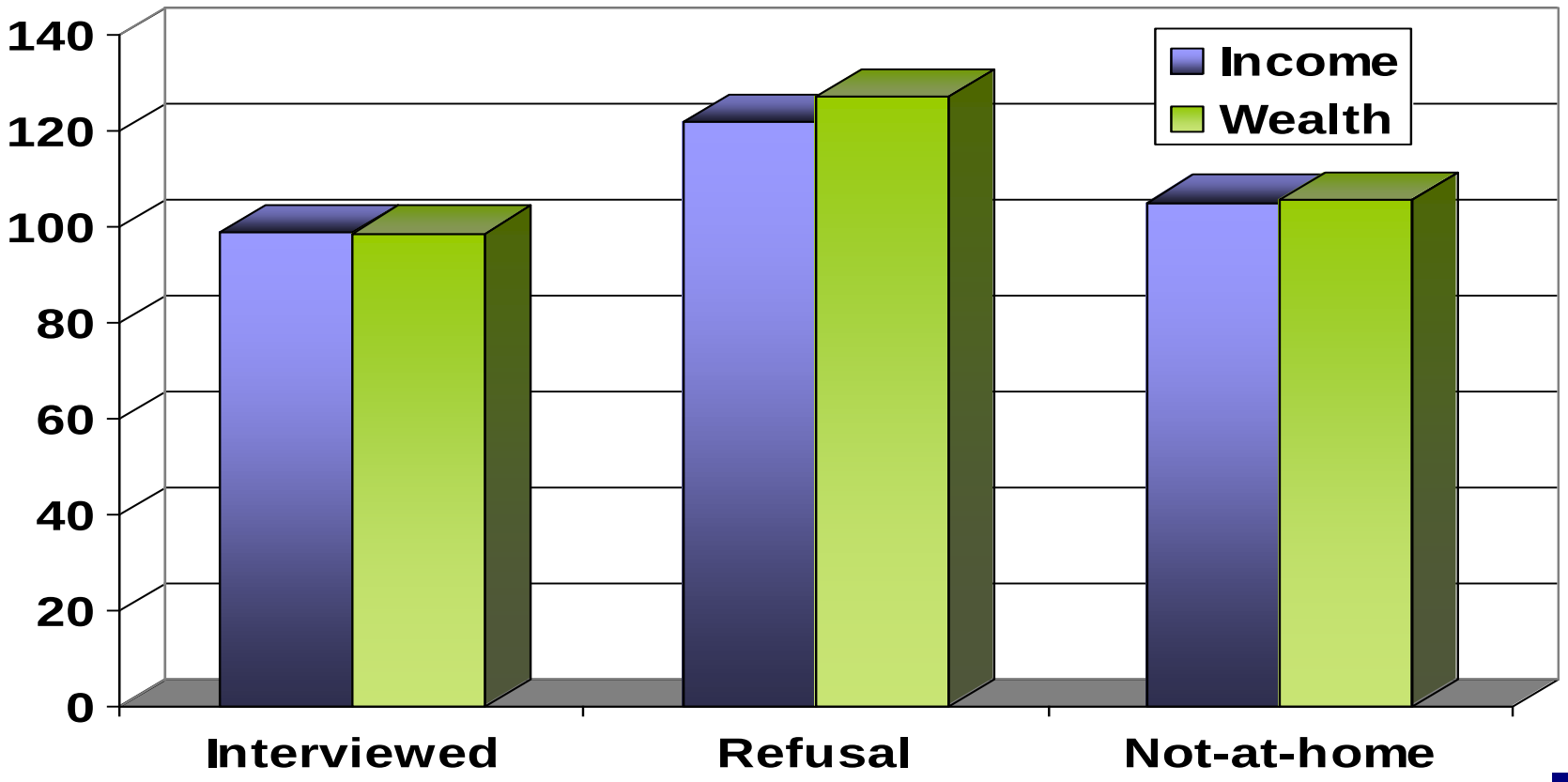
Bias

$$\bar{y}_r - \hat{\bar{y}} = \left(1 - \frac{N_r}{N}\right)\left(\bar{y}_r - \bar{y}_{nr}\right)$$

It's important to reduce non-response (or adopt different estimators)

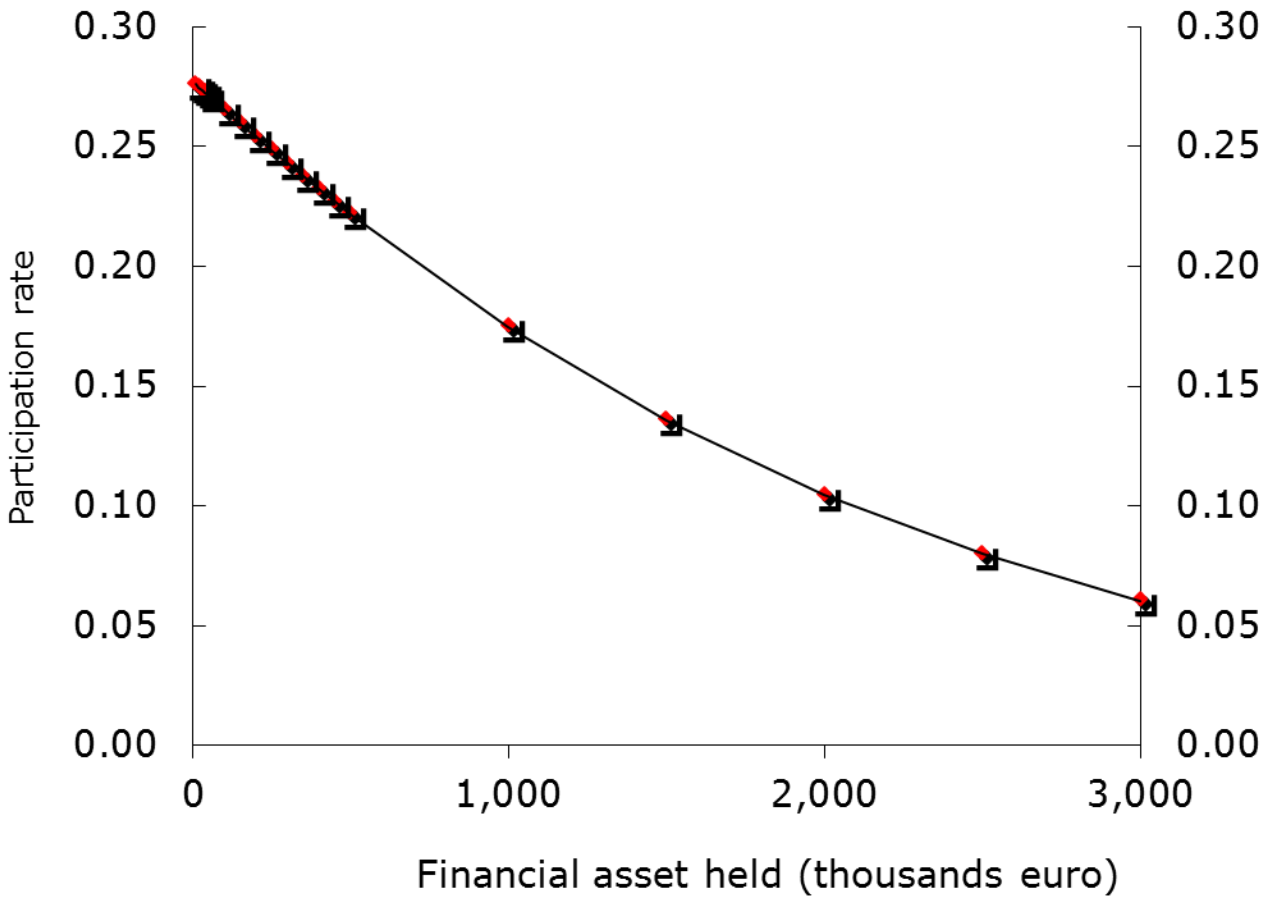
Non-response and biased estimators

Income and wealth of interviewed households according to the results of the first visit (all sample = 100)



Non-response and biased estimator

Statistical matching of SHIW data with a sample of bank client households with high financial wealth



Results:

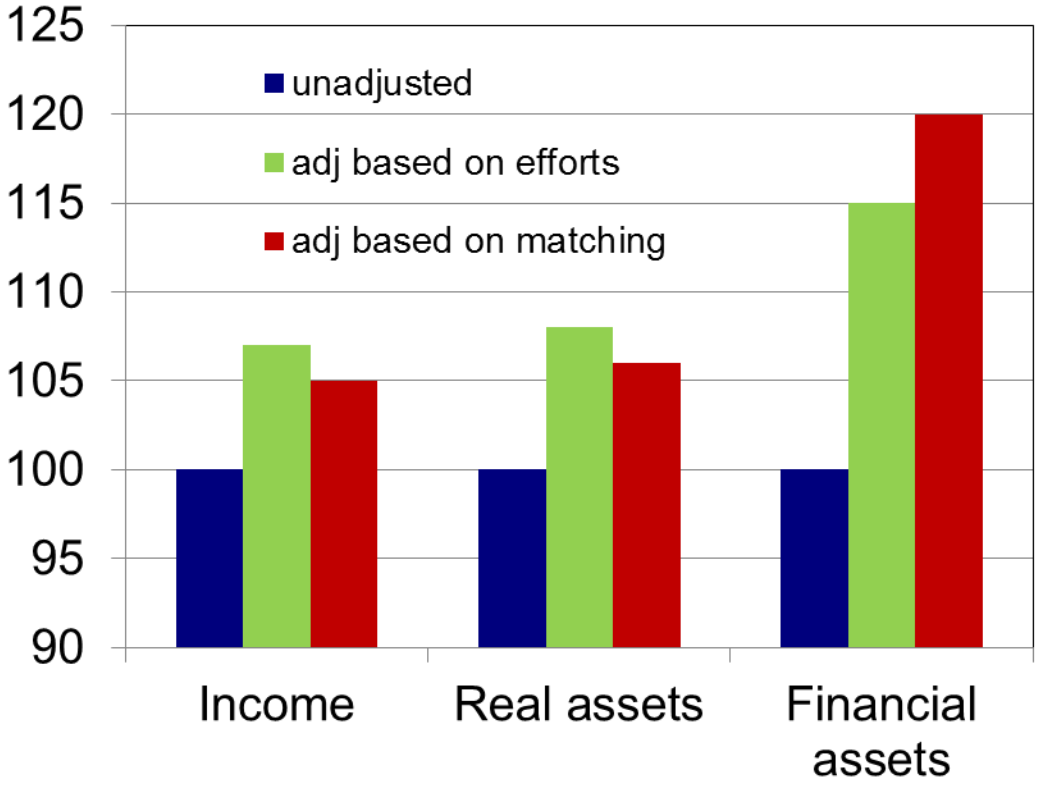
Richer households have less propensity in participating in surveys

It needs take it into account

Non-response and biased estimators

Taking non-response into account

- Once you adjust the estimates on the base of the probability of (actual) participating in surveys you usually obtain:
  - higher average values of income and wealth
  - Higher concentration indexes



Taking the wealthy into account

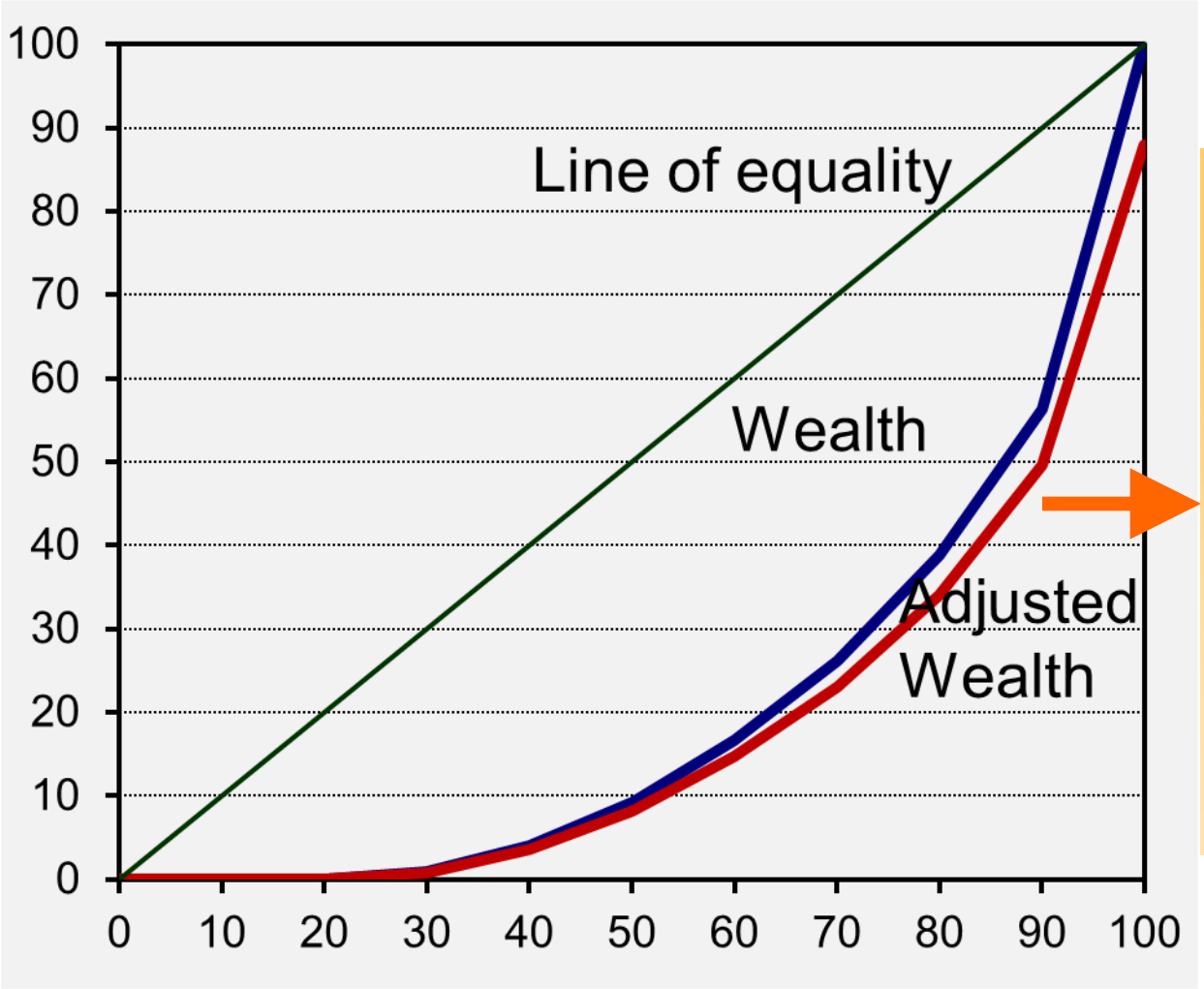
In the world the first 1% holds 50% of total net wealth. Huge wealth inequality is common to most countries (see Global Wealth Report)

Sample surveys are not able to account for the very rich. The extreme cases would even be a problem (outliers)

What to do?

- oversample rich households (or rich areas)
- use robust statistics (i.e. median vs mean; winsorized estimates)
- collect data through out ad-hoc surveys on wealthiest households or other sources (i.e. Forbes) and adjust your statistics

Taking the wealthy into account



Adjusting the Gini index for the very rich (i.e. Forbes list):

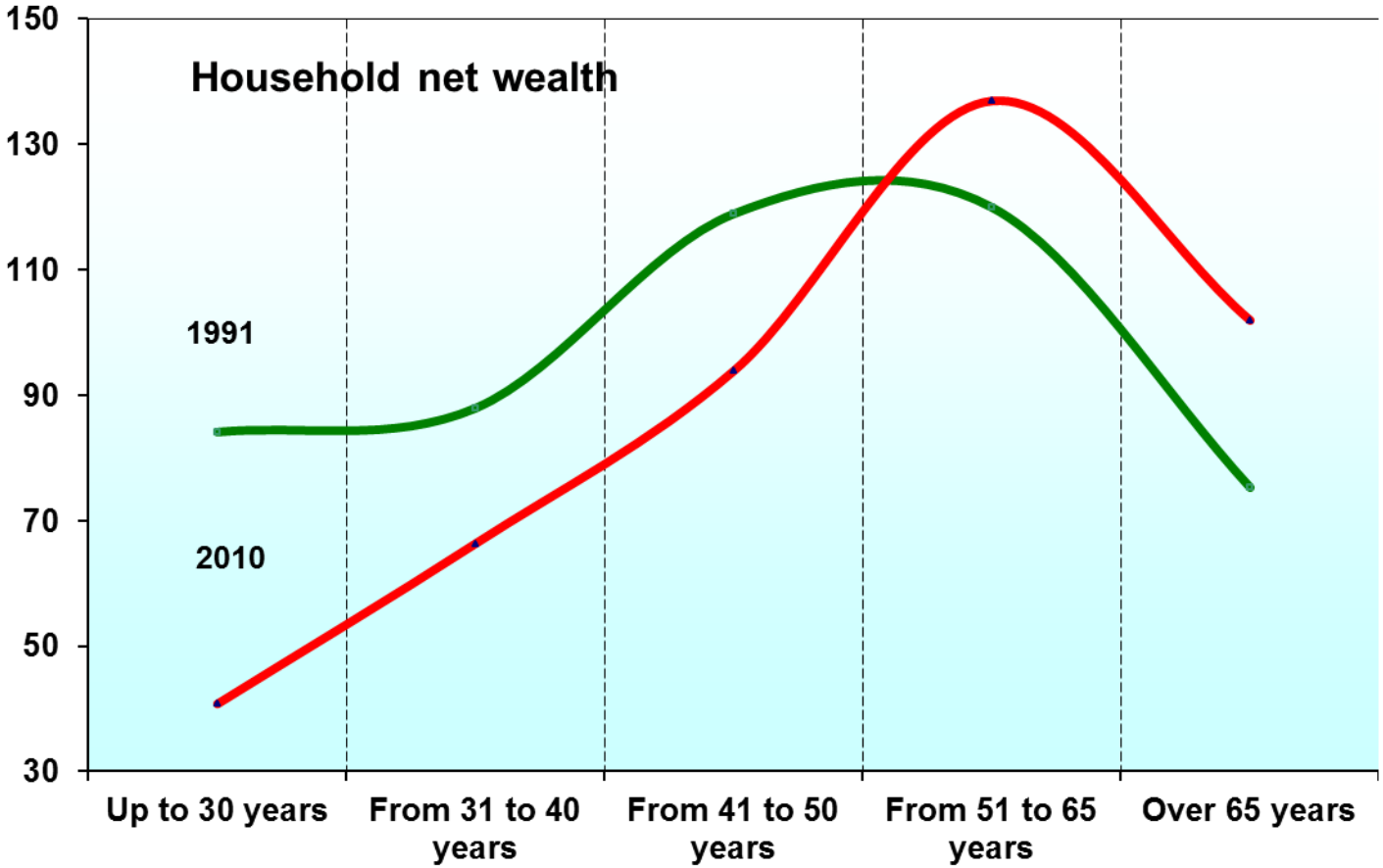
$$G = S + (1 - S)G'$$

where

G' = unadjusted Gini
S = share of wealth held by very rich

Descriptive results

Wealth by age of the household head

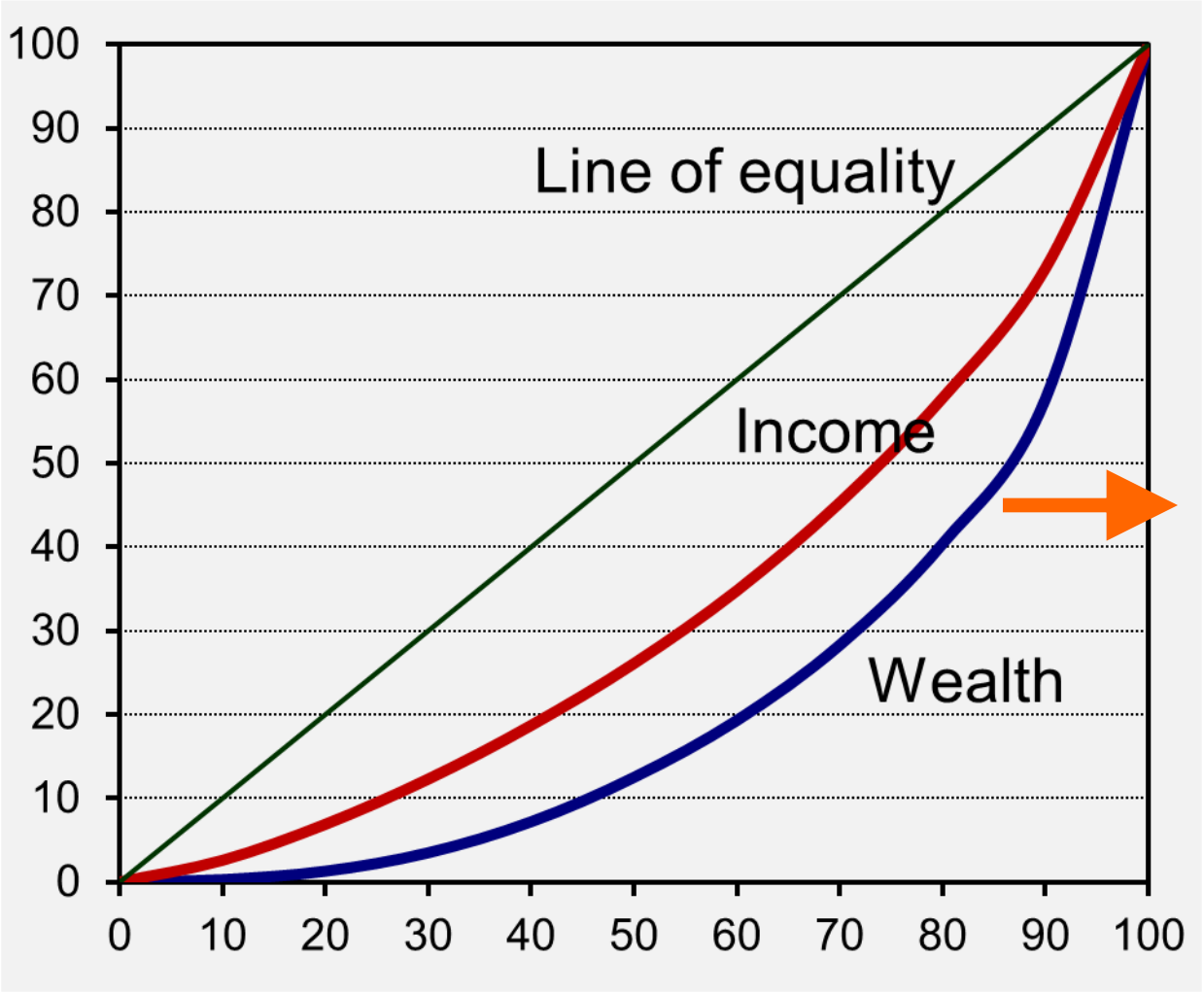


The age-profile of household wealth (life-cycle theory)

Younger cohorts are poorer than older cohorts

Descriptive results

Income and wealth inequality

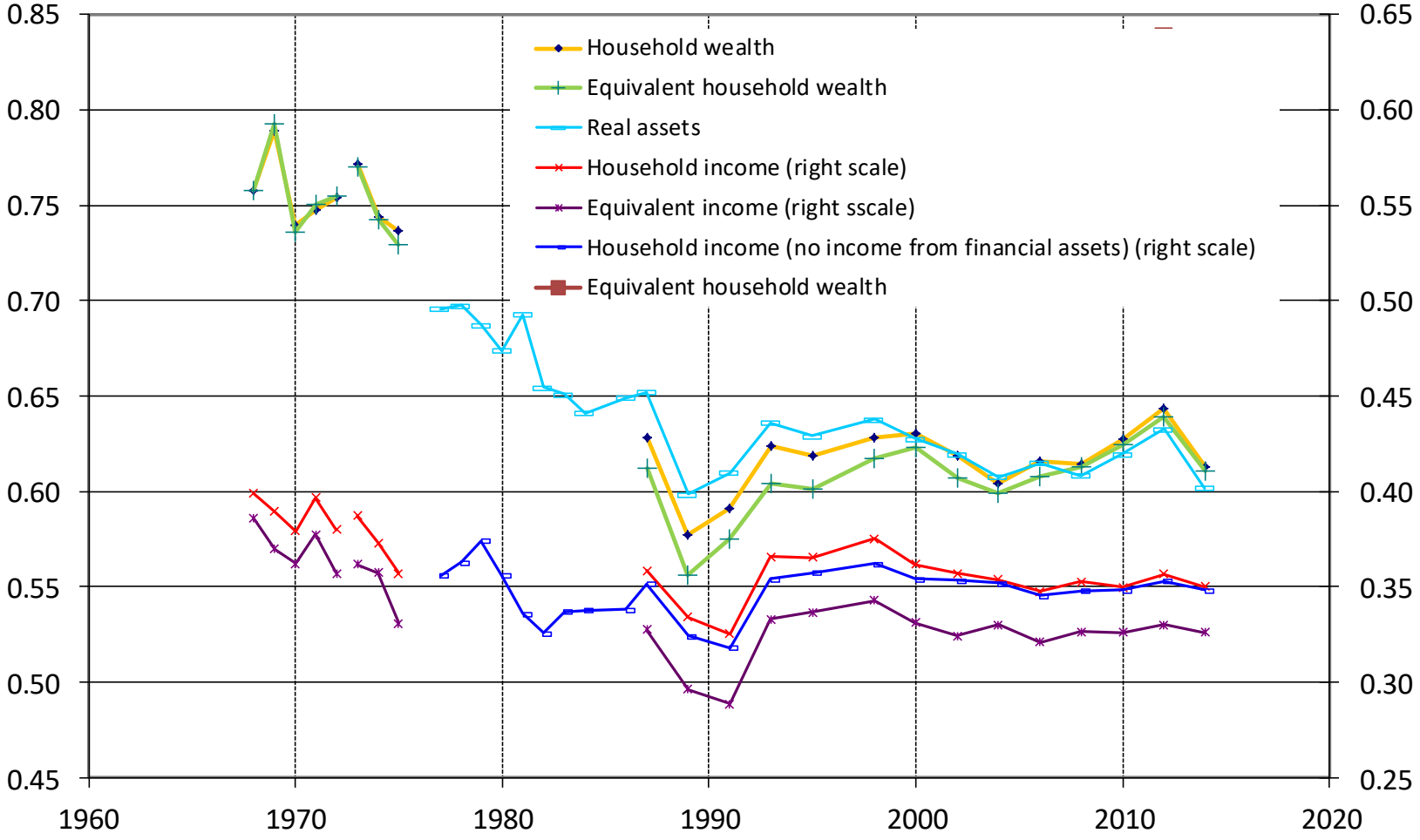


Wealth is usually much more concentrated than income

In Italy, for example, wealth Gini concentration index is around 0.60 against 0.35 for income

Descriptive results

Income and wealth inequality (Gini coefficients), 1968-2014

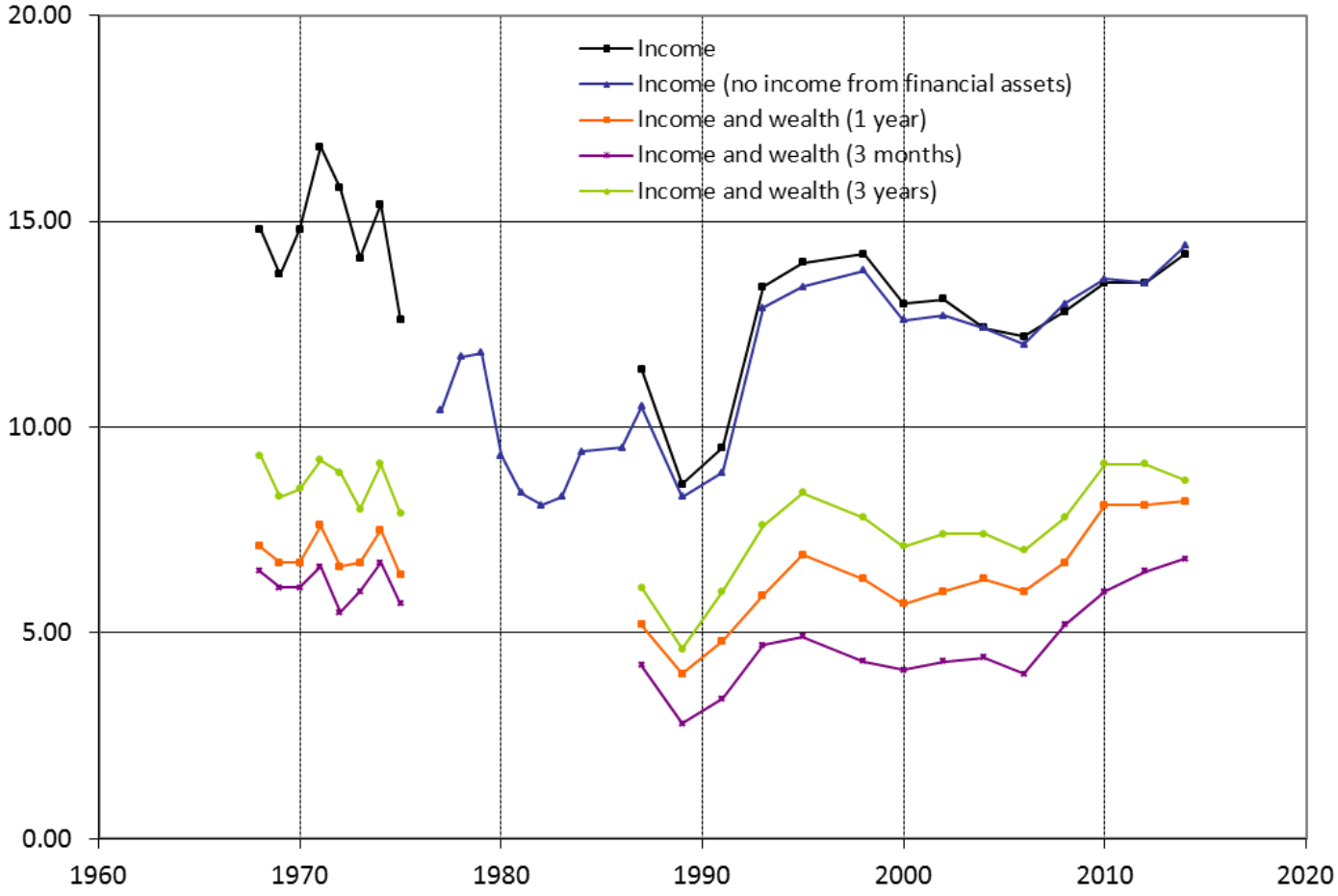


Descriptive results

Poverty measures: taking wealth into account

Head-count relative poverty in Italy, 1968-2014

(share of individuals)



1) Compute the relative poverty line on income

2) If the wealth of a poor household could bring it above the poverty line for a certain period, this index considers that household as non-poor

Descriptive results

Gender wealth gap

Wealth distribution is usually analized at the houshold level (assuming an equal intra-household distribution)

The intra-household distribution of wealth is important (Deere e Doss, 2006)

Recent tentative estimates for SHIW

- Properties: (every wave collected data on the owners - assumed equal shares)
- Financial assets: data on the intra-household distribution of financial assets collected in a special 2013 module:
- Financial liabilities: imputed (where possible) according to the related asset
- Residual parts (i.e. valuables, other debts): equal shares among adults

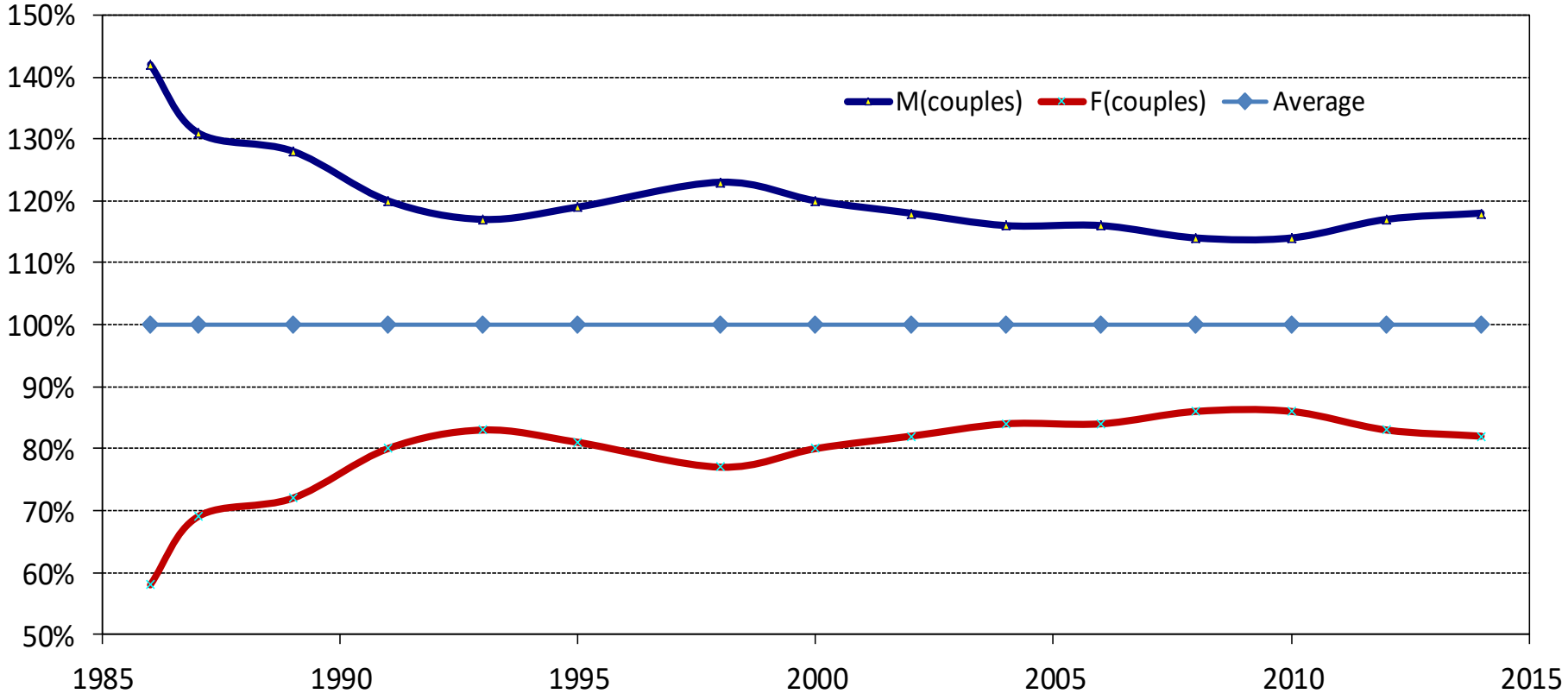
- Legal ownership (see MEXA project for alternative criteria)

Descriptive results

Gender wealth gap

Properties held by men and women, 1986 - 2014

(Index number;Total =100)



- M/F Gap 70% in 1986 – 28% in 2010 – 36% in 2014

Descriptive results

Gender wealth gap

Intrahousehold wealth - Men vs women wealth, 1991-2014

(Percentages of couples)

	1991-1998	2000-2006	2008-2014	2014
Totale				
a. W Women > W Men	13.2	13.3	19.9	22.2
b. W Women = W Men	53.6	54.1	36.7	33.6
c. W Women < W Men	33.3	32.6	43.4	44.2
(c – a)	20.1	19.3	23.5	22.0

Wealth variations

Definition and components

Sometimes the interest is in the origin of wealth: where does wealth come from?

Following National Accounts:

$\Delta W_t = S_t + CT_t + CG_t + OVV_t$ where

S_t = savings

CT_t = capital transfers

CG_t = capital gains

OVV_t = other volume variations

Wealth variations

How do the NA framework apply to microdata

$$\Delta W_t = S_t + CT_t + CG_t + OVV_t$$

- **Savings** S = Y - C

- **Capital transfers** (CT) in NA only consider involving non-resident households (or other sectors). Their role in wealth variation is almost negligible. At the micro level, CT are an important source of wealth variation (gifts and bequests between households)

Collecting data on wealth variations

Inheritances and gifts

$$\Delta W_t = S_t + CT_t + CG_t + OVV_t$$

Capital Gains (CG): variations of wealth deriving from changes in the prices of its items

In NA **Other Volume Variations** (OVV) include catastrophic losses due to earthquakes or floods, etc …

At the micro level, OVV may assume the form of: Lotteries and gambling; Insurance claims (life and non-life insurance, net of the actual loss).

Note: in NA these transfers are considered as current as, on the whole, they are not extraordinary

Collecting data on wealth variations

Savings, inheritance and capital gains

Difficult to obtain reliable estimate of Savings
S = Y – C (measurement errors on both sides)

Difficult to define *good* direct questions for saving (some "payments" include savings, i.e. installment loans)

↓

SHIW collects data on transfers (donations and inheritances). As the phenomenon is quite stable, the survey collects very simple information every wave and submits special modules every 10-15 years

Collecting data on wealth variations

Inheritances and gifts

Stable questions about the origin of the house of residence and other real estate (2/3 of net wealth)

How did the household acquire ownership of the dwelling?

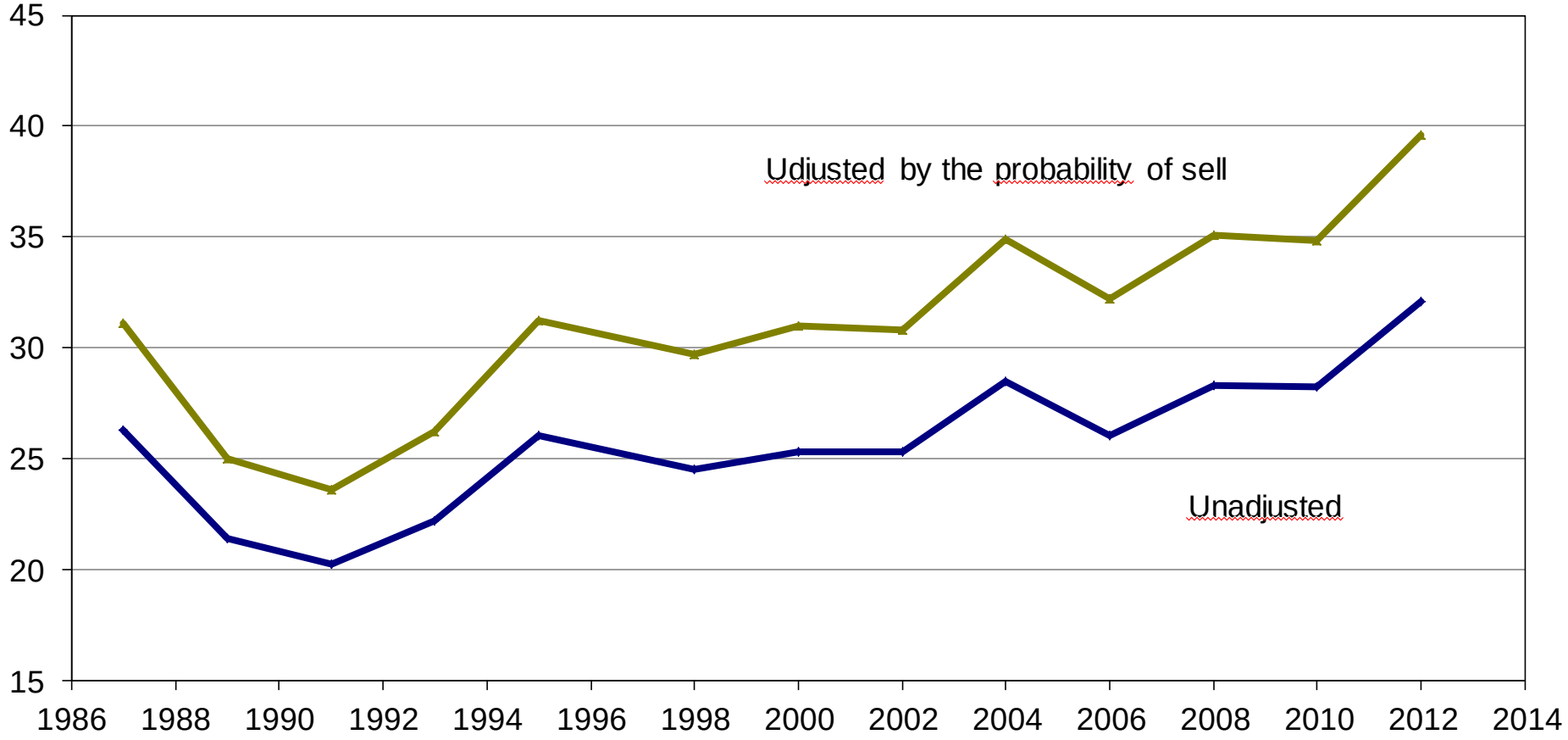
- *purchased from private individual*	*1*
- *inherited*	*2*
- *part purchased/part inherited*	*3*
- *received as a gift*	*4*
- ...	...
- *other*	*8*

In what year did the household acquire ownership of the dwelling?

- *Year* |___|___|___|___|

Houses inherited or received as a gift, 1987-2012

(as a percentage of net wealth)



Collecting data on wealth variations

Special 2002 module on inheritances and gifts

In the 2002 survey, household heads and their spouses/cohabitants were asked to indicate both the value of the Capital Transfers (CT) (bequests and gifts) **made** *and* **received** *during the respondent's lifetime and those that they* **expected to make or receive** *in the future*

However CT are mostly bequests (inconsistencies between the estimates of CT received and given in the sample)

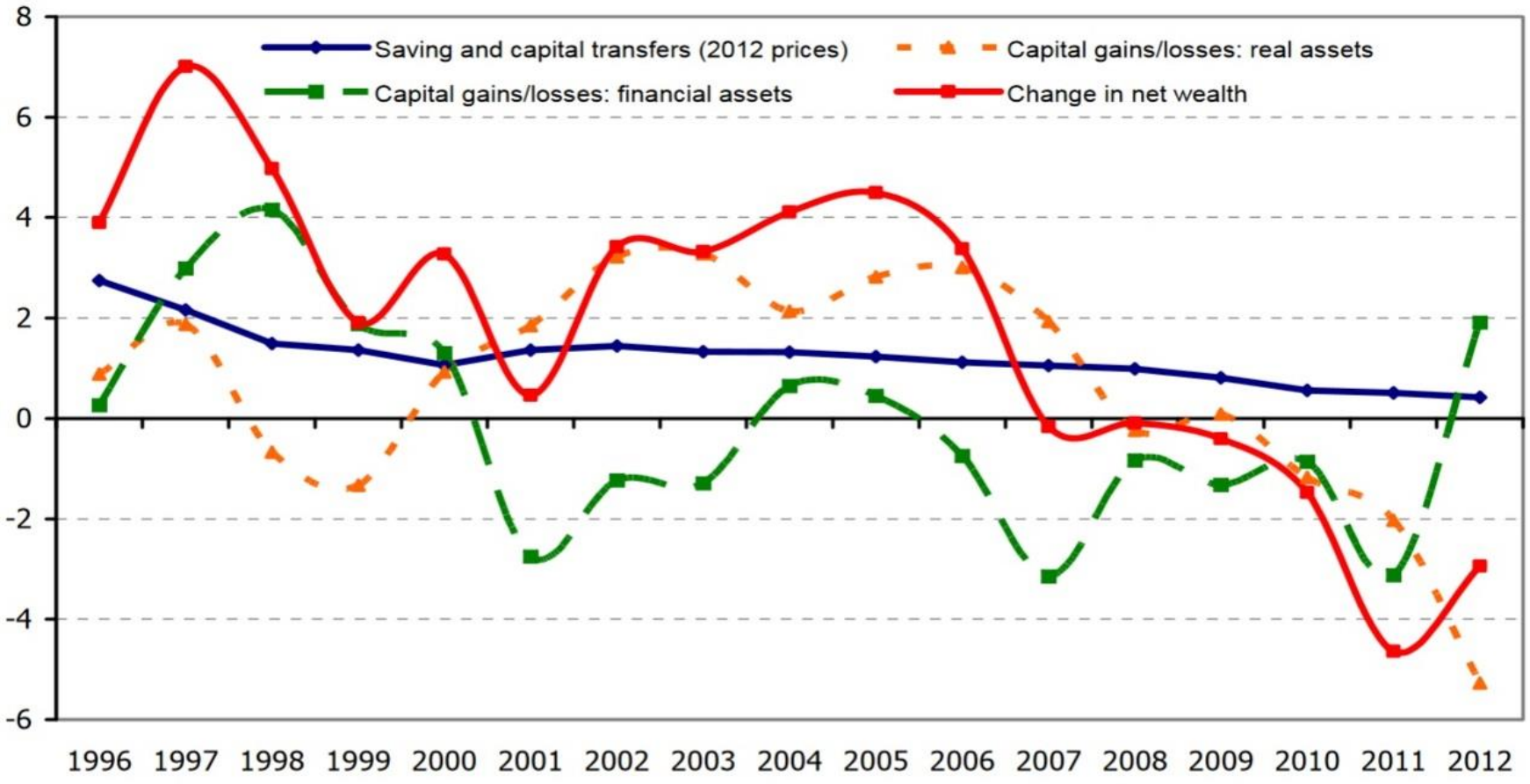
Past CT: *memory bias, evaluation issues*

Future CT: *expectations, plans, hopes*

Wealth variations

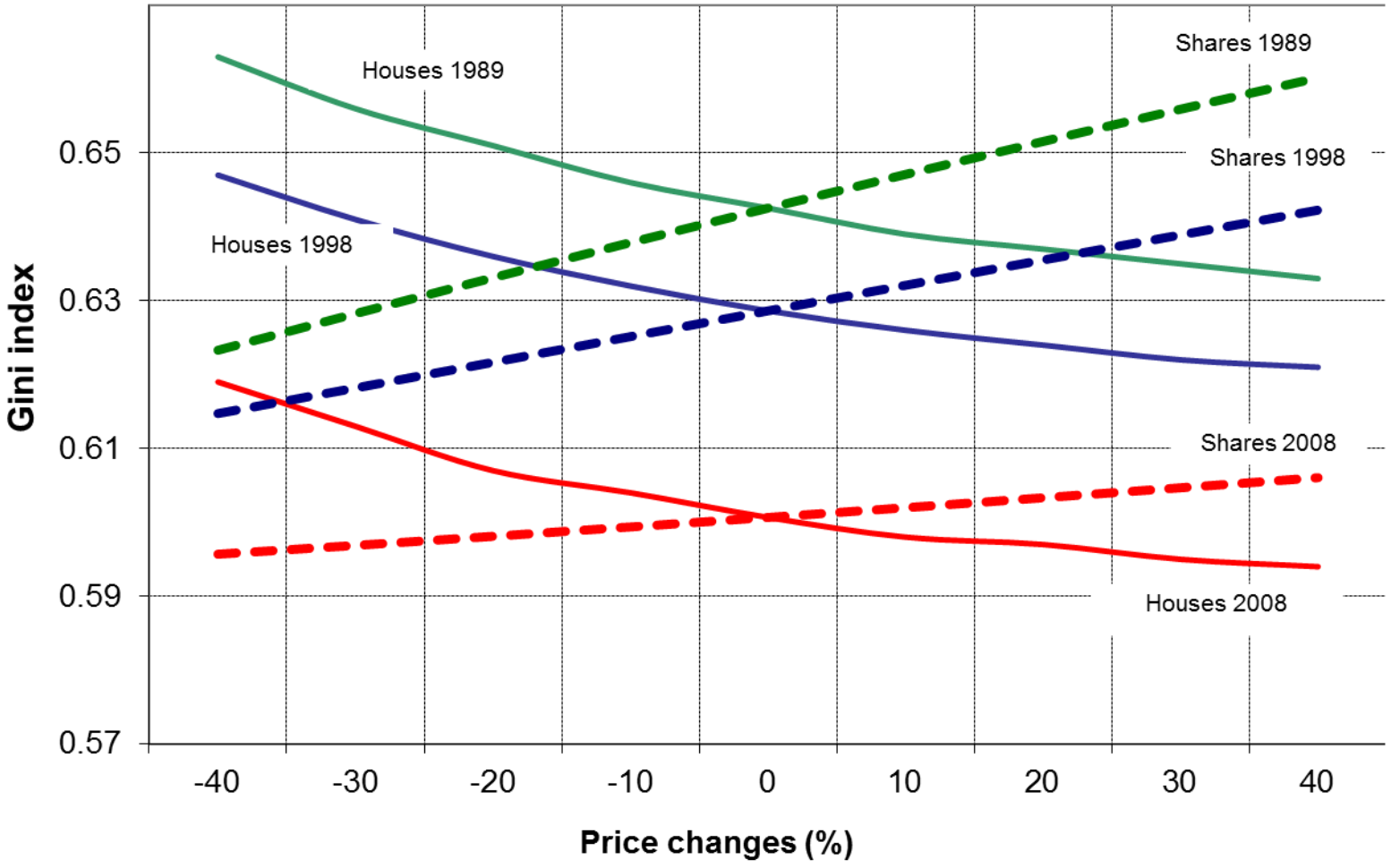
Savings, capital gains/losses and changes in net wealth in Italy

(percentage of net wealth; constant price)



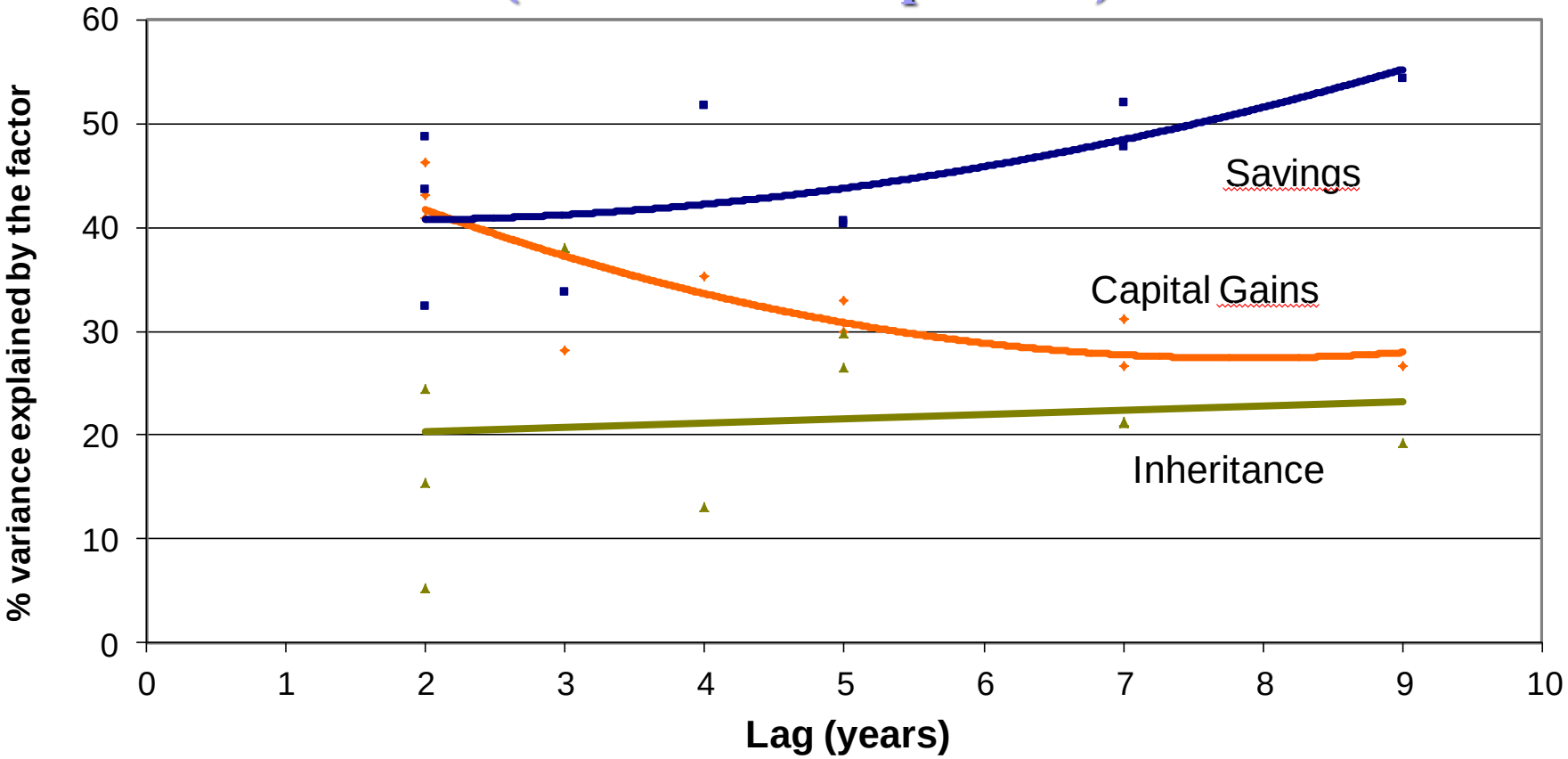
$$DW = S + CG_a + CG_f + VV$$

Inequality and price changes of houses and shares



Impact of savings, inheritances and capital gains on wealth variations over time

(variance decomposition)



In the short term, capital gains are as much as important as savings in determining wealth variations.

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Take home messages

- Wealth is important to complement information on income and consumption
- Data on transfers (i.e. inheritances, gifts) and capital gains are also important to understand how household wealth changes over time
- Quality issues (i.e. sampling, definition, measurement errors, non-response), are important and may seriously affect estimates: producers and users should be aware of this

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