Measuring and Valuing Mobility

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Outline

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   - Ingredients
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2. Intuition
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3. Measurement
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4. Value
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Approaches to mobility

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Measurement addressed from different standpoints

- temporal context:
  - inter / intra-generational (Van de gaer et al 2001)
  - long term / volatility
- in relation to a specific dynamic model
- in relation to welfare issues
- as an abstract distributional concept

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Ingredients for a theory of mobility measurement:

- a time frame
- measure of individual status within society
- aggregation of changes in status over the time frame.

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- class k is associated with income level x_k where $x_k < x_{k+1}$, $k = 1, 2, ..., K-1$
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- mobility characterised by $\left(x_{k_0(1)}, ..., x_{k_0(n)}\right)$ and $\left(x_{k_1(1)}, ..., x_{k_1(n)}\right)$

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- Revaluing the income classes: $n_1(x_k) := \sum_{h=1}^{k} q_h,\ k = 1,...,K$

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Exchange and structural mobility: (Van Kerm 2004, Tsui 2009)

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- $S_1, ..., S_K \subset S$ such that $\cup_{k=1}^{K} S_k = S$ and $S_k \cap S_{k'} = \emptyset$
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From the mobility table construct other useful tools

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Convenient statistic to capture mobility implied by P:

$$m(P) := \frac{K - \sum_{k=1}^{k} p_{kk}}{K - 1}$$

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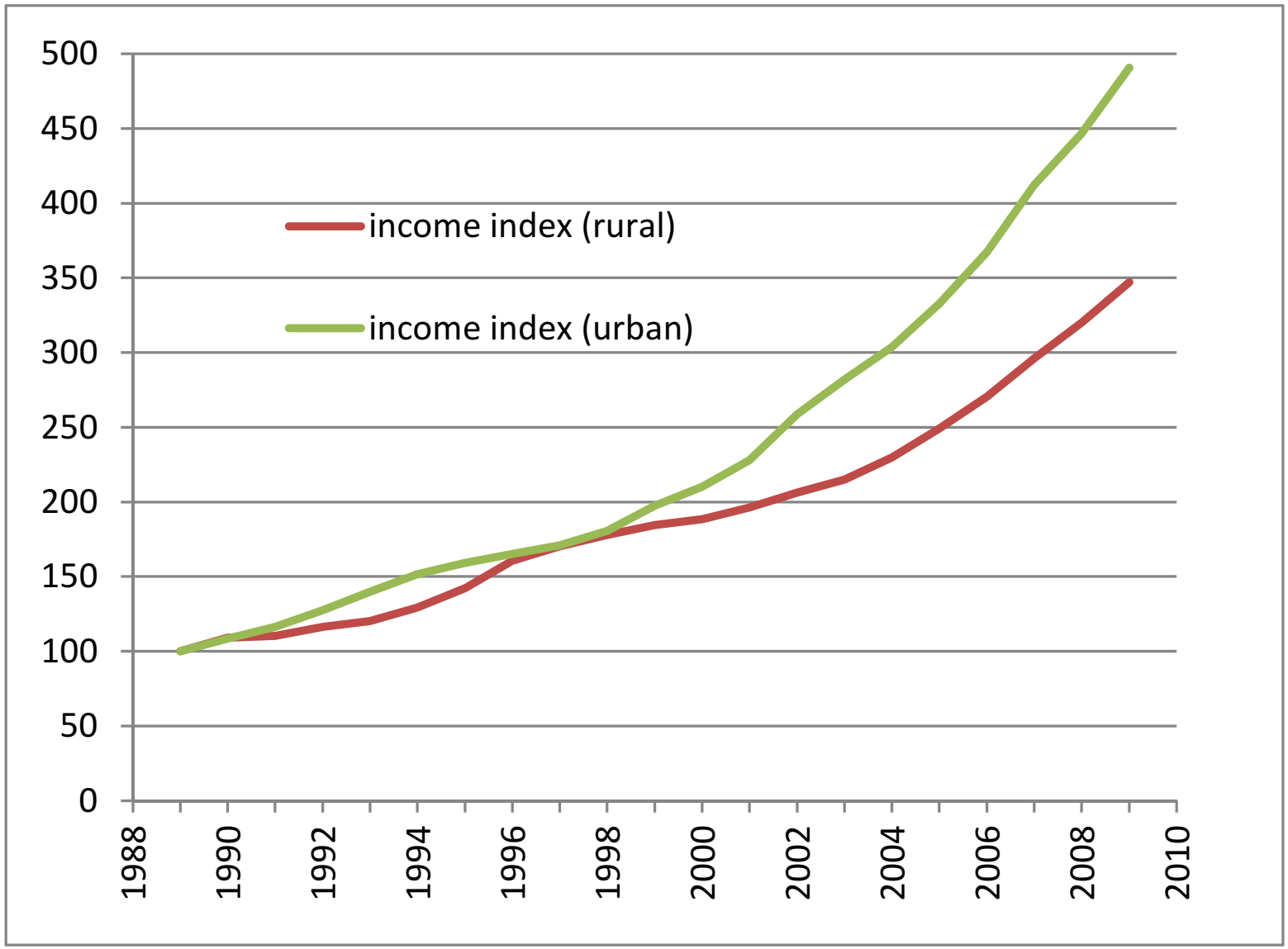
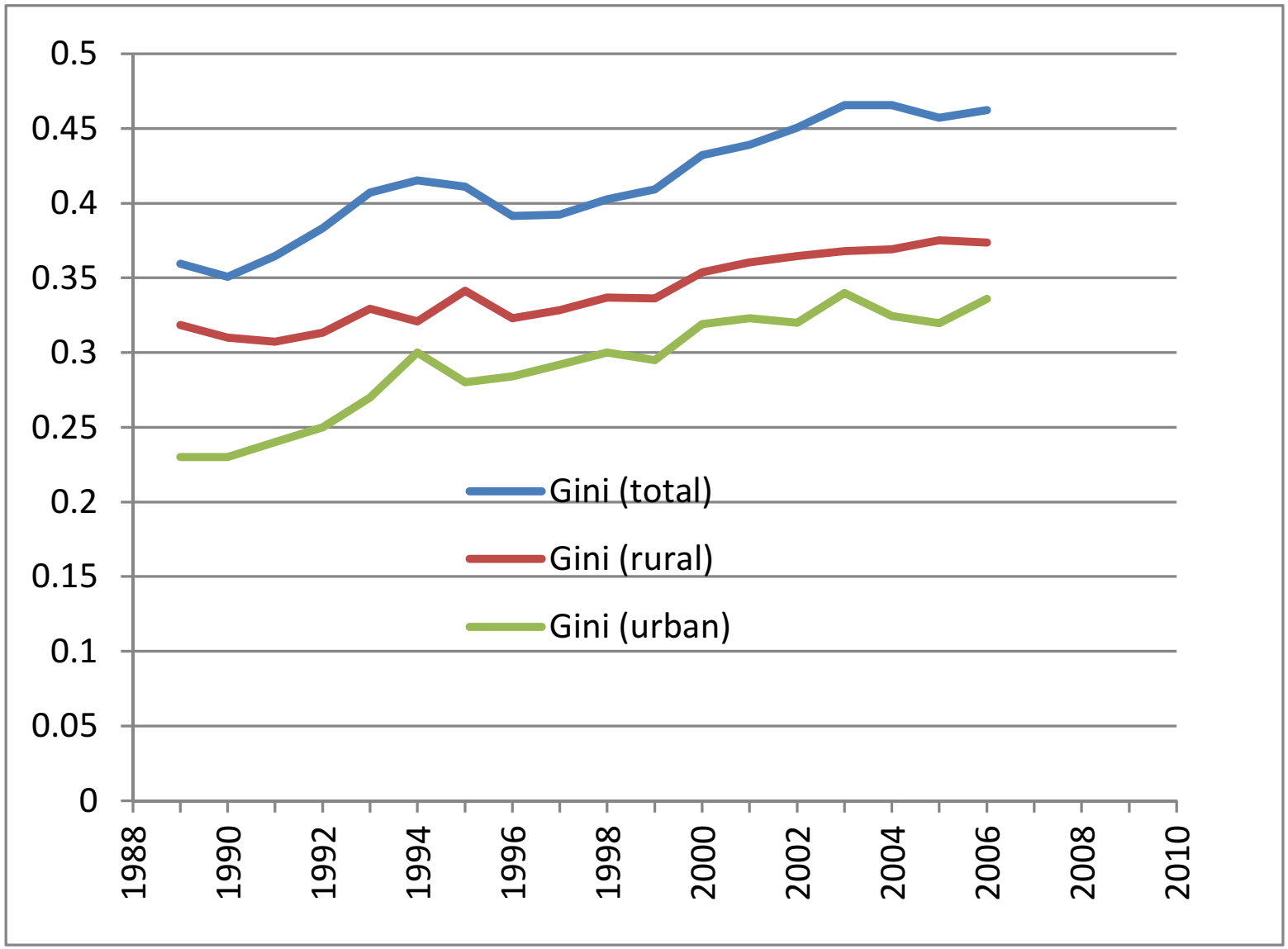
Example: China (income growth)



Example: China (income inequality)



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Extracted income series

- unit of analysis is the household
- equivalised total household income
- valued in 2009 Yuan

CHNS summary

	1989	*1991*	*1993*	*1997*	*2000*	*2004*	*2006*	*2009*
N	3,791	3,607	3,428	3,838	4,307	4,339	4,374	4,433
mean	5,552	5,371	6,172	7,453	9,452	11,730	13,681	19,418
median	4,752	4,689	4,898	6,068	7,450	8,491	9,446	13,938
Gini(T)	0.40	0.37	0.41	0.41	0.44	0.47	0.50	0.49
Gini(R)	0.43	0.40	0.42	0.42	0.45	0.48	0.51	0.50
Gini(U)	0.31	0.29	0.37	0.37	0.41	0.45	0.47	0.47
90/10(T)	7.80	6.89	8.09	8.55	10.75	13.50	13.84	13.11
90/10(R)	9.37	7.62	8.94	9.40	11.35	12.87	13.69	13.32
90/10(U)	3.94	4.49	6.43	6.66	8.05	12.40	12.69	10.89
cv(T)	1.10	0.72	0.86	0.84	1.02	1.01	1.32	1.27
cv(R)	1.24	0.80	0.86	0.87	1.06	1.02	1.35	1.27
cv(U)	0.87	0.56	0.83	0.78	0.94	0.95	1.25	1.24

CHNS: Rank mobility

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1989 \ 2000	1	2	3	4	5
1	**0.276**	0.250	0.194	0.160	0.120
2	0.260	**0.234**	0.216	0.167	0.123
3	0.190	0.231	**0.206**	0.231	0.143
4	0.135	0.163	0.221	**0.202**	0.278
5	0.137	0.123	0.162	0.241	**0.337**

CHNS: Rank mobility

		2000				
		1	*2*	*3*	*4*	*5*
1989	*1*	**0.276**	0.250	0.194	0.160	0.120
	2	0.260	**0.234**	0.216	0.167	0.123
	3	0.190	0.231	**0.206**	0.231	0.143
	4	0.135	0.163	0.221	**0.202**	0.278
	5	0.137	0.123	0.162	0.241	**0.337**

		2009				
		1	*2*	*3*	*4*	*5*
2000	*1*	**0.337**	0.256	0.192	0.125	0.090
	2	0.256	**0.246**	0.210	0.163	0.125
	3	0.195	0.192	**0.204**	0.237	0.172
	4	0.122	0.170	0.206	**0.253**	0.249
	5	0.090	0.136	0.188	0.222	**0.362**

CHNS: mobility test

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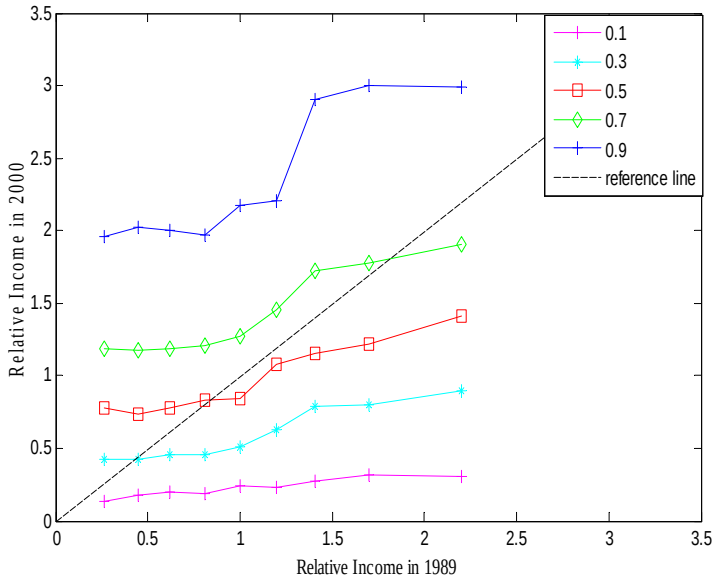
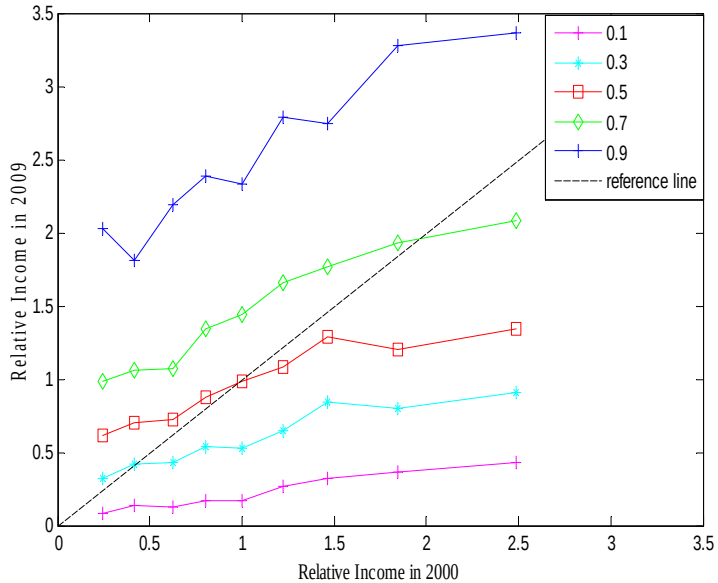
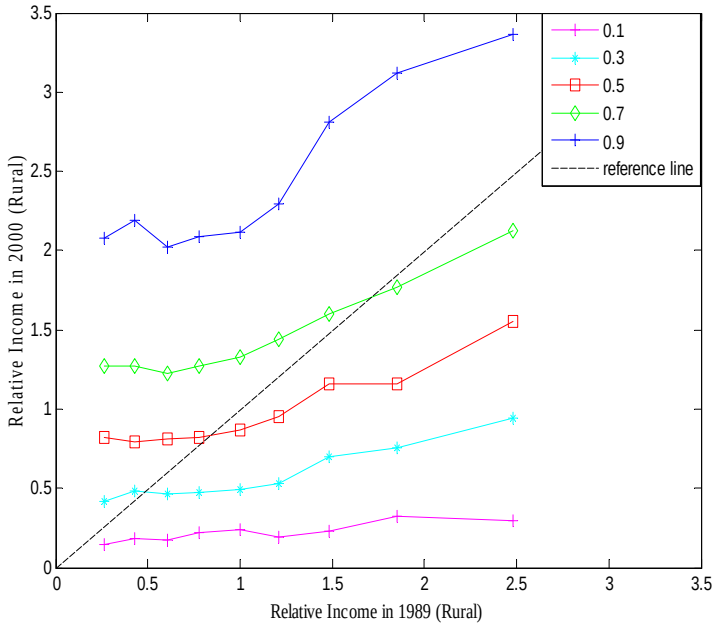
	1989-2000	*2000-2009*
Total	0.9363	0.8995
	[0.9274, 0.9451]	[0.8903, 0.9087]
Rural	0.9315	0.9098
	[0.9212, 0.9418]	[0.8992, 0.9203]
Urban	0.8965	0.8588
	[0.8783, 0.9147]	[0.8396, 0.8779]

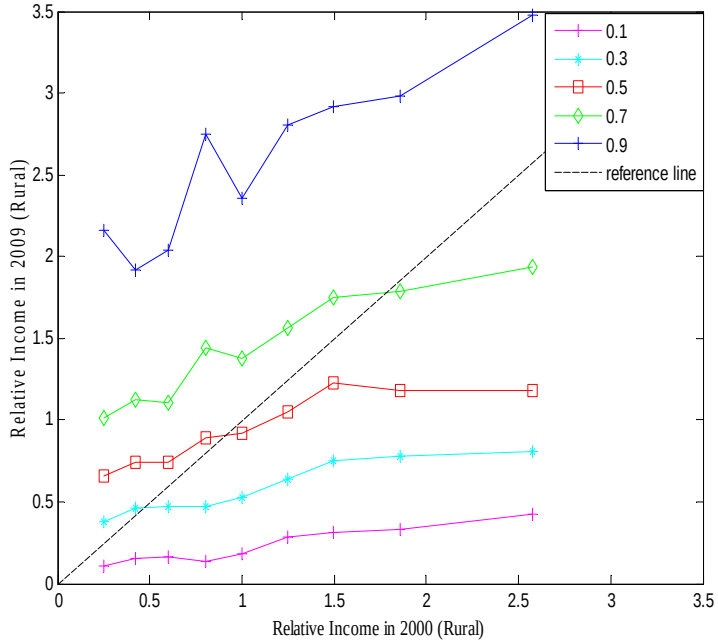
CHNS: Conditional quantiles (T)



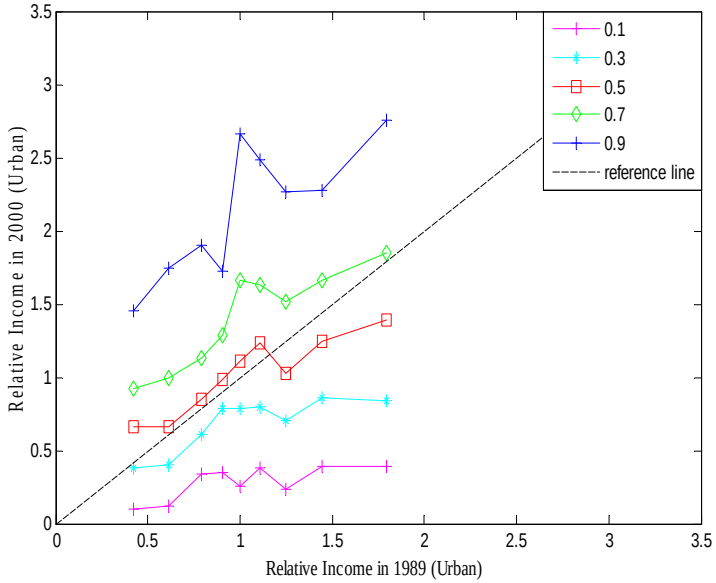


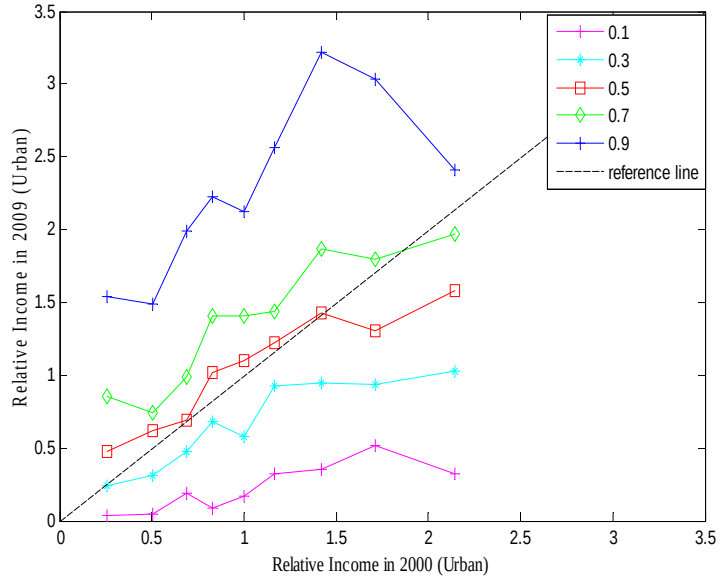
CHNS: Conditional quantiles (R)





CHNS: Conditional quantiles (U)





Outline

Method

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- social welfare
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- emerges from the axiomatisation

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Continuity $\succeq$ is continuous on Z^n

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Monotonicity. If $\mathbf{z}, \mathbf{z}' \in Z^n$ differ only in i then

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Local immobility. Let $\mathbf{z}, \mathbf{z}' \in Z^n$ be such that, for some i and j,
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Status scale irrelevance. For any $\mathbf{z}, \mathbf{z}' \in Z^n$ such that $\mathbf{z} \sim \mathbf{z}'$,
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Mobility scale irrelevance. Suppose there are $\mathbf{z}_0, \mathbf{z}_0' \in Z^n$ such that $\mathbf{z}_0 \sim \mathbf{z}_0'$. Then for all $t > 0$ and $\mathbf{z}, \mathbf{z}'$ such that $m(\mathbf{z}) = tm(\mathbf{z}_0)$ and $m(\mathbf{z}') = tm(\mathbf{z}_0')$: $\mathbf{z} \sim \mathbf{z}'$.

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This requires ϕ and $\bar{\phi}$ are equivalent to:

- $\psi\left(\sum_{i=1}^{n} \left[\frac{u_i}{\mu_u}\right]^{\alpha} \left[\frac{v_i}{\mu_v}\right]^{1-\alpha}\right)$

A class of mobility indices

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A suitable cardinalisation of $\psi(.)$ gives:

- $M_\alpha := \frac{1}{\alpha[\alpha-1]n} \sum_{i=1}^{n} \left[\left[\frac{u_i}{\mu_u} \right]^\alpha \left[\frac{v_i}{\mu_v} \right]^{1-\alpha} - 1 \right]$.

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We have a *class* of aggregate mobility measures

- high $\alpha > 0$: M sensitive to downward movements
- $\alpha < 0$: M sensitive to upward movements

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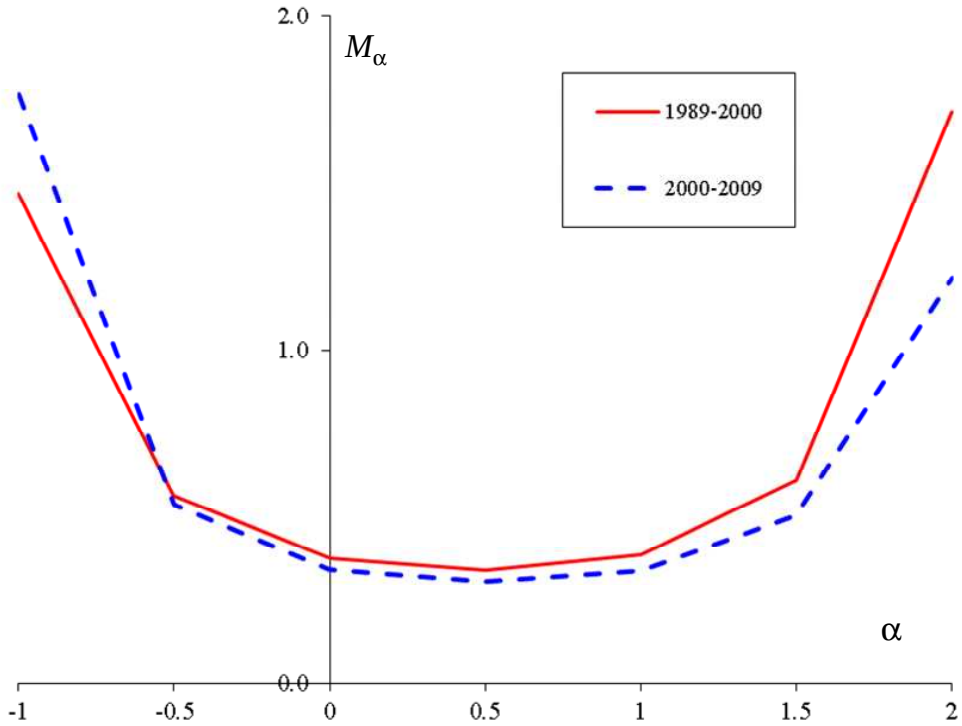
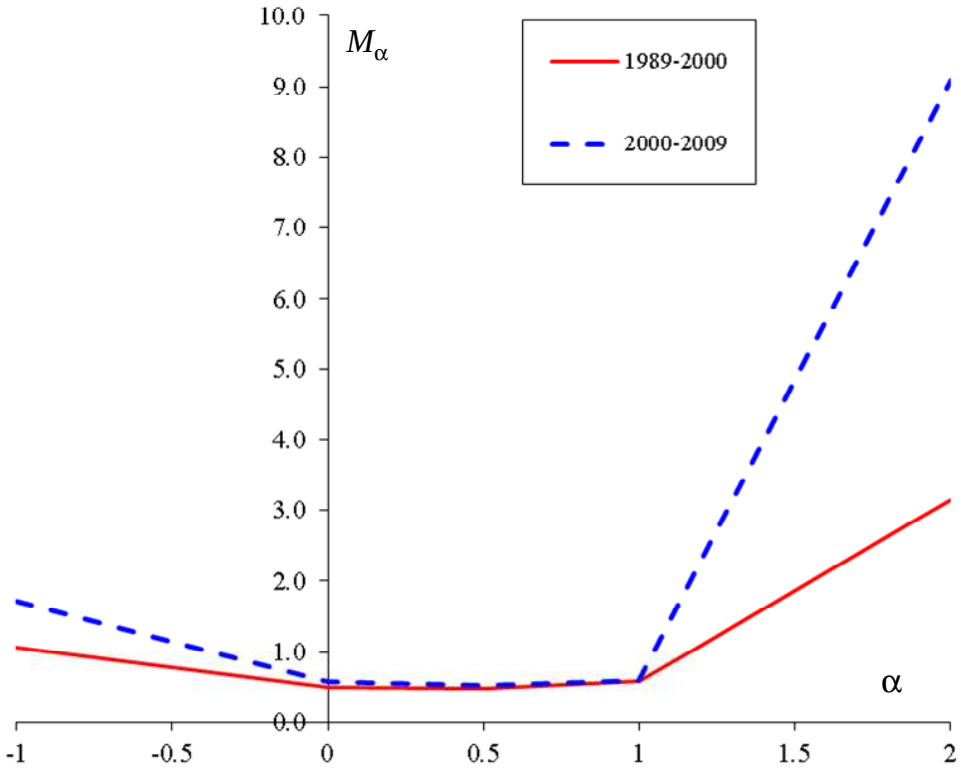


Income mobility



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- Non-utilitarian welfare principles?
  - Full mixing: equality of opportunity? (Shorrocks 1978, Dardanoni 93, Gottschalk and Spolaore 2002)
  - $\partial^2 U(P_i, P_j)/\partial P_i \partial C_j < 0$: move weight off-diagonal increase welfare? (Atkinson 1981, Atkinson and Bouguignon 1982)

Redistribution and mobility

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- Difference of views
  - on importance of effort and predetermined factors in inequality (Piketty 1995)
  - on trade-off between equality and mobility
  - look again at basic mobility table

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Society X

		Children		
		\$600	**\$1000**	
Parents	**\$200**	10	0	*10*
	\$600	0	10	*10*
		10	*10*	

Society Y

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- Parents have same inequality in X and Y
- Child distribution in X Lorenz dominates Y: Children's welfare higher in X?

Inequality and mobility 2

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- role of incentives for economic efficiency
- also fairness: rewards related to individual desert
- inequality accepted only to the extent it serves this purpose

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Investigate in ABCD study

- Amiel et al (2012)
- Based on Amiel-Cowell (1999) “bus queue” design

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- Common to empirical social choice

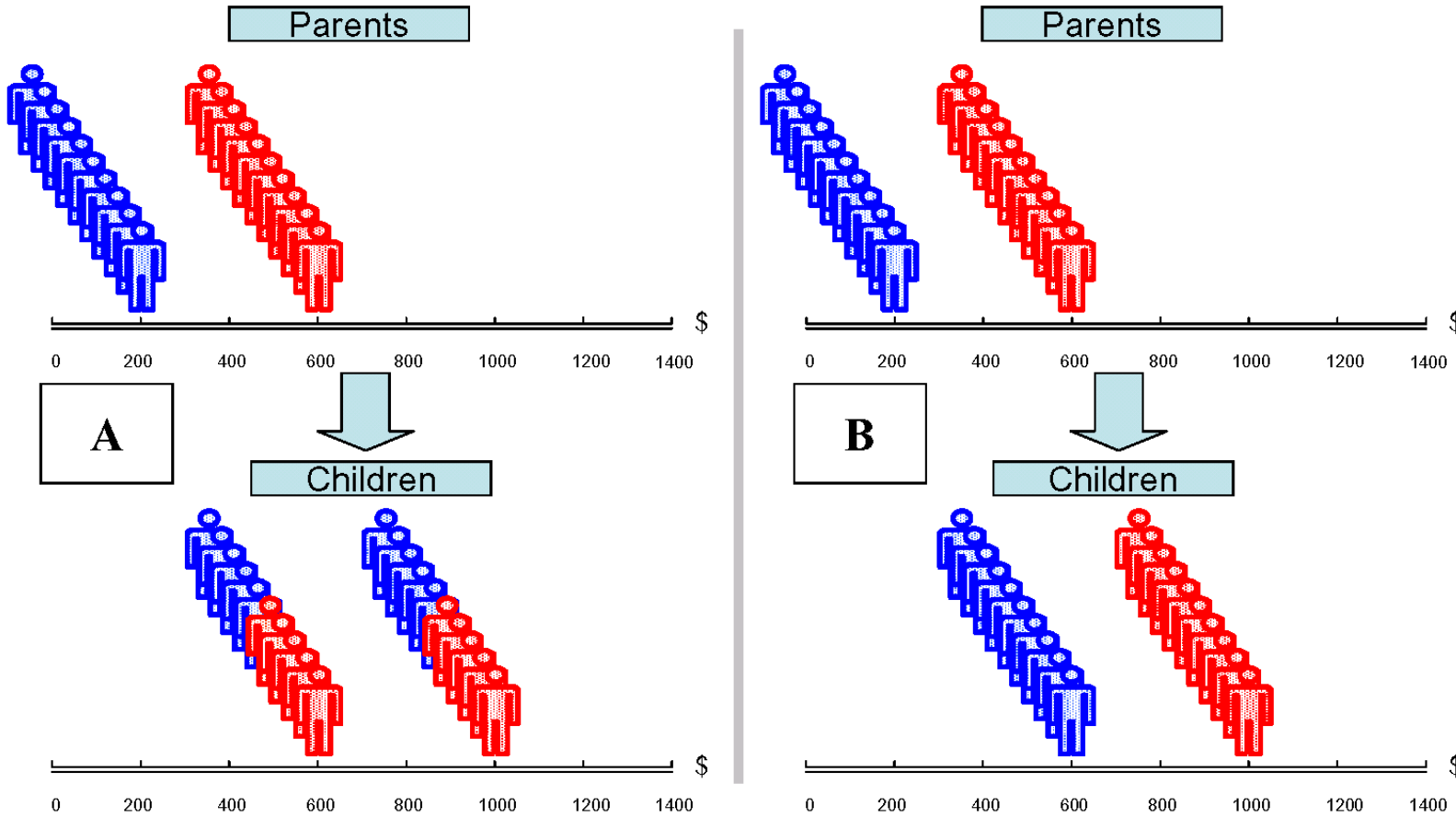
Investigate in ABCD study

- Amiel et al (2012)
- Based on Amiel-Cowell (1999) “bus queue” design

Implementation

- Student respondents
- Three countries: Israel, Italy, UK

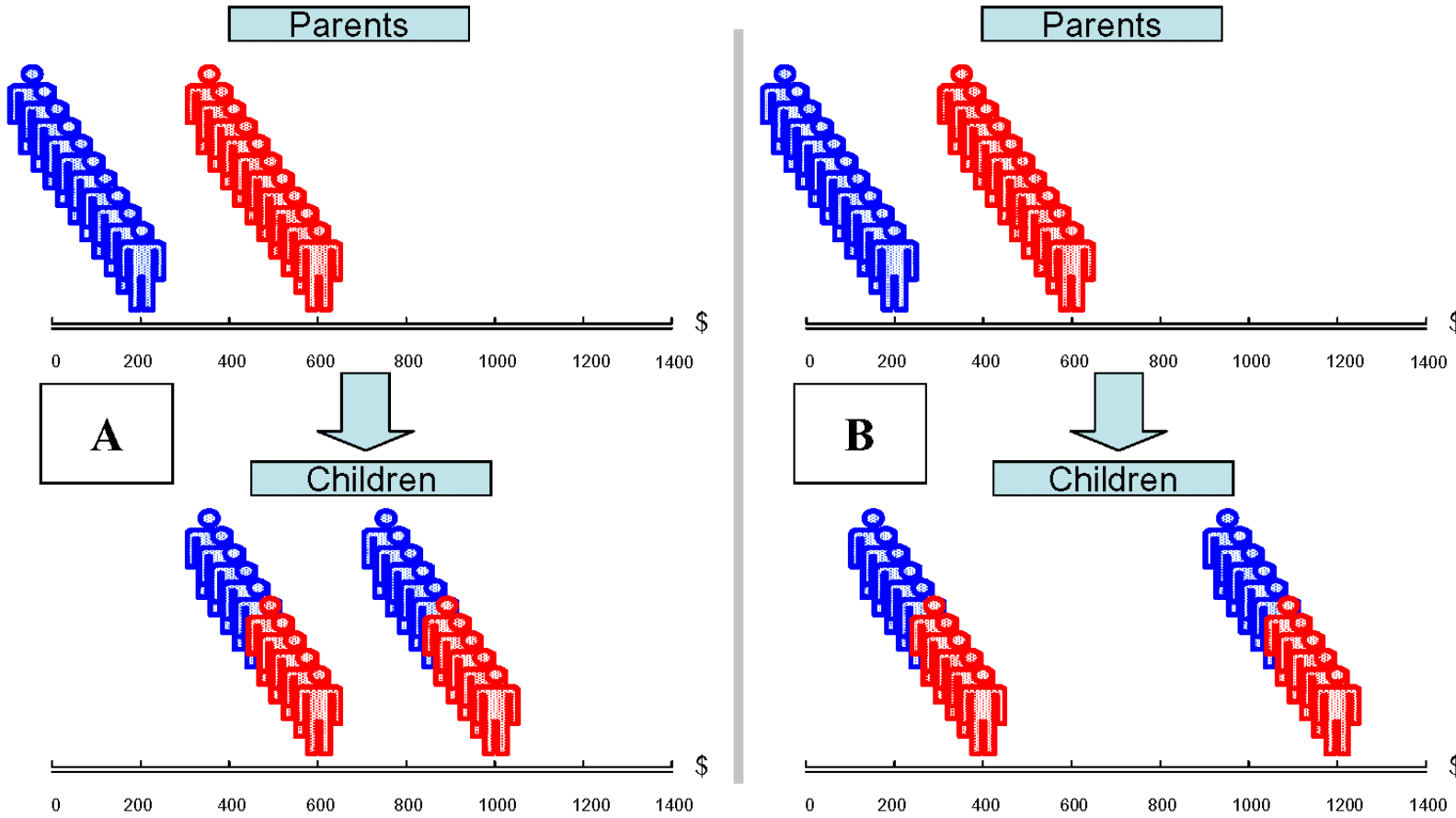
1 Full Mixing v Rigidity



Please check (✓) one :

A is preferable
B is preferable
A and B are equally preferable

2 Full Mixing and Widening



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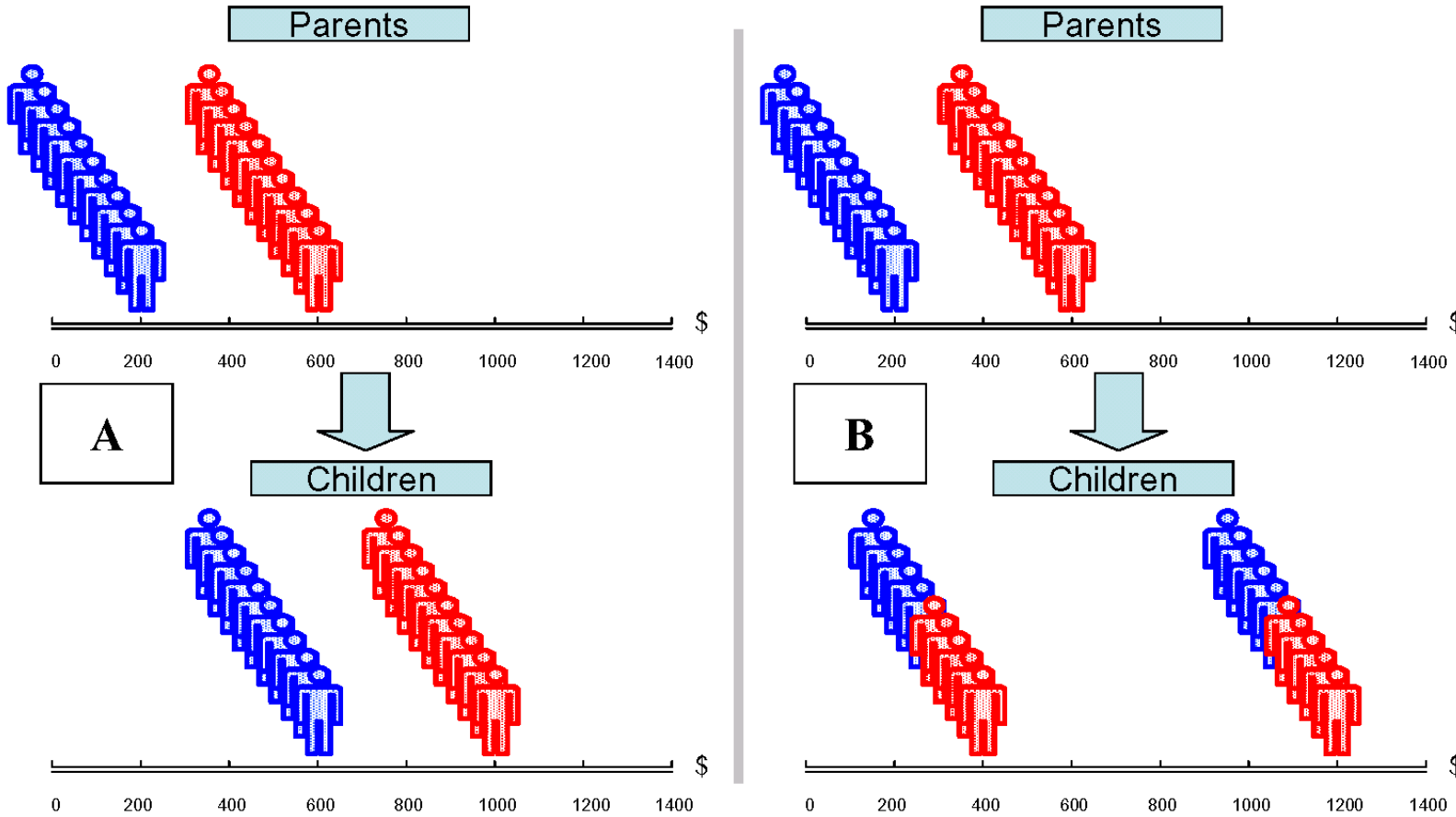
3 Rigidity v Full Mixing+Widening



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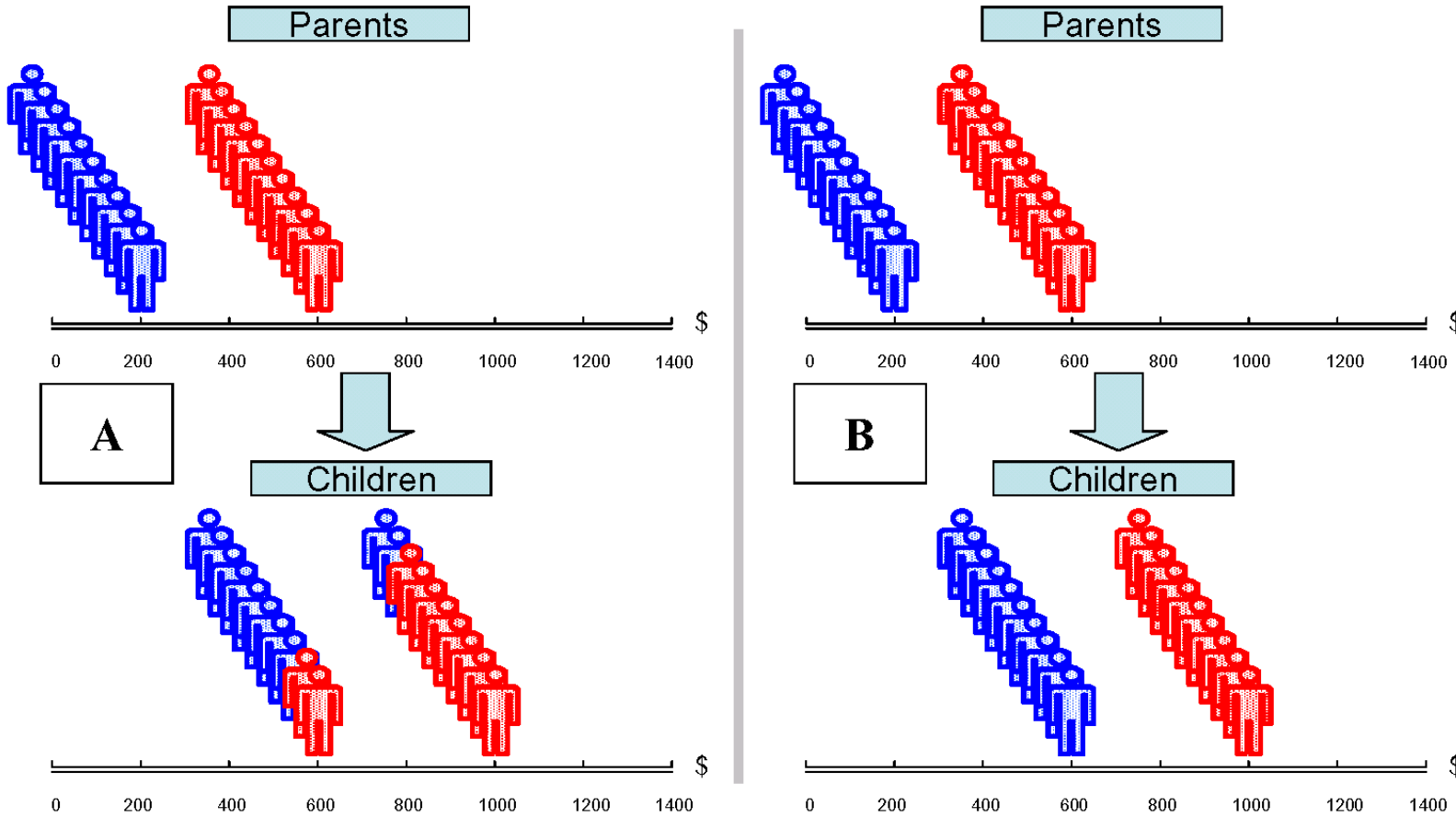
4 Partial mixing v Rigidity



Please check (✓) one:

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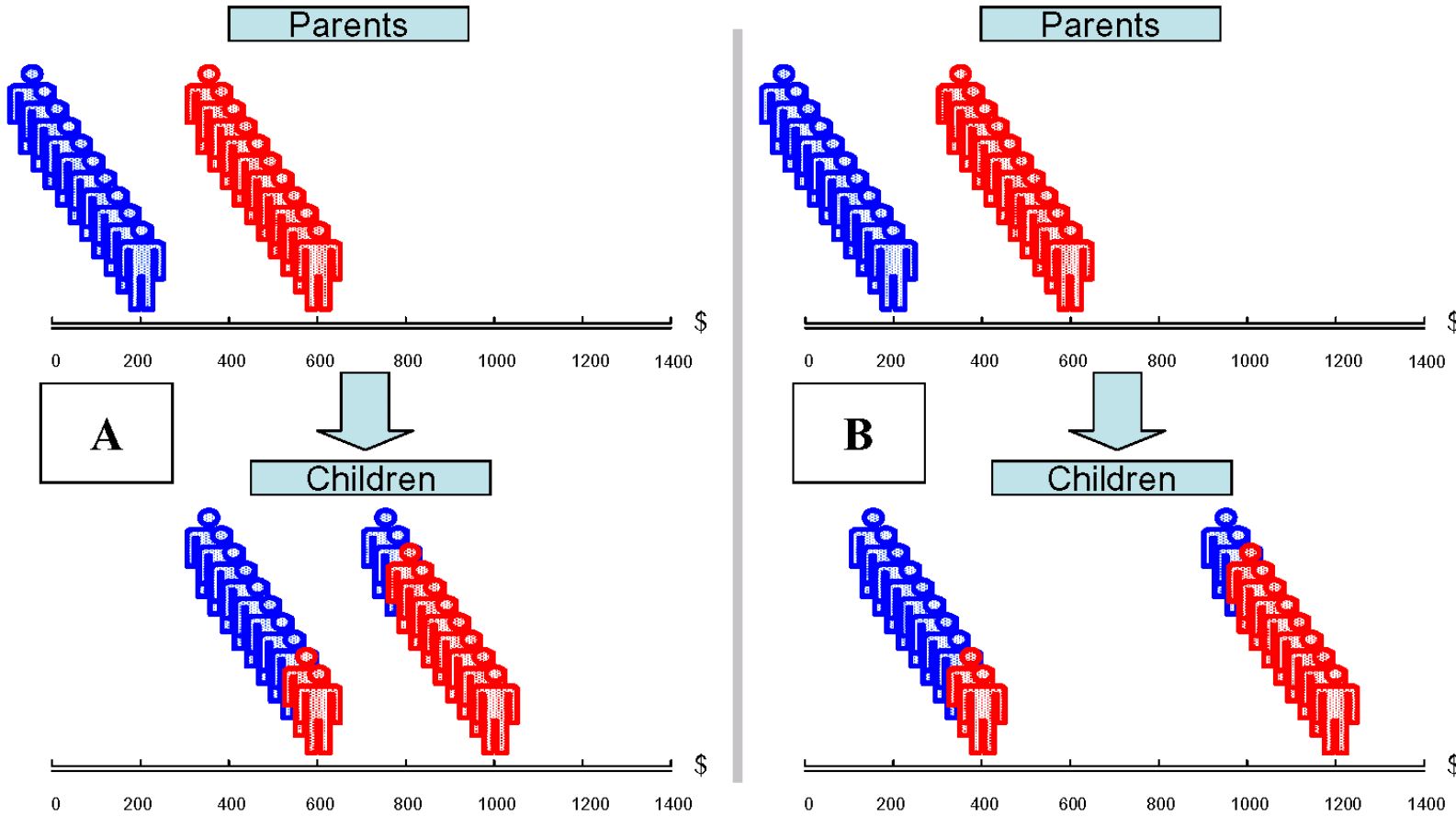
5 Partial Mixing and Widening



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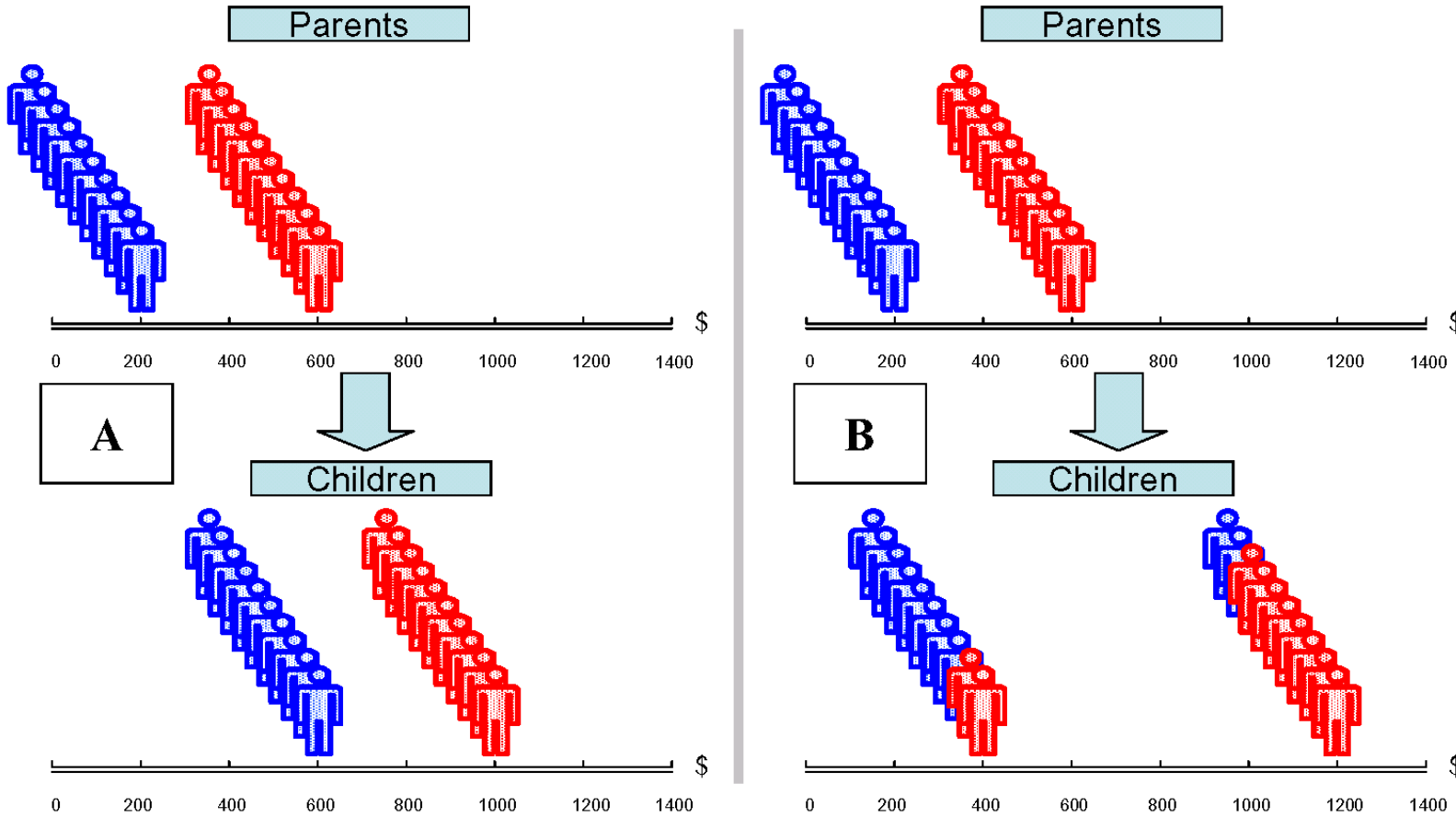
6 Rigidity v Partial Mixing+Widening



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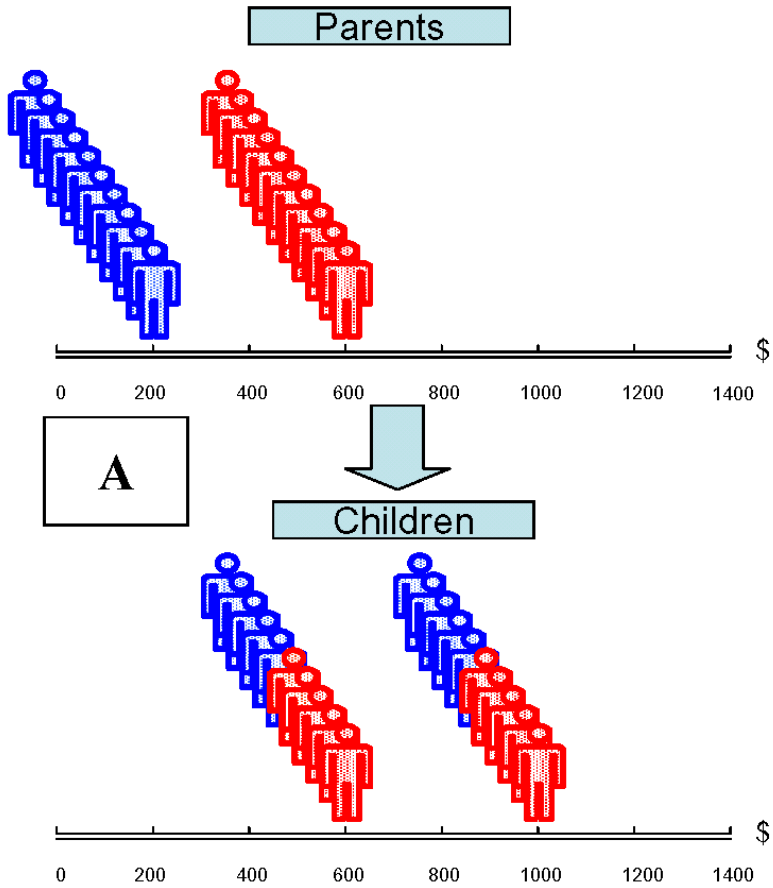
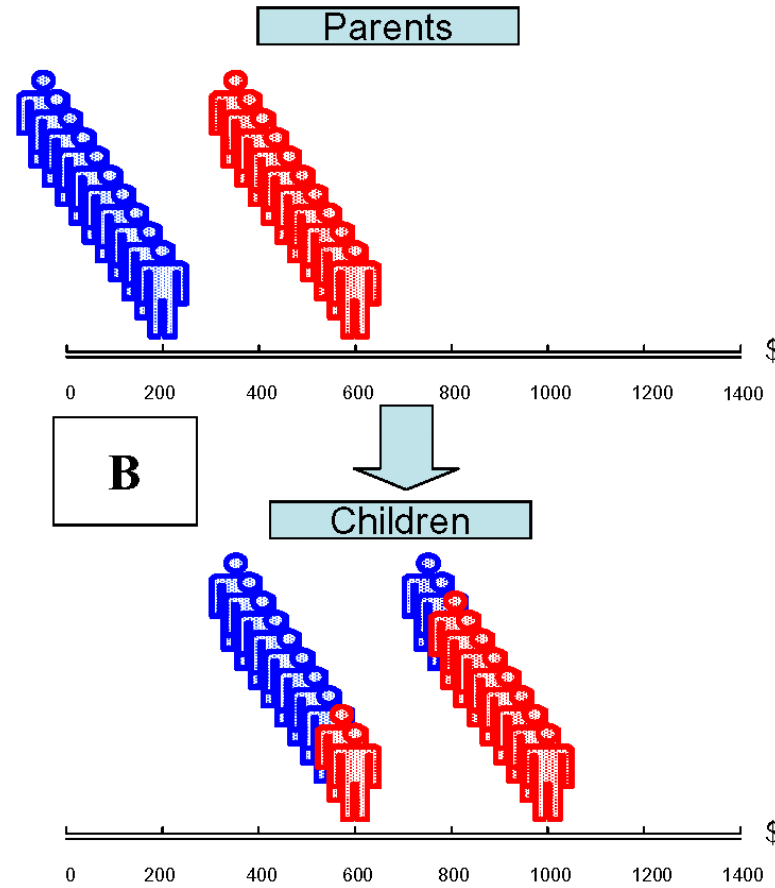
7 Full v Partial Mixing





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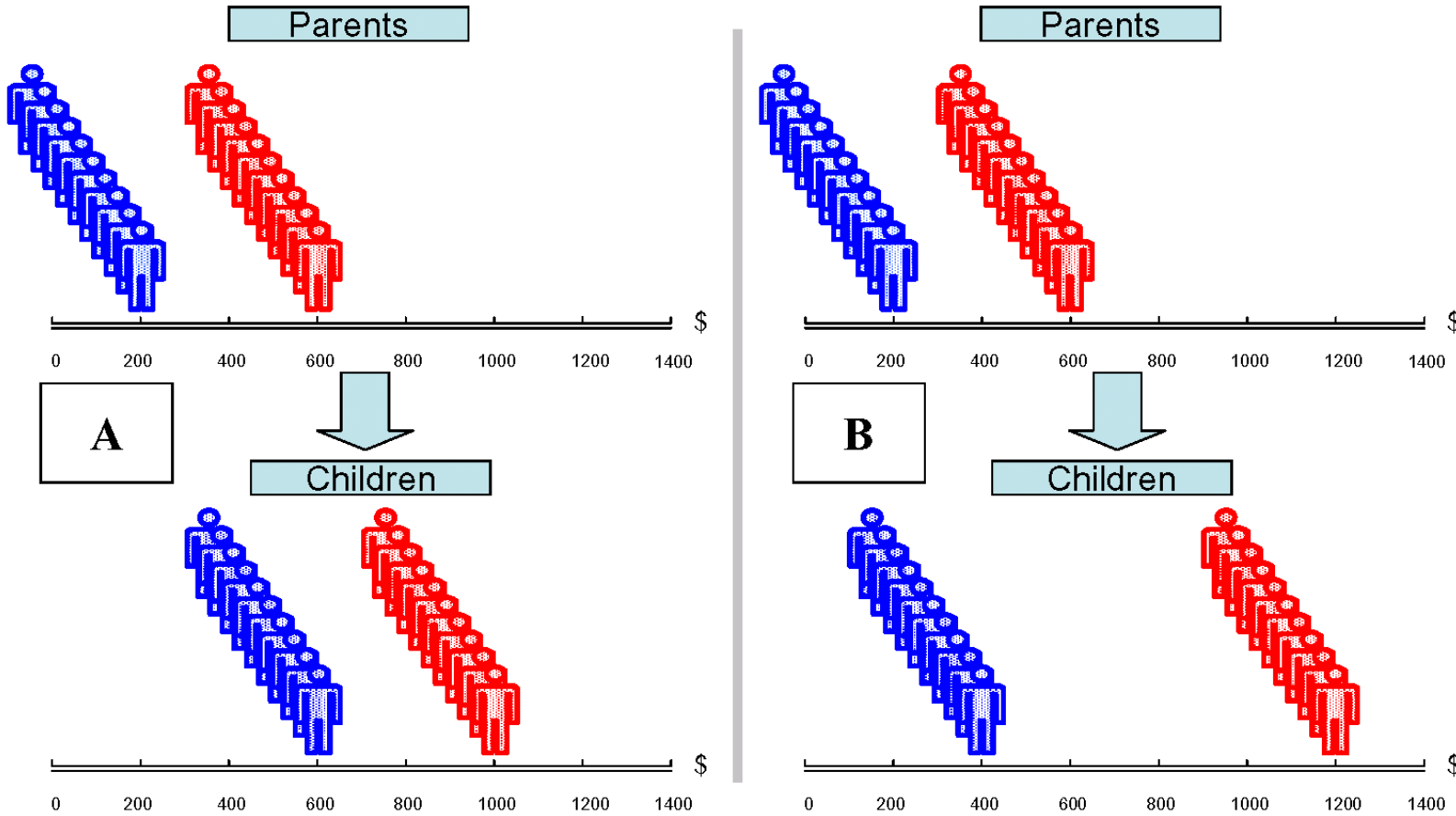
8 Rigidity v Simple Widening



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Outline

Do people value mobility? equality?

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- Mobility: Yes if A chosen more often than B in
  - Q1 (Full mixing v rigidity)
  - Q4 (Partial mixing v rigidity)
  - Q7 (Full v partial mixing)

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  - Q2 (Full mixing and widening)
  - Q5 (Partial mixing and widening)
  - Q8 (Rigidity v Simple widening)

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  - Q2 (Full mixing and widening)
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	Mobility			**Equality**		
	Q1	**Q4**	**Q7**	**Q2**	**Q5**	**Q8**
A	68.8	67.7	69.1	71.4	72.5	76.7
B	17.7	21.1	18.0	16.0	14.6	11.2
indiff	13.5	11.0	12.6	12.6	12.9	11.8

Does mobility induce lower support for equality?

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- Check if #B in Q2 (Full mixing+widening) > #B in Q5 (Partial mixing+widening) > #B in Q8 (Rigidity v widening)

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- Check if #B in Q2 (Full mixing+widening) > #B in Q5 (Partial mixing+widening) > #B in Q8 (Rigidity v widening)

	Q2				*Q5*		
Q5	*A*	*B*	*Indiff*	*Q8*	*A*	*B*	*Indiff*
A	62.08	5.90	4.49	A	65.63	5.92	5.35
B	5.34	7.02	2.25	B	2.25	6.76	2.25
Indiff	3.93	3.09	5.9	Indiff	4.51	1.97	5.35

Does mobility induce lower support for equality?

- Check if #B in Q2 (Full mixing+widening) > #B in Q5 (Partial mixing+widening) > #B in Q8 (Rigidity v widening)

	Q2				*Q5*		
Q5	*A*	*B*	*Indiff*	*Q8*	*A*	*B*	*Indiff*
A	62.08	5.90	4.49	A	65.63	5.92	5.35
B	5.34	7.02	2.25	B	2.25	6.76	2.25
Indiff	3.93	3.09	5.9	Indiff	4.51	1.97	5.35

- Although support for B increases, vastly outweighed by A
- Mobility not a substitute for equality
- Applies to all three subsamples

Willing to sacrifice equality for mobility?

- Yes if #B in Q3 (Rigidity v Mixing+Widening) > #B in Q6 (Rigidity v Partial Mixing+Widening) > #Q8 (Rigidity v Simple widening)

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- Yes if #B in Q3 (Rigidity v Mixing+Widening) > #B in Q6 (Rigidity v Partial Mixing+Widening) > #Q8 (Rigidity v Simple widening)

	Q3				*Q6*		
Q6	*A*	*B*	*Indiff*	*Q8*	*A*	*B*	*Indiff*
A	37.22	15.63	3.13	*A*	48.58	22.16	6.53
B	7.67	25.57	2.56	*B*	3.69	6.82	0.57
Indiff	2.56	3.41	2.27	*Indiff*	3.69	6.82	1.14

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- From simple percentages, clearly yes
- Applies to all three subsamples

Does more mobility elicit stronger preference?

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- Yes if #A in Q1 (Full Mixing v Rigidity) > #A in Q4 (Partial mixing v rigidity)
- Yes if #A in Q1 (Full Mixing v Rigidity) > #A in Q7 (Full v Partial Mixing)

Does more mobility elicit stronger preference?

- Yes if #A in Q1 (Full Mixing v Rigidity) > #A in Q4 (Partial mixing v rigidity)
- Yes if #A in Q1 (Full Mixing v Rigidity) > #A in Q7 (Full v Partial Mixing)

	Q1	**Q4**	**Q7**
Italy	60.83	56.67	68.33
UK	77.53	84.27	68.54
Israel	70.07	66.67	70.07

Mobility preferences: categorical variable

- Check for each person the answers to Q1,Q4,Q7
- Categorise 0A, 1A, 2A, 3A
- Calculate percentages in each category

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	0A	**1A**	**2A**	**3A**
Italy	10.8	24.2	33.3	31.7
UK	9.0	11.2	20.2	59.6
Israel	10.9	16.3	27.9	44.9
TOTAL	10.4	17.7	27.8	44.1

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- The higher the category, the greater the percentage (almost)
- Applies to all three subsamples

Equality preferences: categorical variable

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- Check for each person the answers to Q2,Q5,Q8
- Categorise 0A, 1A, 2A, 3A
- Calculate percentages in each category

Equality preferences: categorical variable

- Check for each person the answers to Q2,Q5,Q8
- Categorise 0A, 1A, 2A, 3A
- Calculate percentages in each category

	0A	**1A**	**2A**	**3A**
Italy	16.7	10.0	23.3	50.0
UK	13.5	6.7	11.2	68.5
Israel	9.5	14.3	19.7	56.5
TOTAL	12.9	11.0	18.8	57.3

Equality preferences: categorical variable

- Check for each person the answers to Q2,Q5,Q8
- Categorise 0A, 1A, 2A, 3A
- Calculate percentages in each category

	0A	**1A**	**2A**	**3A**
Italy	16.7	10.0	23.3	50.0
UK	13.5	6.7	11.2	68.5
Israel	9.5	14.3	19.7	56.5
TOTAL	12.9	11.0	18.8	57.3

- Except for 0A,1A, the higher the category, the greater the percentage
- Similar across subsamples

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- Majority of subjects prefer society where mobility is higher
- In most cases more mobility induces stronger preferences
- Majority of subjects prefer the society where inequality is lower
- Preferences for income equality do not become weaker with more income mobility
- Trade-off between preferences for mobility and for equality;
  - subjects willing to sacrifice some equality
  - if this is necessary to obtain more mobility

Outline

Regression model

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- Seek to explain
  - attitudes to mobility
  - attitudes to equality

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- Dependent variable is categorical
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Regression model

- Seek to explain
  - attitudes to mobility
  - attitudes to equality
- Dependent variable is categorical
  - mobility preferences 0A, 1A, 2A, 3A
  - equality preferences 0A, 1A, 2A, 3A
- Independent variables: personal characteristics
- Use ordered probit

Personal characteristics 1

1) How old are you? _____.(years)

2) Are you □ male? □ female?

3) Do you consider yourself:

□ *British?* □ *other European?* □ *Chinese?* □ *other Asian?*

□ *North American?* □ *Latin-American/Caribbean?* □ *other? (___)*

4) How would your rank the income of your family?

□ *very low* □ *low* □ *adequate* □ *high* □ *very high*

5) How would you rank the living standards of your family with respect to the average standard in your country?

□ *much lower* □ *lower* □ *the same* □ *higher* □ *much higher*

Personal characteristics 2

6) How would you imagine your income will be in 10 years with respect to your parents' income at the same age?

□ *much lower* □ *lower* □ *the same* □ *higher* □ *much higher*

7) How would you imagine your social position will be in 10 years with respect to your parents' social position at the same age?

□ *much lower* □ *lower* □ *the same* □ *higher* □ *much higher*

8) Please indicate how much you agree or disagree with the following statements:

A) "The more independent are children's and parents' economic positions in a society, the more socially preferable is the society"

□ *Strongly agree*
□ *Agree*
□ *Neither agree nor disagree*
□ *disagree*
□ *Strongly disagree*

B) "The more independent are children's and parents' economic positions in a society, the more equality of opportunity there is in the society"

□ *Strongly agree*
□ *Agree*
□ *Neither agree nor disagree*
□ *disagree*
□ *Strongly disagree*

Personal characteristics 3

9) “How would you place your view on the following scale?”

	1	2	3	4	5	6	7	8	9	10	
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
“The government should take the responsibility to ensure equal opportunity to everyone, but then everyone should be left on his or her own”											“No matter whether people have equal opportunity or not, it is the responsibility of government to reduce income differences between people as much as possible”

Mobility and Equality – Baseline

Mobility	Coef.		***Equality***	Coef.	
age	*0.0062*		age	*0.0440*	
gender	*-0.1638*		gender	*-0.1005*	
familyincome	*0.0271*		familyincome	*0.2514*	**
livingstan~s	*-0.0311*		livingstan~s	*-0.0879*	
prospects	*0.0212*		prospects	*0.0368*	
perspectiv~n	*-0.0349*		perspectiv~n	*-0.2068*	*
independen~a	*-0.3152*	***	independen~a	*-0.0130*	
independen~b	*-0.1149*		independen~b	*0.0114*	
government~e	*0.0102*		government~e	*-0.0655*	**

Mobility and Equality – Country

Mobility	Coef.		***Equality***	Coef.	
age	*-0.0164*		age	*0.0537*	
gender	*-0.1607*		gender	*-0.0960*	
familyincome	*-0.0147*		familyincome	*0.2566*	**
livingstan~s	*-0.0675*		livingstan~s	*-0.0782*	
prospects	*-0.0743*		prospects	*0.0499*	
perspectiv~n	*-0.0172*		perspectiv~n	*-0.2077*	*
independen~a	*-0.3201*	***	independen~a	*-0.0135*	
independen~b	*-0.0892*		independen~b	*0.0050*	
government~e	*0.0125*		government~e	*-0.0648*	**
italy	-0.3782	**	italy	0.0896	
uk	*0.1636*		uk	*0.1115*	

Mobility and Equality – Nationality

Mobility	Coef.		***Equality***	Coef.	
age	*0.0188*		age	*0.0472*	*
gender	*-0.1487*		gender	*-0.0943*	
nationality	*-0.4375*	***	nationality	*-0.1000*	
familyincome	*0.0157*		familyincome	*0.2493*	**
livingstan~s	*-0.0776*		livingstan~s	*-0.0977*	
prospects	*-0.0093*		prospects	*0.0296*	
perspectiv~n	*-0.0330*		perspectiv~n	*-0.2068*	*
independen~a	*-0.3168*	***	independen~a	*-0.0114*	
independen~b	*-0.1150*		independen~b	*0.0123*	
government~e	0.0167		government~e	-0.0642	**

Summary

- Principles of mobility measurement lay a foundation
- Introduction of welfare valuation presents a problem
  - individualistic values?
  - mobility a substitute for redistribution?
  - a trade-off between mobility and equality?
- We can reconcile tastes for equality and tastes for mobility
  - common analytical framework
  - use tools from empirical social choice
- Who really value mobility?
  - nothing to do with factors on valuing equality
  - importance of attitudes
  - importance of actions