



Poverty measurement:
Housing



Why is housing relevant?

Consumption Aggregate \approx Indirect Utility Function



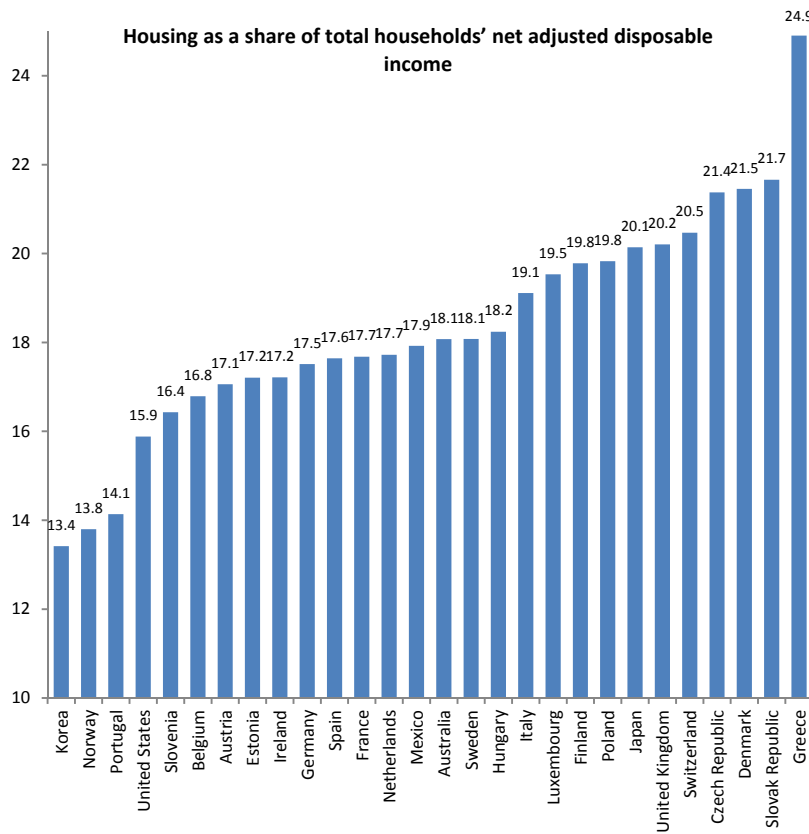
It must be as comprehensive as possible
(we must consider all goods and services)

- ▶ Gaerner and Short (2009): “...[including housing in the welfare aggregate]...allows for more reasonable inter-household comparisons, as well as international comparisons, of economic well-being.”

Why is housing relevant?

Dominant component of total income

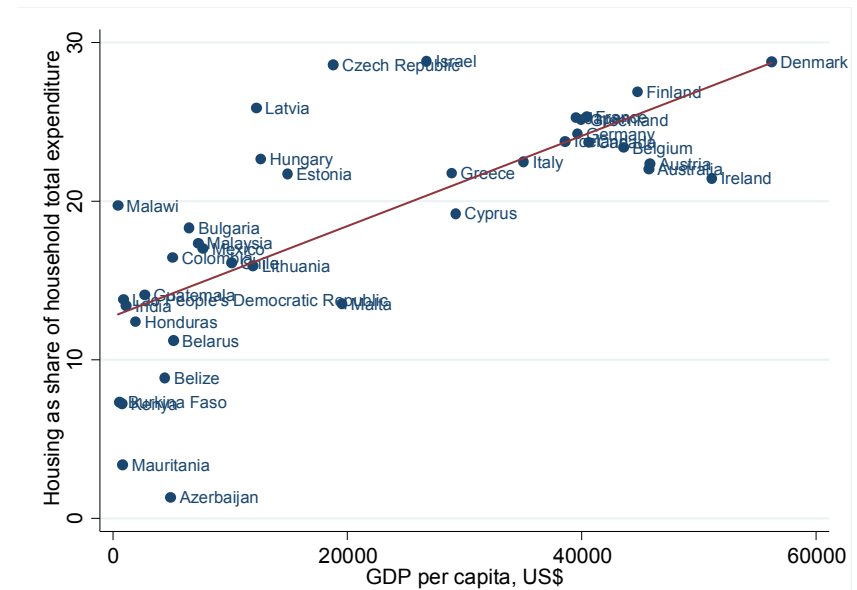
(Norris and Pendakur, 2013)



Source: OECD National Accounts, 2012

Share of housing consumption increases with welfare levels

(Blades, 2009)



Source: authors elaboration on UNStat System of National Accounts

What are the problems?

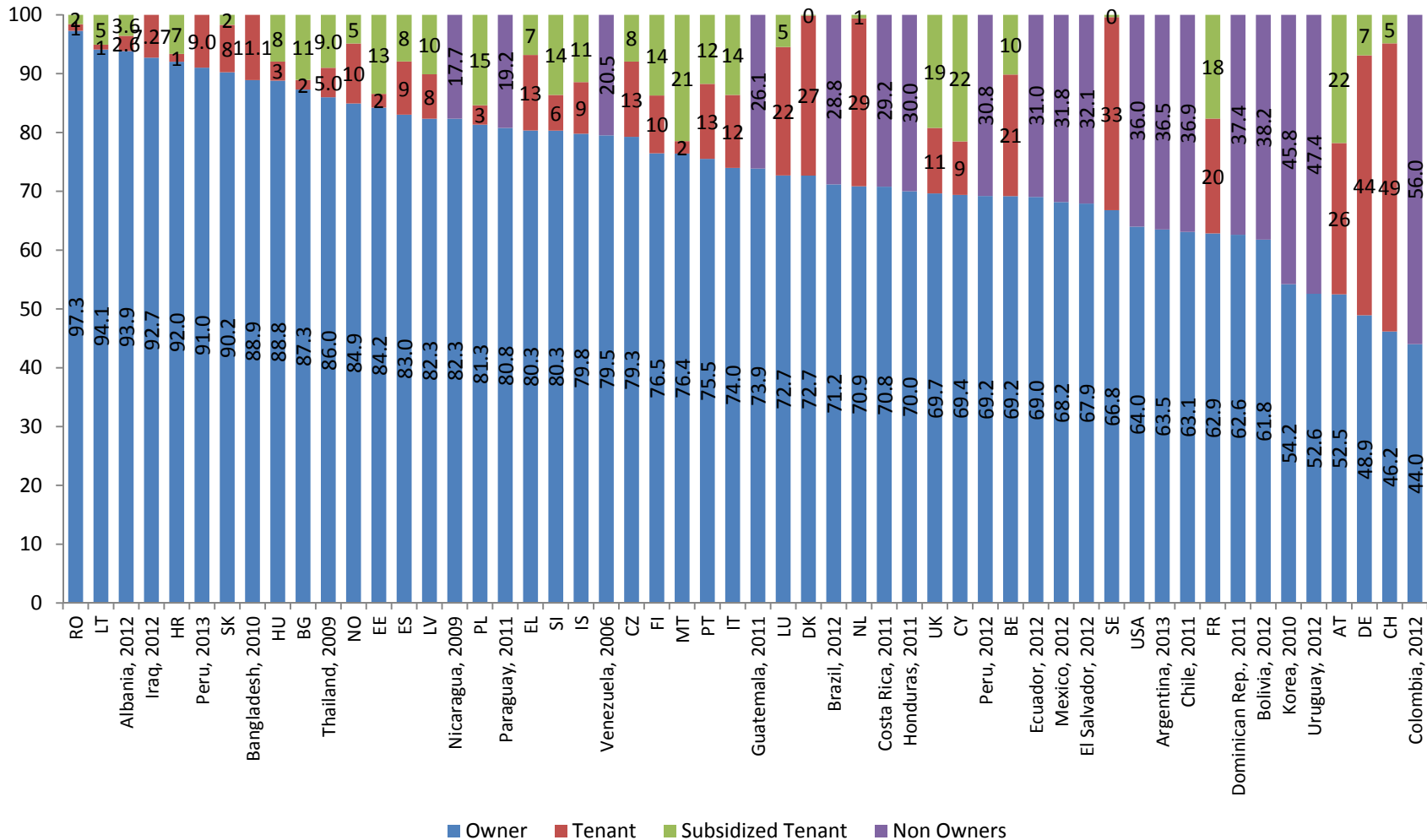
The basics...

- ▶ The utility → is the value of the flow of services from occupying the dwelling rather than the expenditure for purchase it over the period of analysis
- ▶ Rental markets → they work perfectly and all households rent their dwellings. Hence, *market rents* are a good approximation of dwelling services

However...

- ▶ Many households own their dwellings
- ▶ In other cases, households receive housing free of charge or at subsidized rates by their employer, friends, relatives, government or other entities

Few households rent their dwelling

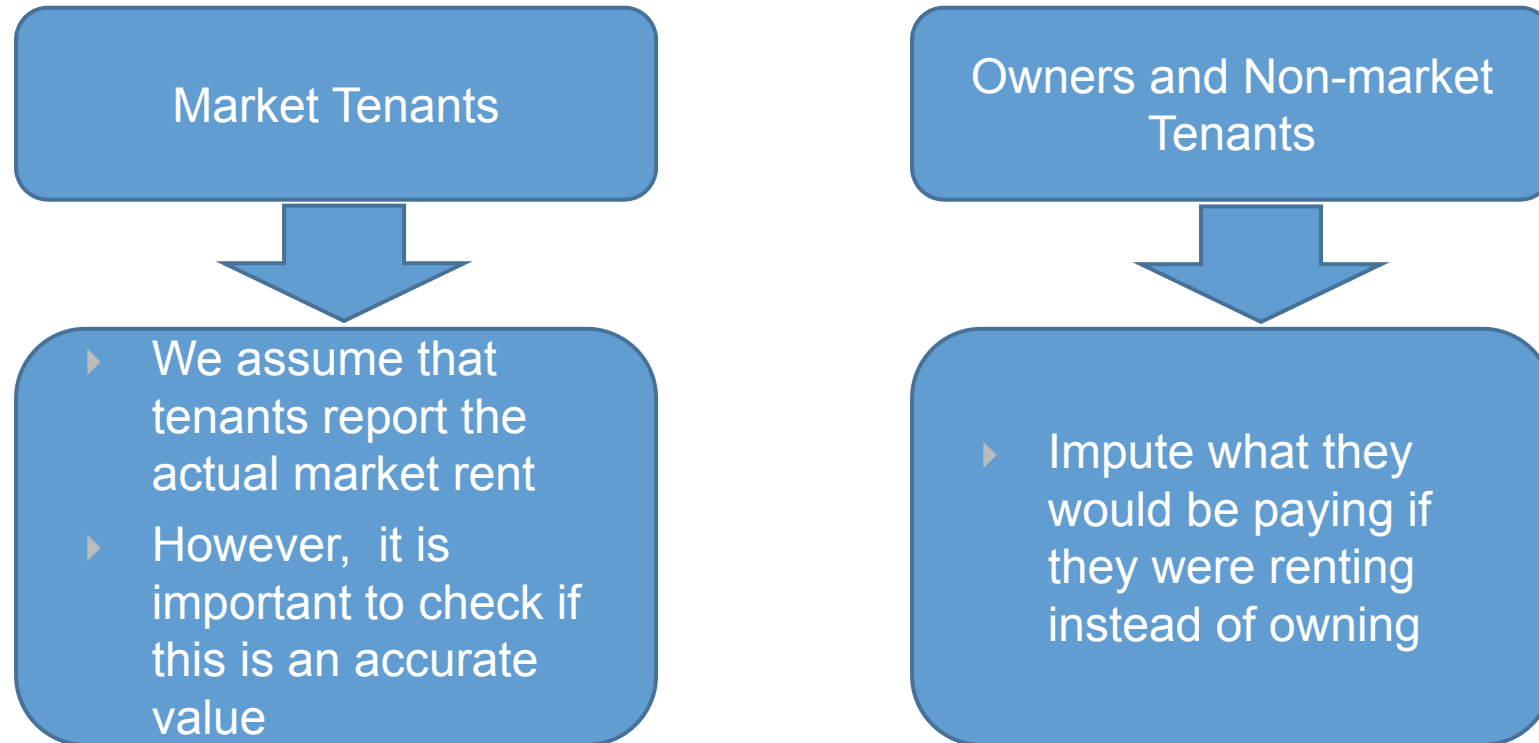


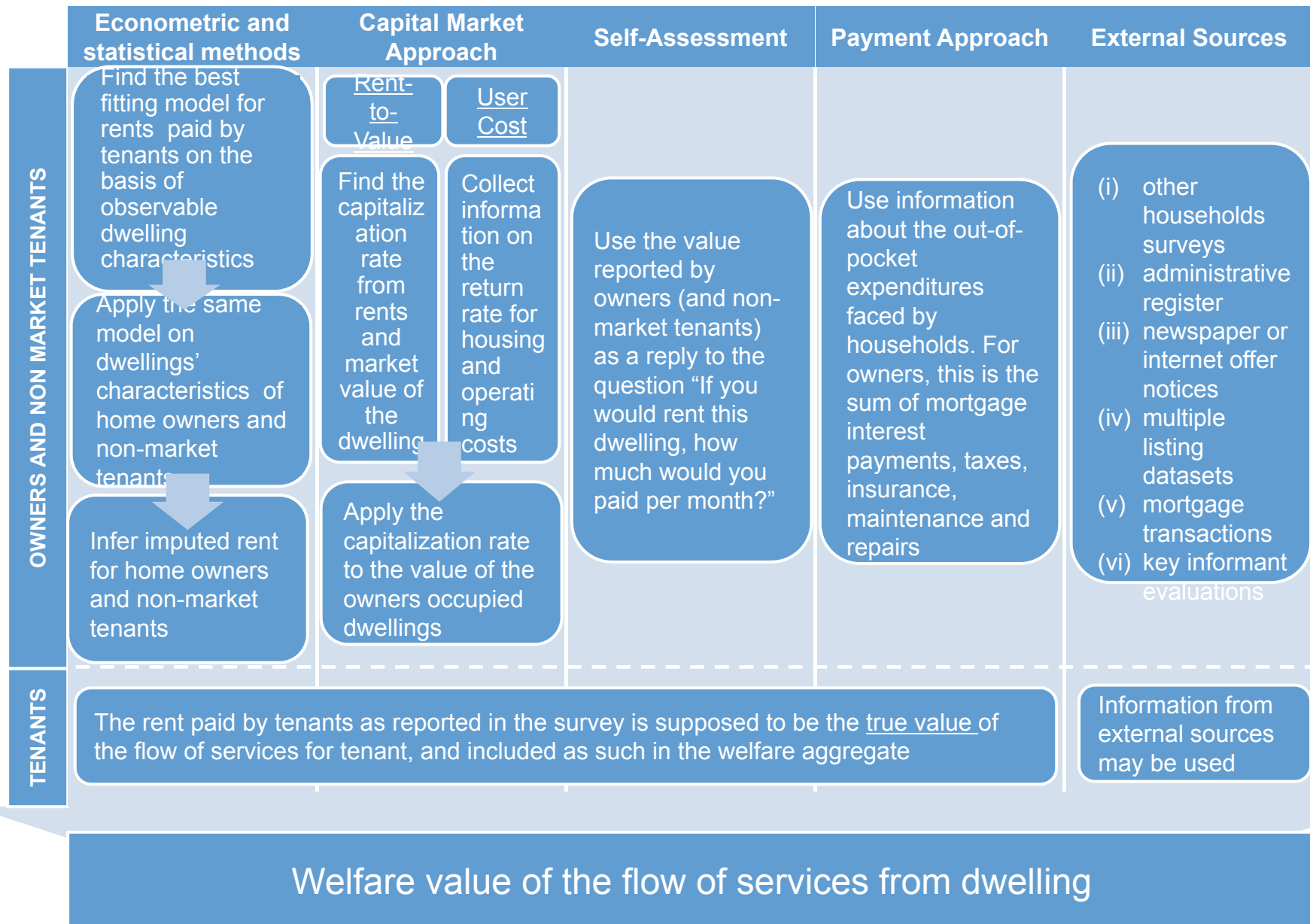
Source: authors elaboration on EU-SILC; SEDLAC;
http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?_afpt=table (USA);
<http://kostat.go.kr/portal/english/news/1/17/1/index.board?bmode=read&bSeq=&aSeq=273080&pageNo=2&rowNum=10&navCount=10&currPg=&sTarget=title&sTxt=> (Korea); authors elaboration on HBS (Albania, Bangladesh, Iraq, Peru)

Theoretical viewpoint

- ▶ When *expenditure* is used as a yardstick of welfare, it is important to achieve comparability across household
- ▶ Including the rent expenditure for renters and not the flow of the service of the dwelling for non-renters would lead to wrong conclusions:
 - ▶ Tenants would be better off than Non-Tenants!

Empirical Application





Econometric and statistical methods

Find the best fitting model for rents paid by tenants on the basis of observable dwelling characteristics

Apply the same model on dwellings' characteristics of home owners and non-market tenants

Infer imputed rent for home owners and non-market tenants

Econometric and statistical methods

1. Hedonic models

- ▶ The most generic functional specification is:

$$g(R_h) = \alpha_0 + \sum_{m=1}^M f_m(X_{hm})\beta_{hm} + \sum_{m=1}^M \sum_{k=1}^M f_m(X_{hm})f_k(X_{kh})\gamma_{hmk} + \varepsilon$$

- ▶ In the literature, different specifications and estimation methods are found:
 - ▶ Linear, semi-log and higher order
 - ▶ Quantile regression, semi-parametric and non-parametric
 - ▶ Heckman selection model
 - ▶ Spatial Dependency

Econometric and statistical methods

1. Hedonic models: Semi-Log

$$\ln R_h = \alpha_0 + \sum_{m=1}^M f_m(X_{hm})\beta_{hm} + \varepsilon$$

PROs:

- ▶ The coefficients show approximately the percentage change in the imputed rent for a given unit-change in the covariate
- ▶ It mitigates the heteroskedasticity problem
- ▶ It is computationally simple
- ▶ It allows the marginal rent-value to be a non-linear function of the size and quality of the dwelling

BUT:

- ▶ The unobserved quality of the dwelling chosen by renters can be different from that chosen by owners

Econometric and statistical methods

1. Hedonic models: Heckman Selection

- ▶ If the choices of tenure type and characteristics of the dwelling are not independent, the OLS estimation in the market rental sector might be inconsistent (Arevalo and Ruiz-Castillo, 2004)
- ▶ SOLUTION: Heckman two-stages selection model

$$g(R_h) = \alpha_0 + \sum_{m=1}^M f_m(X_{hm})\beta_{hm} + \epsilon_h \text{ if } t_h = 1$$

- ▶ Where:

$$t_h = \begin{cases} 1 & \text{if } \sum_{m=1}^M f_m(X_{hm})\gamma_{hm} + \sum_{j=1}^J f_j(X_{hj})\delta_{hj} + \eta_h > 0 \\ 0 & \text{otherwise} \end{cases}$$

Econometric and statistical methods

1. Hedonic models - COMMENT

▶ PRO:

- ▶ Simple and fast to implement
- ▶ We can apply the model fitted on tenants on the entire population and get an estimate of imputed rent for everybody

▶ CONS:

- ▶ We risk to underestimate the prediction for those with higher flow of services from housing and to overestimate the prediction for those with lower
- ▶ There is no way to test whether the prediction for owners and non market tenants is accurate

Econometric and statistical methods

1. Hedonic models – COMMENT (cont.)

▶ Alert:

- ▶ *In some countries, housing and rental markets are not well enough developed to permit any serious estimate of rental value, and attempts to repair the deficiency using data from a small number of households are unlikely to be effective, however sophisticated the econometric technique (Deaton and Zaidi, 2002, p.38-39)*

Econometric and statistical methods

2. Stratification

- ▶ Define a set of relevant characteristics
- ▶ Each characteristic has a set of possible realizations:
 - (e.g. Region1, Region2, Region3)
 - (e.g. Detached House, Flat)
 - (e.g. 1room, 2rooms, 3rooms, >3rooms)
- ▶ From which we can define strata of dwellings with homogeneous characteristics:
- ▶ Take the average rent for each stratum and assign it to each owner-occupied or non-market tenant dwelling in the same stratum

Econometric and statistical methods

2. Stratification

▶ PRO:

- ▶ Dwellings in the same strata will be of a more homogeneous quality, leading to more precise estimates for owners and non-market tenants, since the model is defined on dwellings with similar characteristics

▶ BUT:

- ▶ Increasing the number of strata reduces the average number of observations per stratum

▶ What we learn:

- ▶ We may obtain better predictions for owners if we infer their rents using information from tenants with dwellings having similar characteristics, possible there is no overlap

Self-assessment

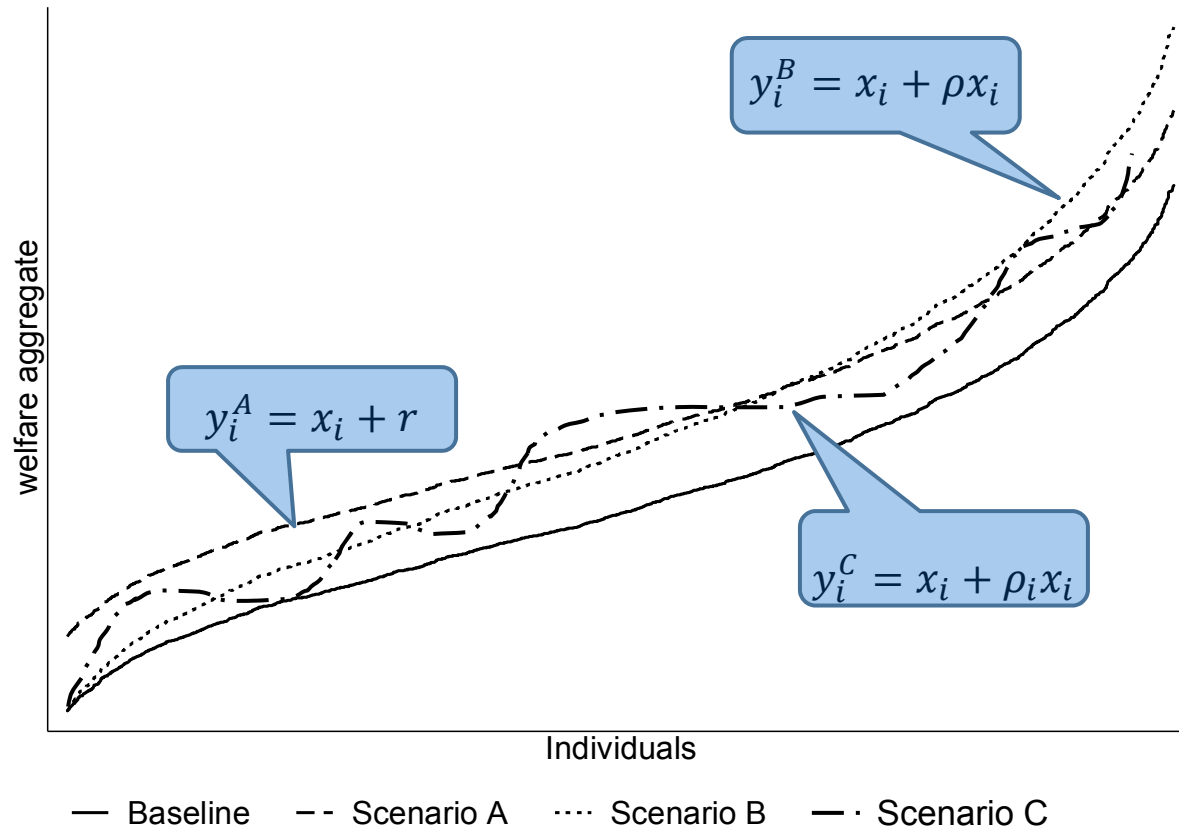
- ▶ This approach is based on data collected about owners' estimates of a fictitious market rent → homeowners are asked to estimate how much they would pay if they were renting their home
- ▶ Assumption: owners *can* estimate rental equivalences
 - ▶ This should be less problematic in regions where rental market is active and well developed (Lanjouw, 2009)
 - ▶ BUT...owner-occupiers may **over-estimate** the true rental value of their dwelling given the affinity to their property or neighborhood (owner *pride* factor)
 - ▶ Should be treated with caution and should be tested
 - ▶ Sergio's presentation next Thursday!

III. Distributional Impacts

A theoretical framework

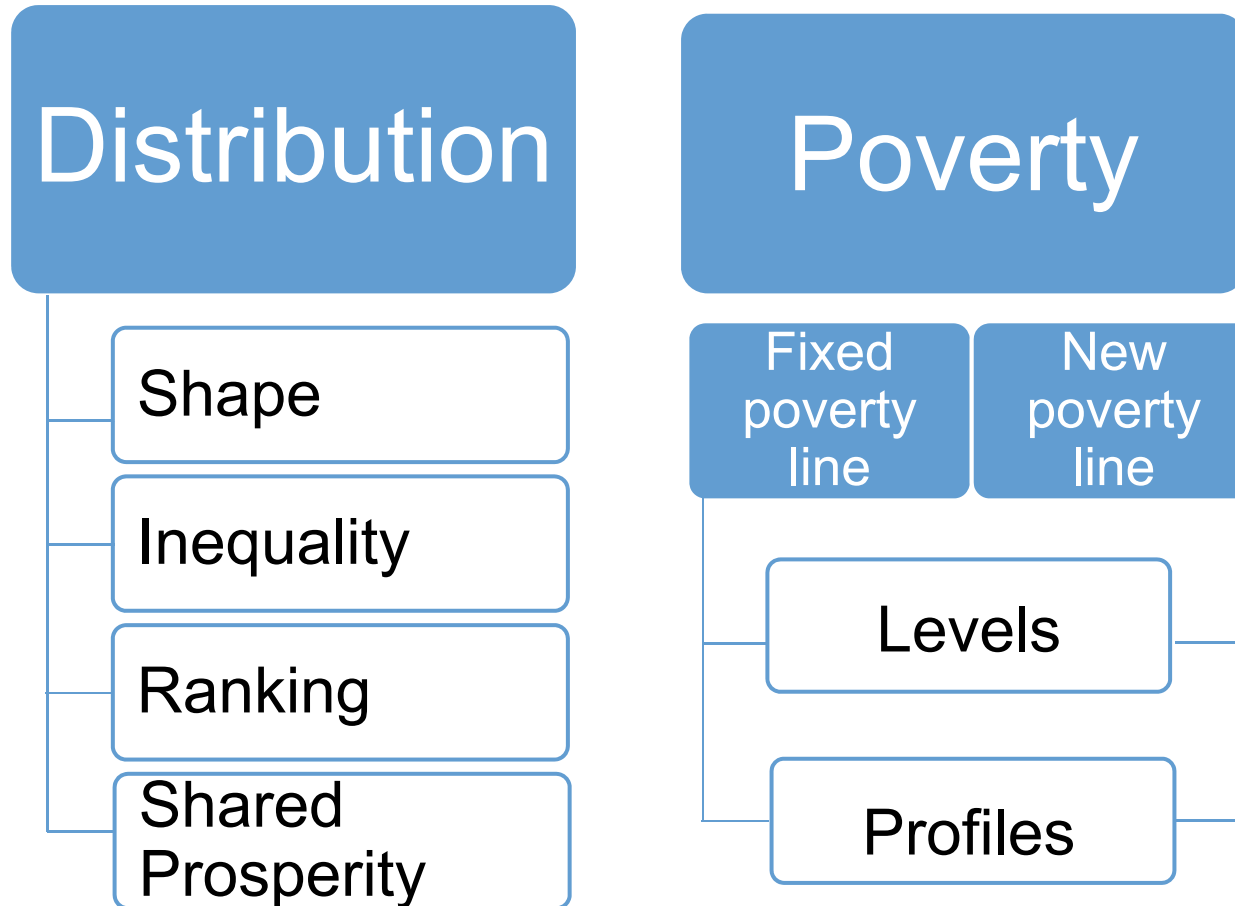
- ▶ Population N , made of $i = 1, 2, \dots, n$ individuals, $n \in \mathbb{N}$
- ▶ $x = [x_1, x_2, \dots, x_n]$ distribution of welfare aggregate (w/o rent)
- ▶ x_i level of welfare aggregate for i – th individual
- ▶ Assume $x_1 \leq x_2 \leq \dots \leq x_n$
- ▶ $r = [r_1, r_2, \dots, r_n]$ distribution of rents
- ▶ Consider three possible scenarios:
 - A. $r_i^A = r \quad \forall i \in N, \quad r > 0$
 - B. $r_i^B = \rho x_i \quad \forall i \in N, \quad \rho \in (0, 1)$
 - C. $r_i^C = \rho_i x_i \quad \forall i \in N, \quad \rho_i \in (0, 1)$

A theoretical framework



Distributional Impact of Rent Imputation

- ▶ We are interested in:

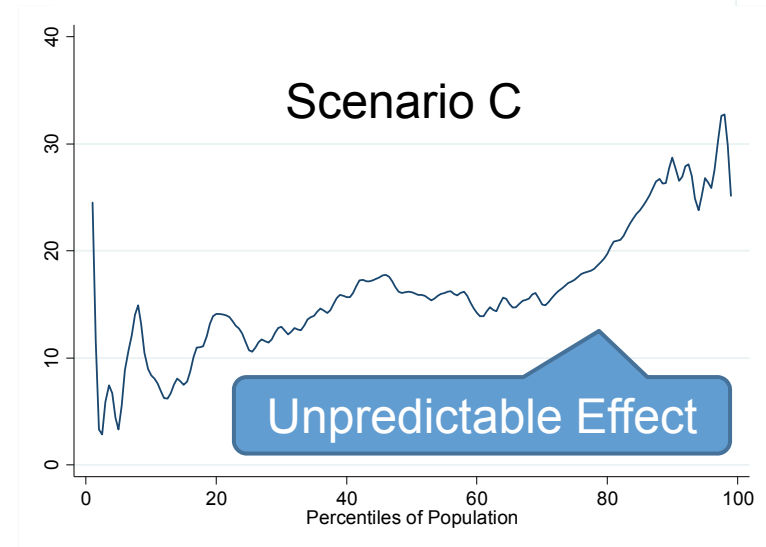
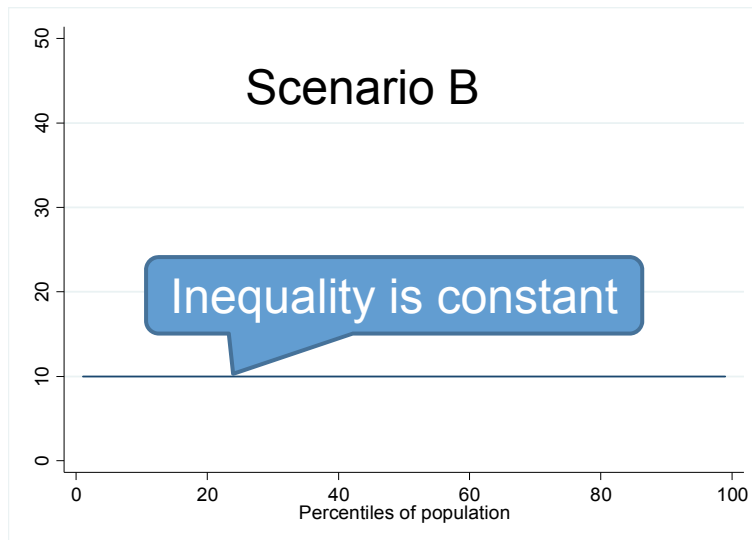
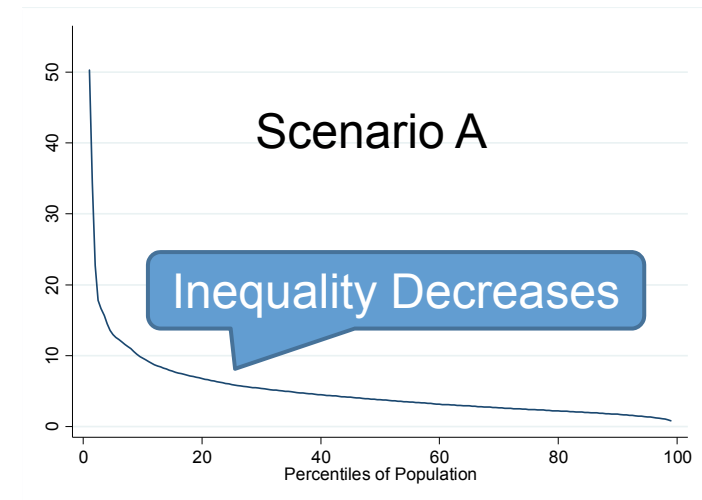


Distribution

Theoretical Framework

- ▶ Define a Rent-Incidence Curve:

- ▶
$$g_q = \frac{y_q^j - x_q}{x_q} = \frac{(x + r^j)_q - x_q}{x_q}$$



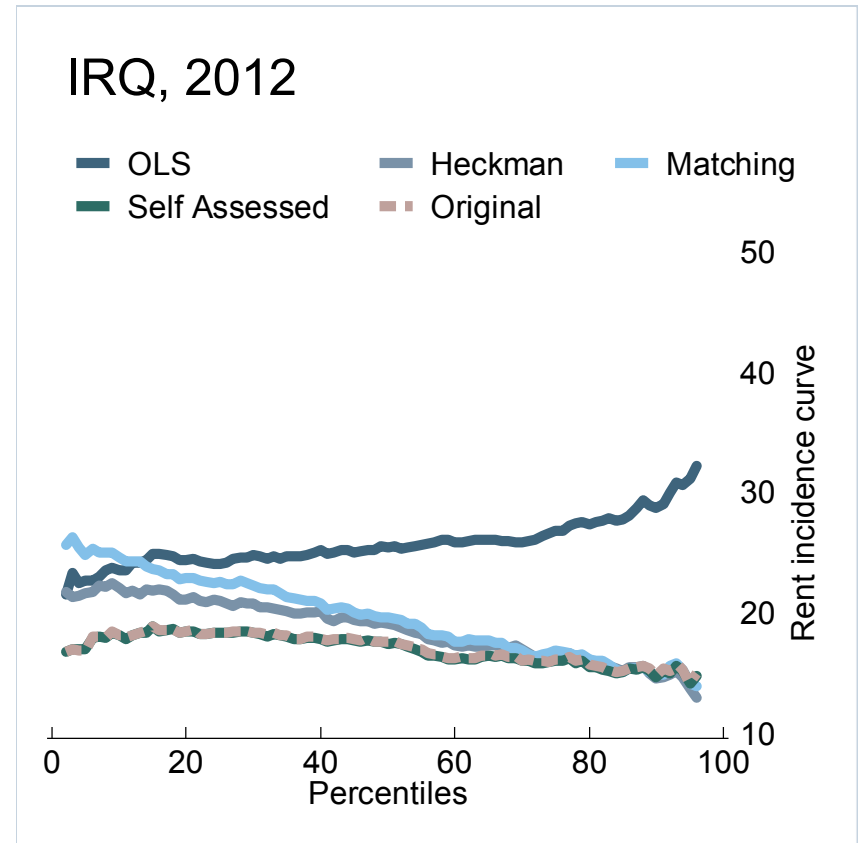
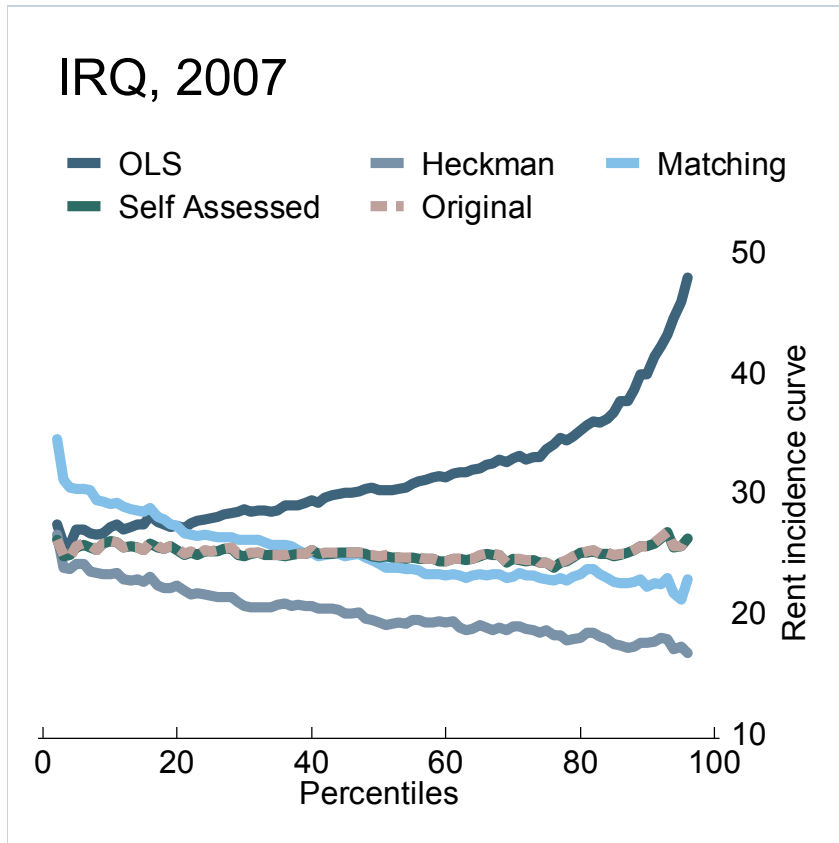
Distribution

Evidence from the Literature

- ▶ In general, the literature finds that including rents reduces inequality
- ▶ Mainly developed countries
- ▶ Mostly income as welfare aggregate
- ▶ Some examples:
 - ▶ Guenard and S. Mesple-Soms (2010) for Madagascar and Cote D'Ivoire: the poor are more likely to own their homes
 - ▶ Gasparini and Escudero (2004) for the Greater Buenos Aires area: large proportion of house-owners at the bottom of income distribution, and income elasticity in housing expenditure < 1
 - ▶ Törmälehto and Sauli (2010, 2013) for 29 EU-SILC countries: combined effect of the equalizing gap-effect and dis-equalizing re-ranking effect

Distribution

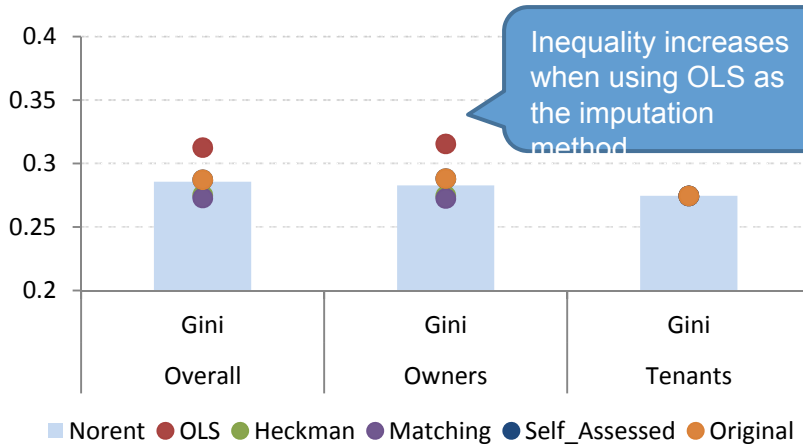
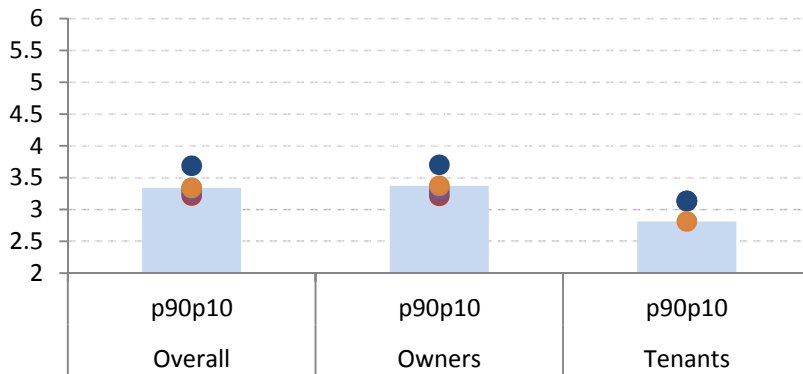
Our Findings – Rent Incidence Curve



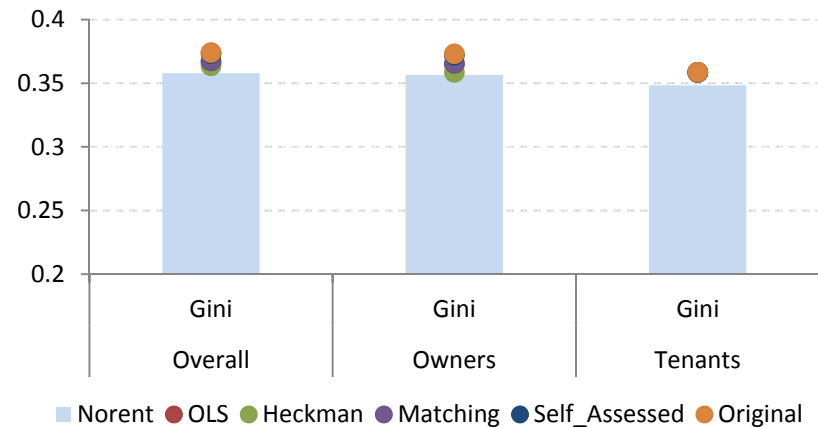
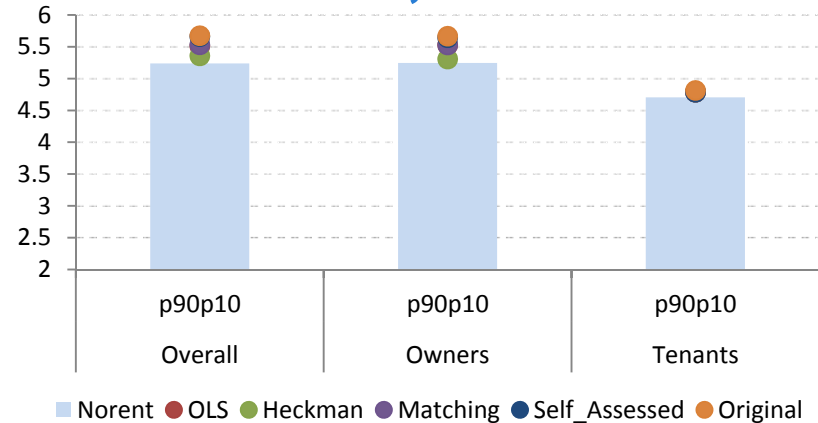
Distribution

Our Findings - Inequality

Iraq, 2012



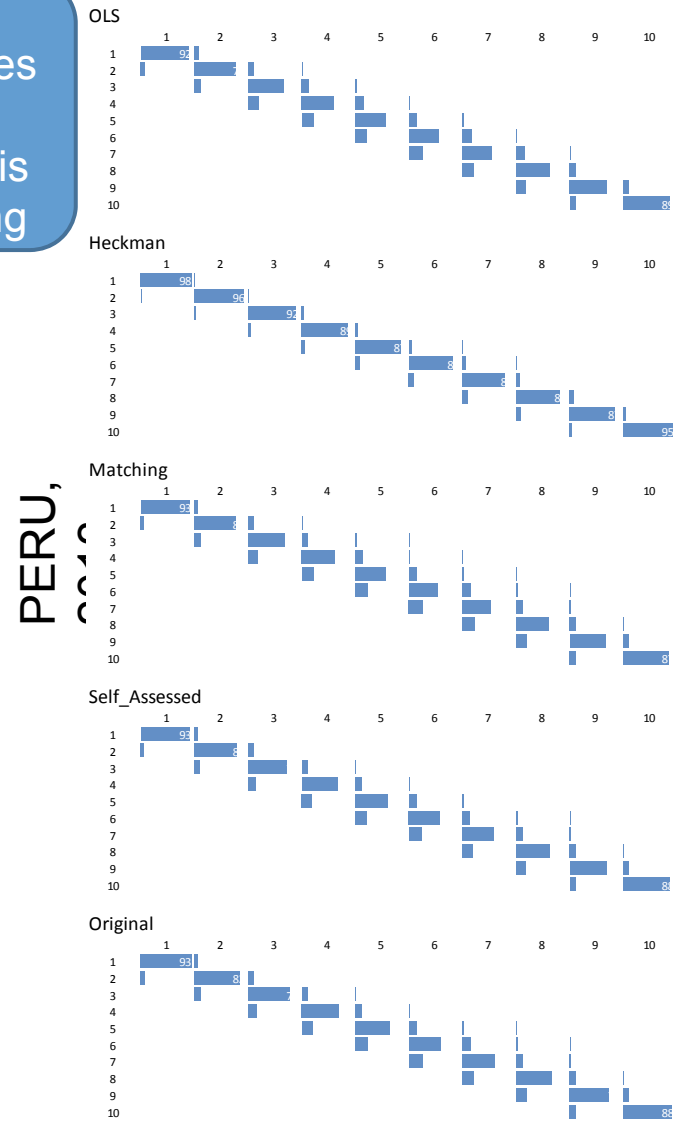
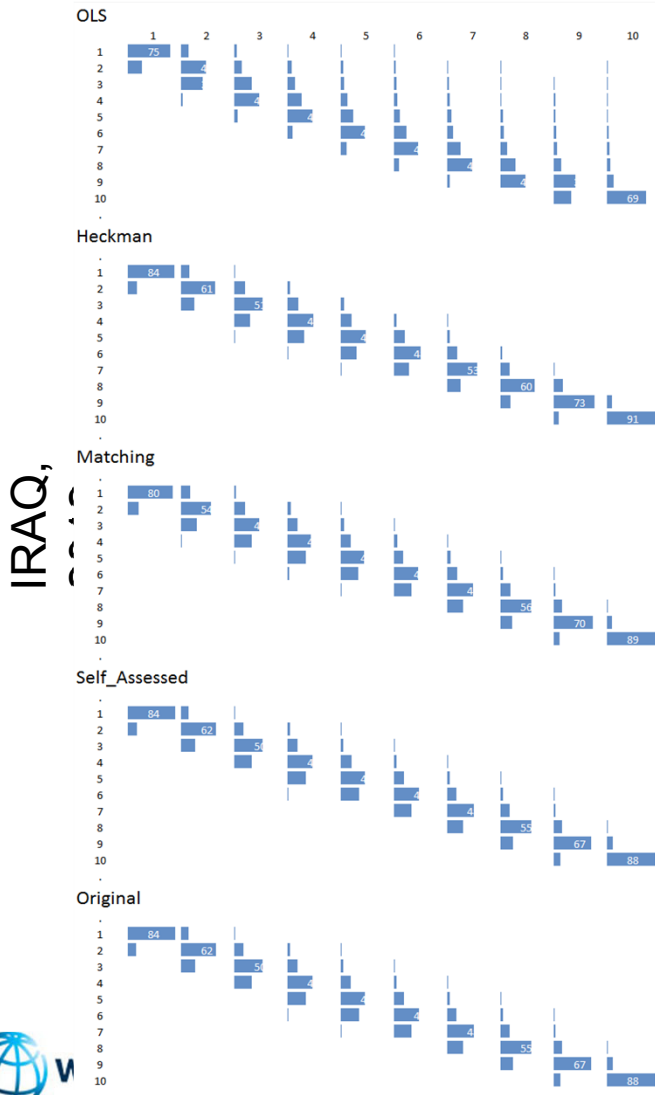
Peru, 2013



Distribution

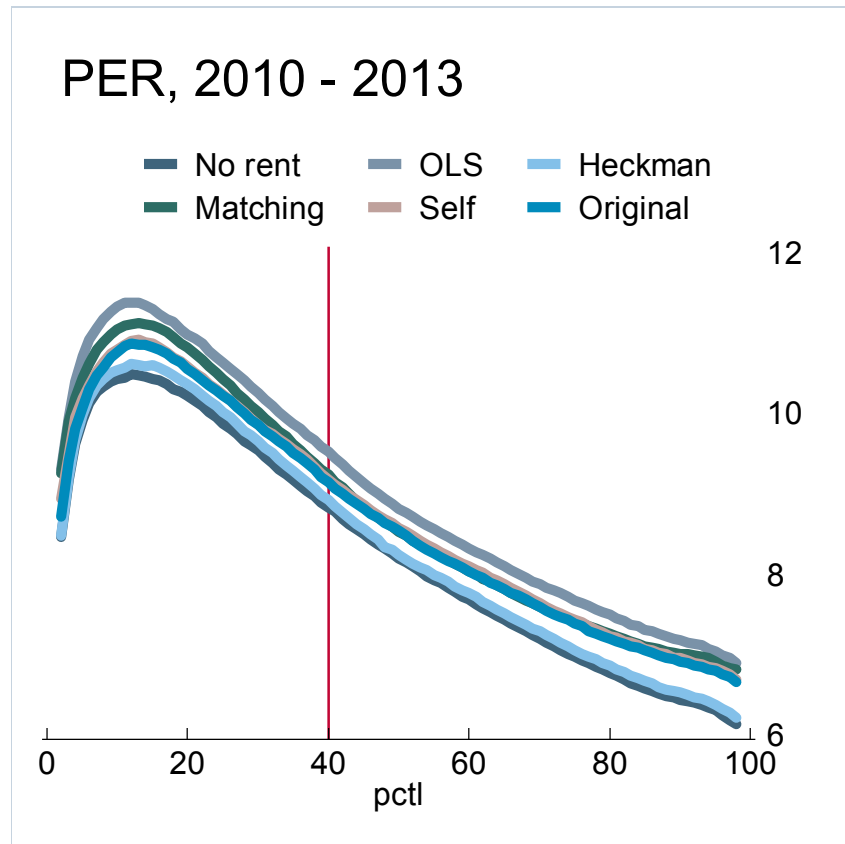
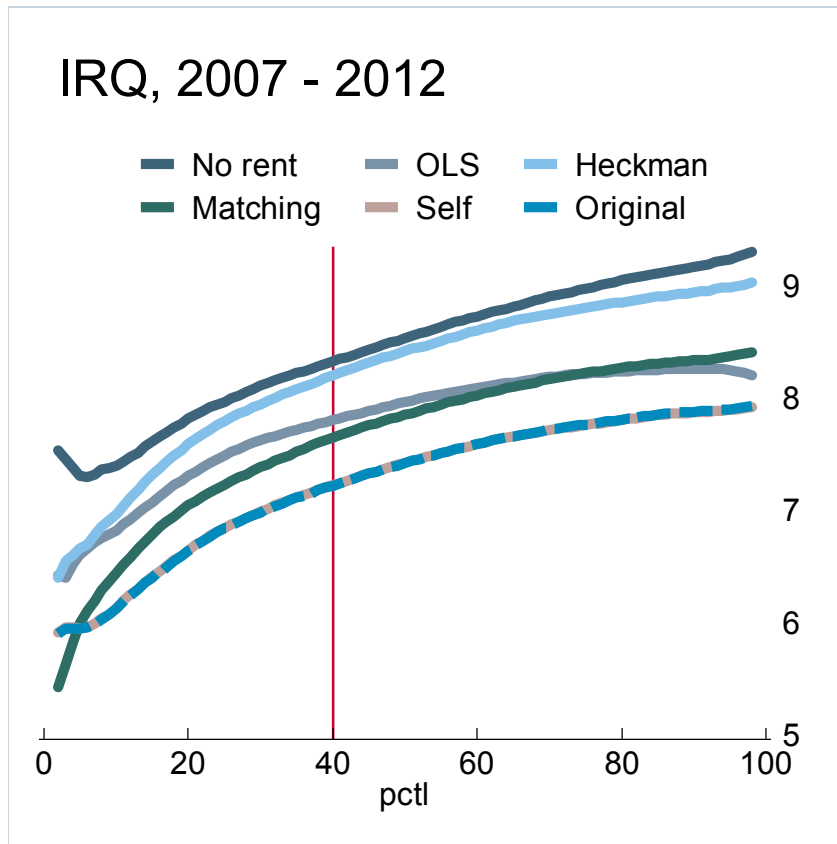
Our Findings - Re-ranking

Even if inequality does not change much, there is still re-ranking



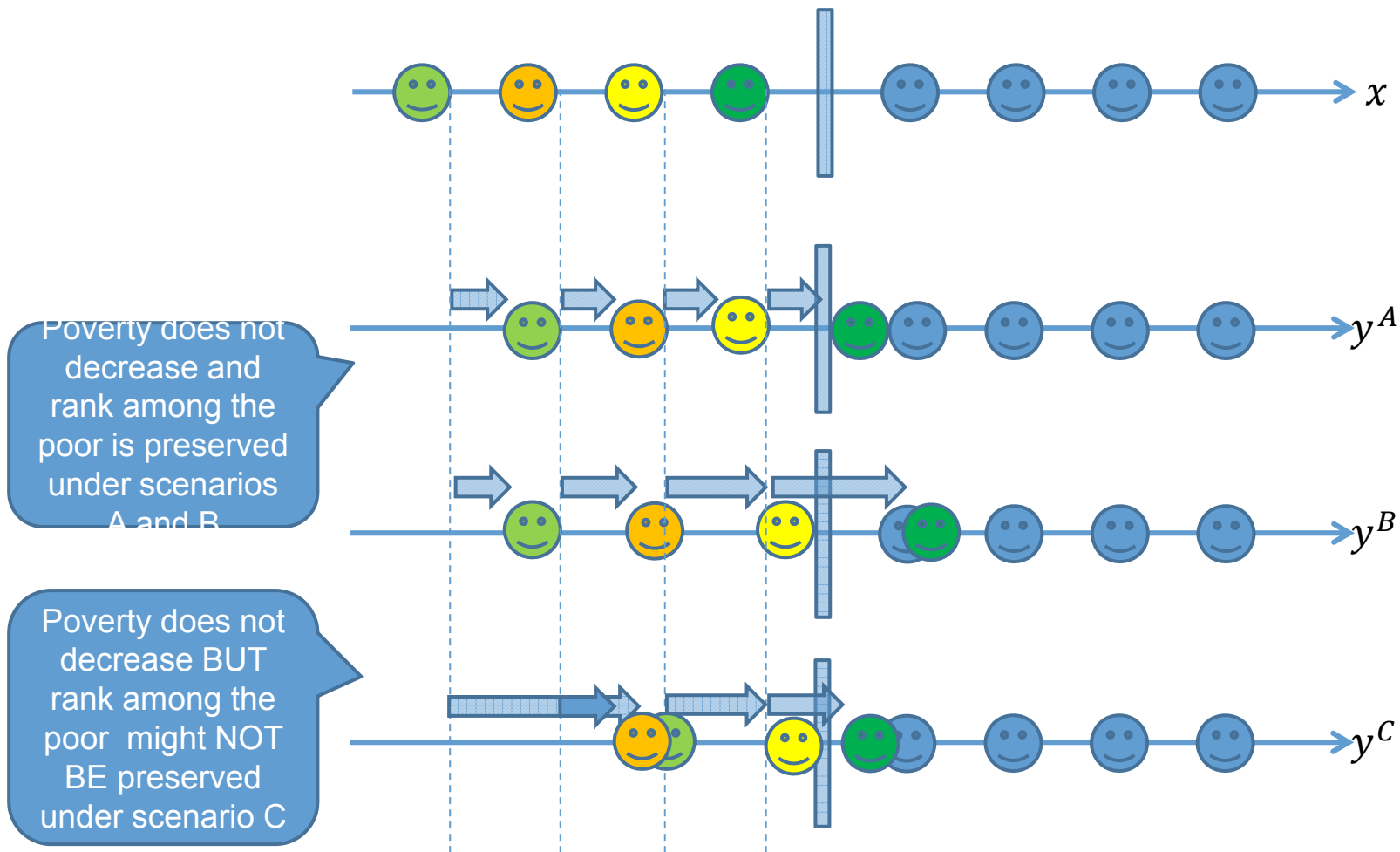
Distribution

Shared prosperity



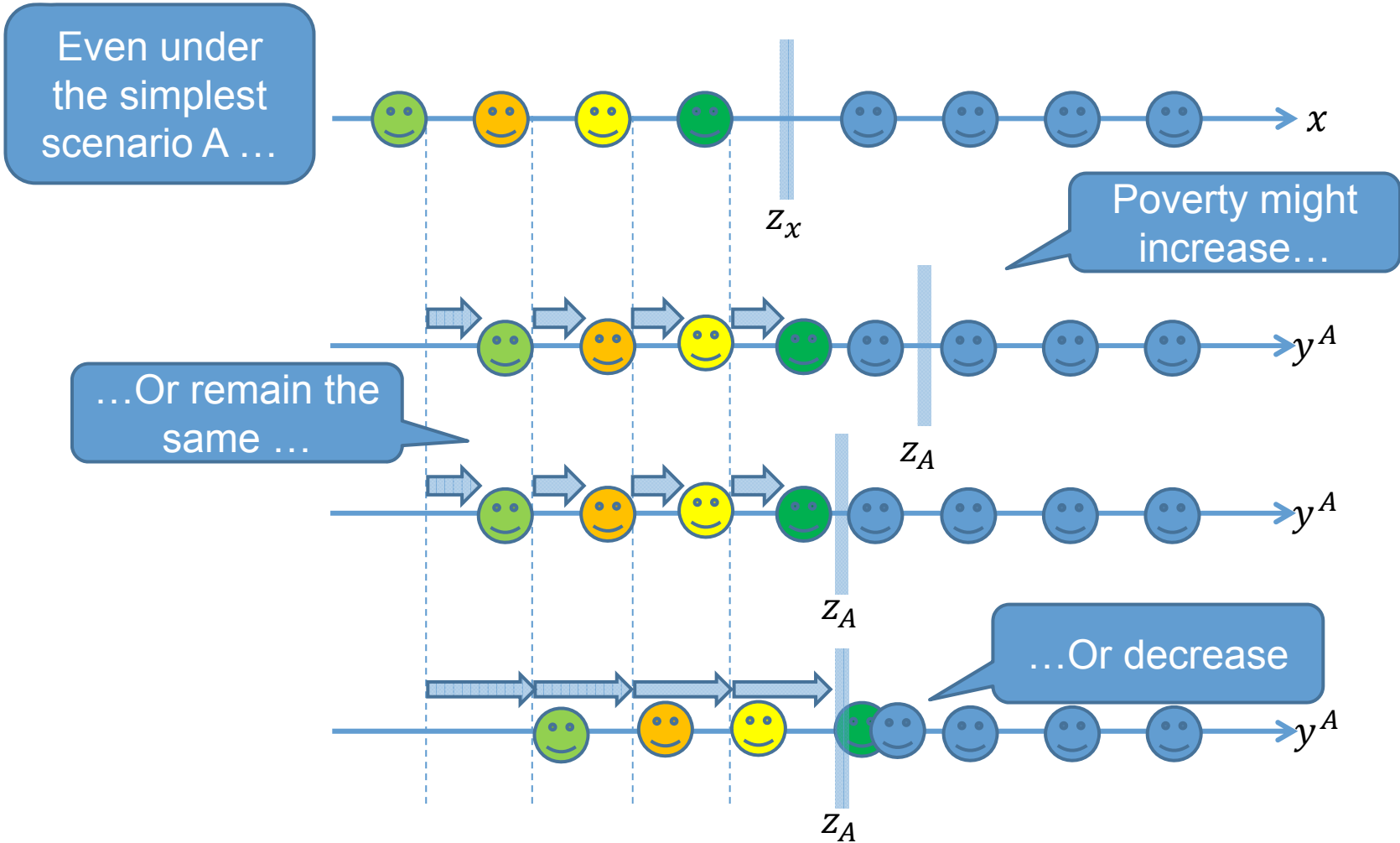
Poverty Indices

Theoretical Framework – Fixed Poverty Line



Poverty Indices

Theoretical Framework – Adjusted Poverty Line

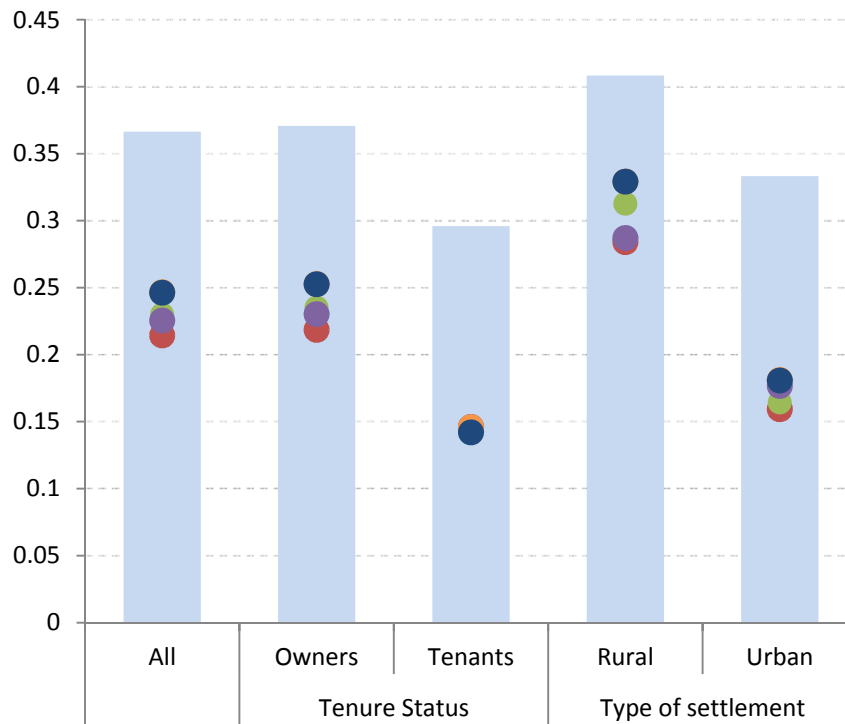


Poverty Indices – FGTO

Our Findings – adjusting poverty line

Iraq, 2012

Absolute, Fixed Poverty Line



Iraq, 2012

Absolute, Adjusted Poverty Line

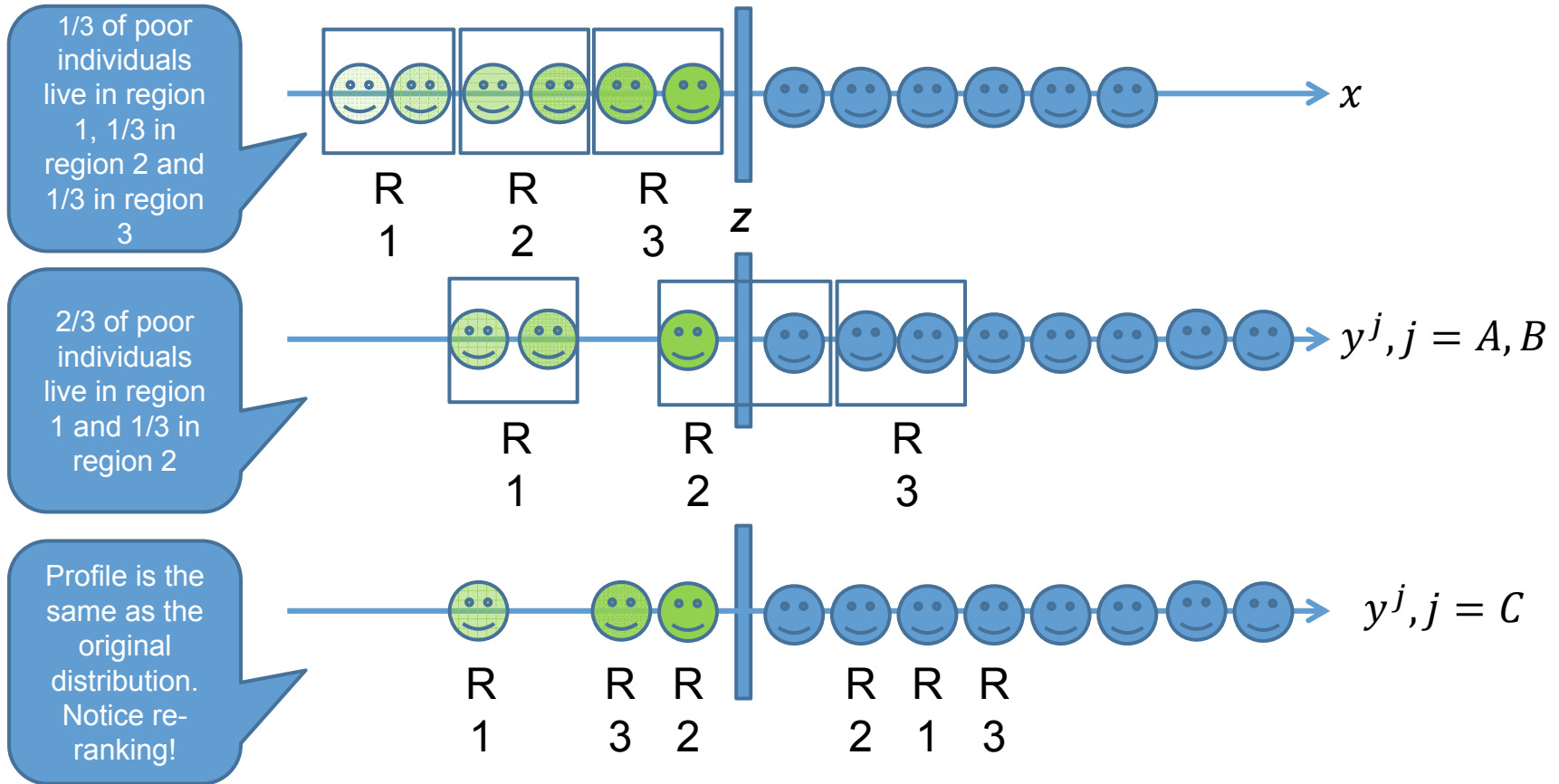


Legend: Noret (light blue bar), OLS (red dot), Heckman (green dot), Matching (purple dot), Self_Assessed (orange dot), Original (dark blue dot)

Legend: Noret (light blue bar), OLS (red dot), Heckman (green dot), Matching (purple dot), Self_Assessed (orange dot), Original (dark blue dot)

Poverty Profiles

Theoretical Framework – Fixed Poverty Line



► Other examples: urban/rural, minorities, education...

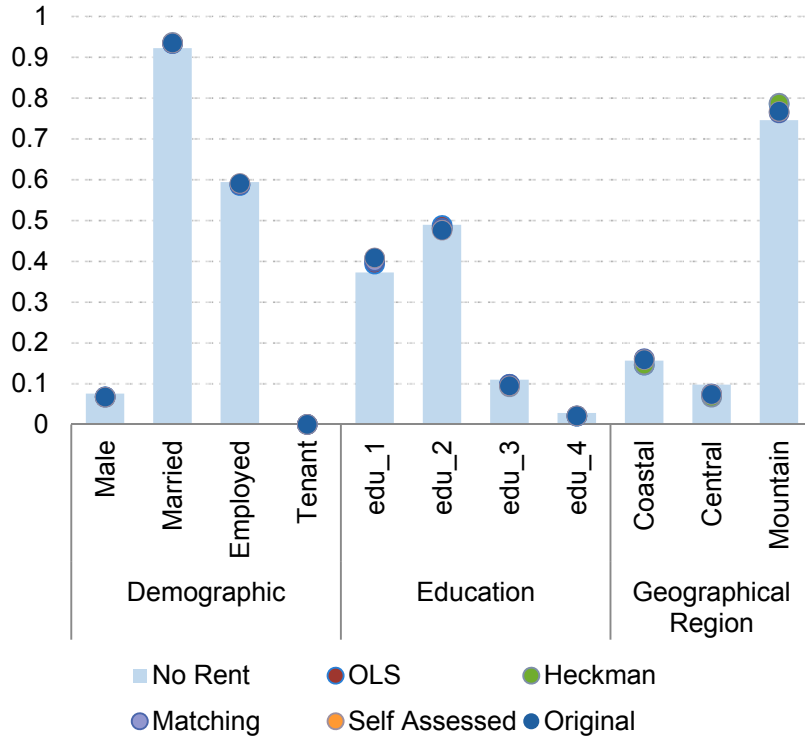
Poverty Profiles – FGTO

Our Findings

Iraq, 2013

Absolute, Fixed Poverty Line

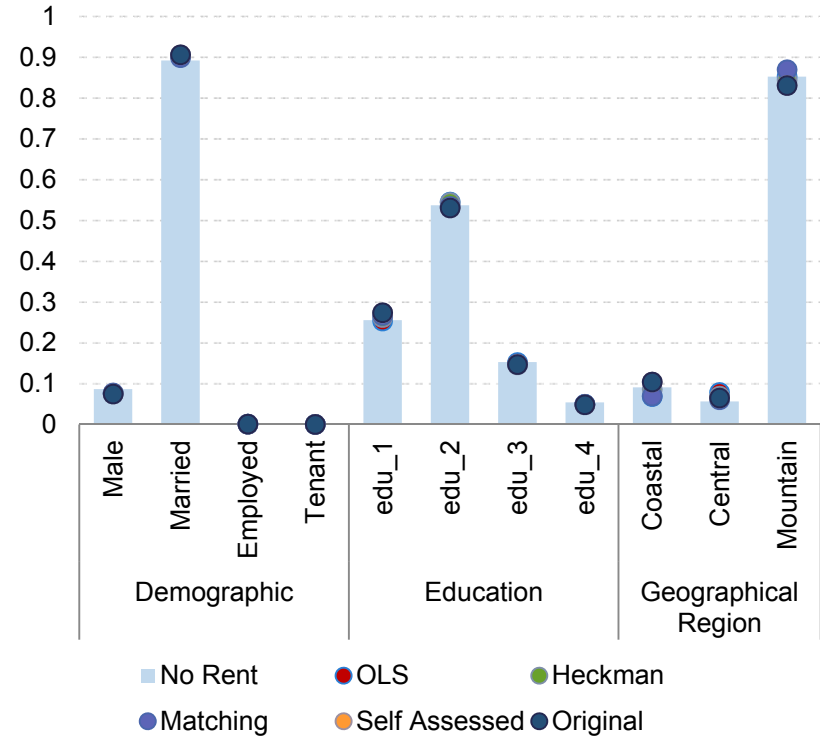
Share of poor individuals



Iraq, 2013

Absolute, Adjusted Poverty Line

Share of poor individuals



Poverty

Summary of Results

- ▶ As expected, poverty decreases by keeping fixed the poverty line and adding imputed rents to the consumption aggregate
- ▶ Poverty changes very little when the poverty line is adjusted by adding imputed rent in the non-food component
- ▶ With an adjusted poverty line poverty tends to slightly decrease for tenants and to increase in rural areas (particularly in Iraq and Peru)
- ▶ The profile of the poor does not seem to change, both keeping fixed and varying the poverty line, according to the imputation method used

Further Readings

the
review
of **income and wealth**

Review of Income and Wealth
Series 00, Number 00, Month 2017
DOI: 10.1111/roiw.12312

RENT-IMPUTATION FOR WELFARE MEASUREMENT: A REVIEW OF METHODOLOGIES AND EMPIRICAL FINDINGS

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MARCO RANZANI

The World Bank

