The inequality of equal mating

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Assortative mating

- Marriage within own socio-economic group has existed in all societies at all times
- Persons with high earnings marry others with high earnings

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- Marriage within own socio-economic group has existed in all societies at all times
- Persons with high earnings marry others with high earnings
- What does this imply for the inequality between households?

Not a trivial question

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  Exacerbates inequality

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  Also exacerbates inequality, but at the bottom of the distribution

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- The rich marry within their class
  Exacerbates inequality
- The poor marry within their class
  Also exacerbates inequality, but at the bottom of the distribution
- Still the richest can afford non-working spouses and spouses with low income potenial
  - "Trophy wives"
  - "Gold diggers"
- Such effect could reduce inequality

Hypotesis

1. Equal mating *into* households leads to inequality *between* households
2. All countries have a *neutral middle* where equal mating has little effect. Most of the effect is in the tails of the income distribution
3. Not random whether countries are affected most in the upper or the lower tail

Data

- Taken from the Luxembourg Income Study
- Micro data from a total of 254 surveys covering 46 countries over the period 1967-2013.
- Mostly rich (OECD) countries but recently more middle income and transition countries
- We focus on husband's and wife's labor income
  - Avoids issues of joint taxation and jointly determined transfers
  - Ignores equalizing effect through taxes and transfers
- Including capital income has negligible effect
  - The super rich not in the sample
- Disposable income is a combination of assortative mating and welfare state arrangements
  - Interesting, but not what we study here

Data – our sample

- We only consider husband and wife
  Other family members disregarded
- Keep households were both are between 25 and 61 years old
- Leave out households earning less than 10 % of median income to avoid unrealistically low incomes
  Typically this is less than 1 % of the sample

Basics

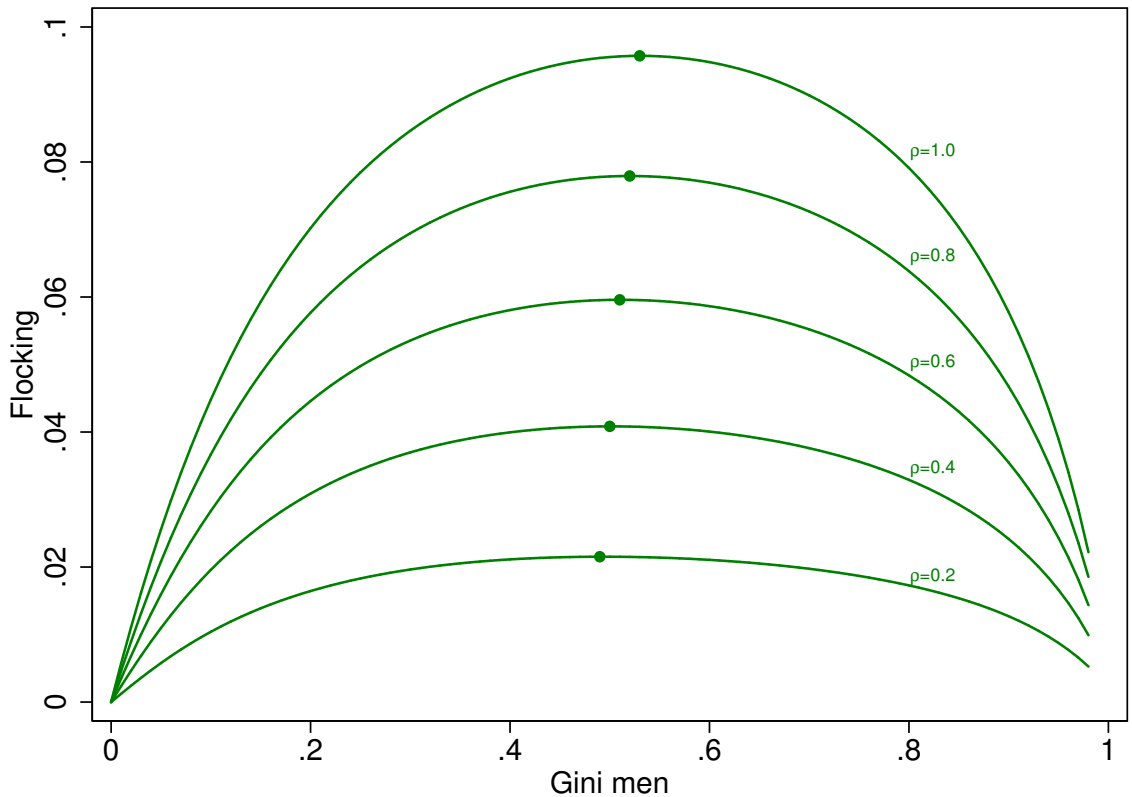
- Household – husband and wife
- Incomes Y_1 and Y_2
  Household income $Y = Y_1 + Y_2$
- Let F_1, F_2, and F be the associated distribution functions
- How does inequality in Y depend on the inequality in Y_1 and Y_2 and the association between Y_1 and Y_2?

Basics – our experiment

- Construct a hypothetical income distribution with random matching F_r
  - Each man matched with a random woman
  - Repeated draws have minor effects
- No flocking $\iff$ $F_r(y) = F(y)$ for all y
- Flocking: the difference between actual and hypothetical distributions
- Difference: CDF, normalized Lorenz curves
- Also: F_{max} and F_{min} based on perfect positive and negative assortative mating.
  The boundaries implied by the income distribution of each gender

Basics – the theoretical answer

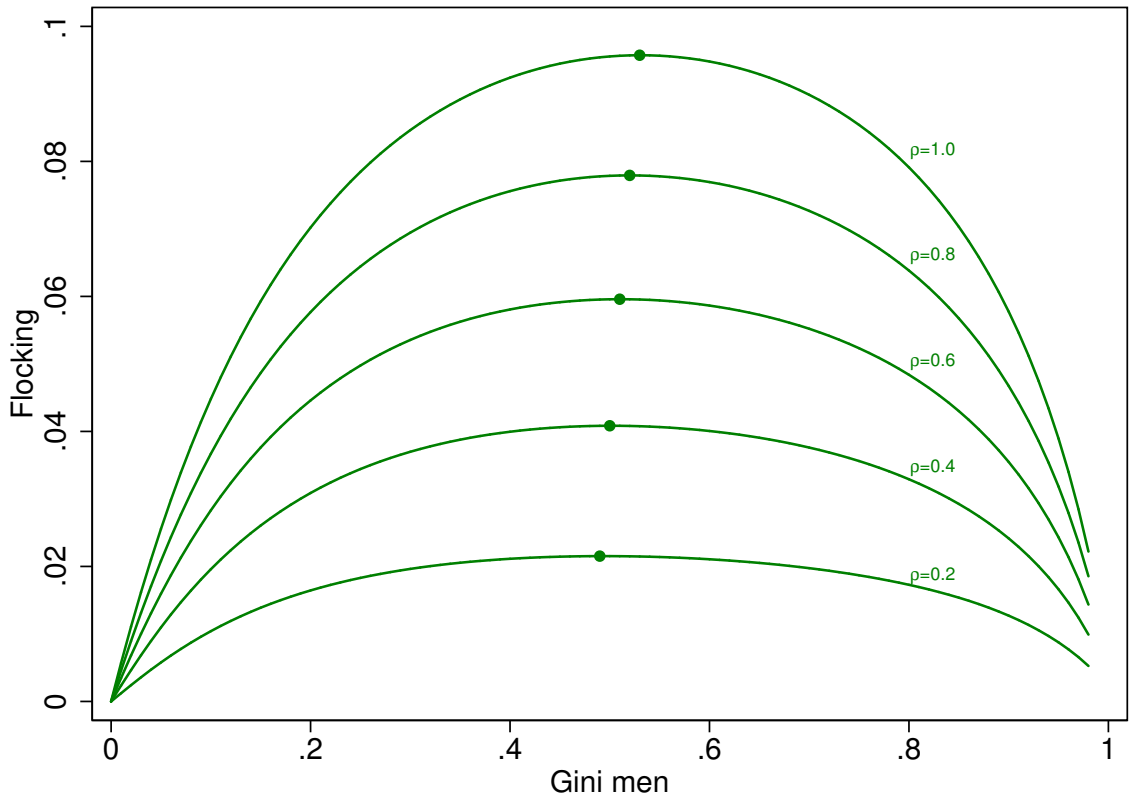
Simulate income distributions, varying inequality and association $Y_1 - Y_2$; compute Gini coefficient



- Flocking increasing in association ρ
- Flocking inverted U-shaped in inequality

Basics – the theoretical answer

Simulate income distributions, varying inequality and association $Y_1 - Y_2$; compute Gini coefficient



Holds empirically:

$$(G - G_r) = \underset{(0.007)}{-0.057} + \underset{(0.029)}{0.099} G_1 \underset{(0.028)}{-0.082}\ G_1^2 + \underset{(0.018)}{0.077} G_2 \underset{(0.014)}{-0.044}\ G_2^2 + \underset{(0.003)}{0.137} \rho$$

Caveat

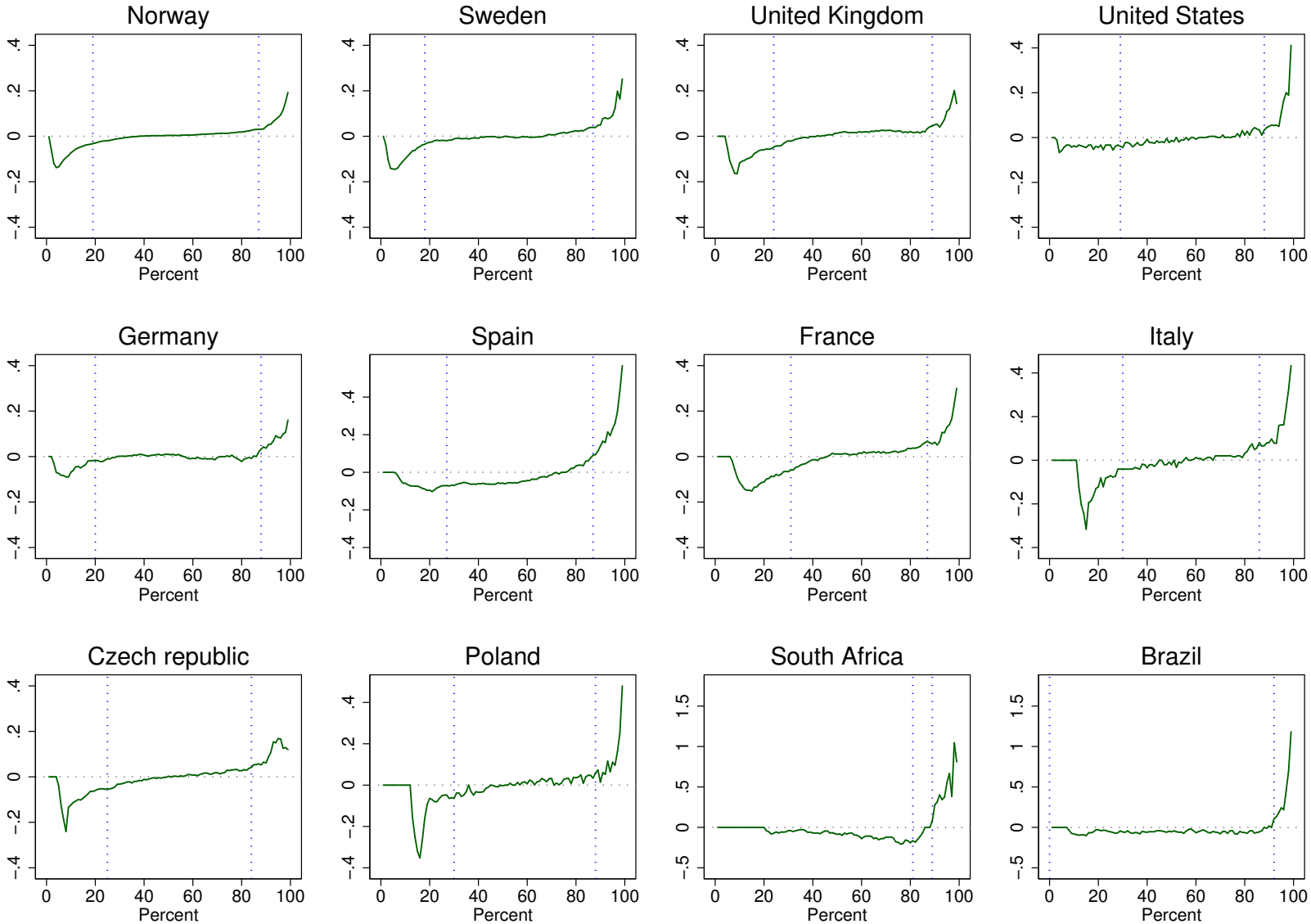
- We keep incomes constant when changing couple structures
- In reality incomes would change due to e.g. labor supply reactions
- This paper studies the current distribution of income, not a real world policy experiment

Winners and losers

- A household with income y occupies rank $u = F(y) \in [0, 1]$
- A household occupying rank u gets income $F^{-1}(u)$, and would have gotten $F_r^{-1}(u)$ with random matching
- Gain relative to random matching given by

$$\Lambda_F(u) = \frac{F^{-1}(u) - F_r^{-1}(u)}{\mu} \quad \text{for} \quad 0 \leq u \leq 1$$

Winners and losers



Winners and losers

Country	loosers u_L	winners $1 - u_H$	neutral middle $u_H - u_L$
Sweden	18	13	69
Norway	19	13	68
Germany	20	12	68
United Kingdom	24	11	65
Spain	27	13	60
United States	29	12	59
Czech republic	25	16	59
Poland	30	12	58
France	31	13	56
Italy	30	14	56
Brazil	0	8	92
South Africa	81	11	8

Contributions to inequality

- How large is deviation from equality at each quantile u?
- How much of this is given by systematic matching?
- Given by Lorenz curves $L(u)$ and $L_r(u)$
- Need to compare L and L_r

Contributions to inequality

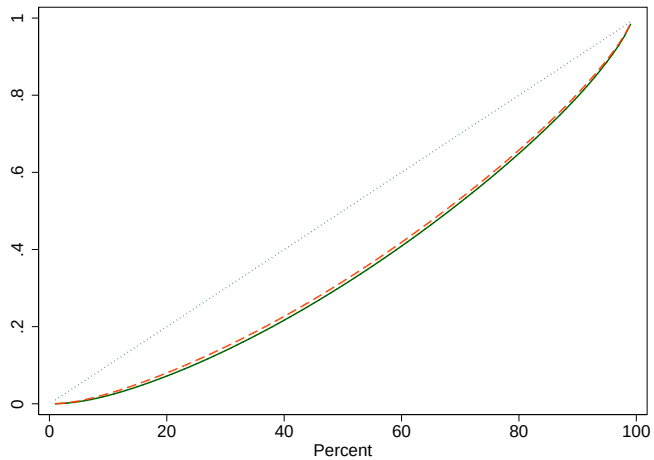
Depicting income distributions

- The standard Lorenz curve

$$L(u) = \frac{1}{\mu} \int_0^u F^{-1}(t)\, dt$$

Tells too little about low incomes

Lorenz curve



Contributions to inequality

Depicting income distributions

- The standard Lorenz curve

$$L(u) = \frac{1}{\mu} \int_0^u F^{-1}(t)\, dt$$

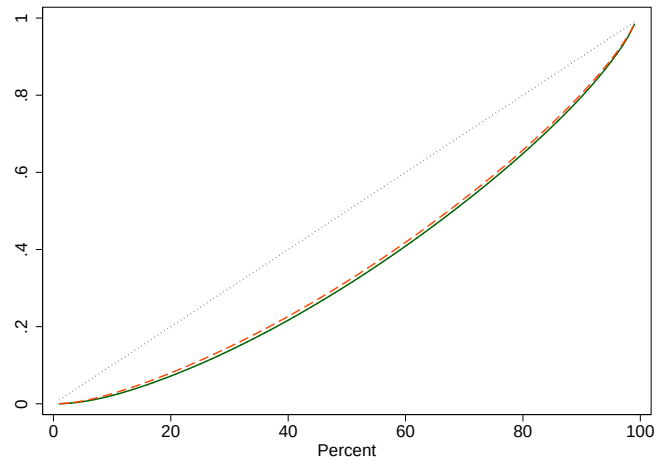
Tells too little about low incomes

- The normalized Lorenz curve (M curve) (Aaberge, 2007)

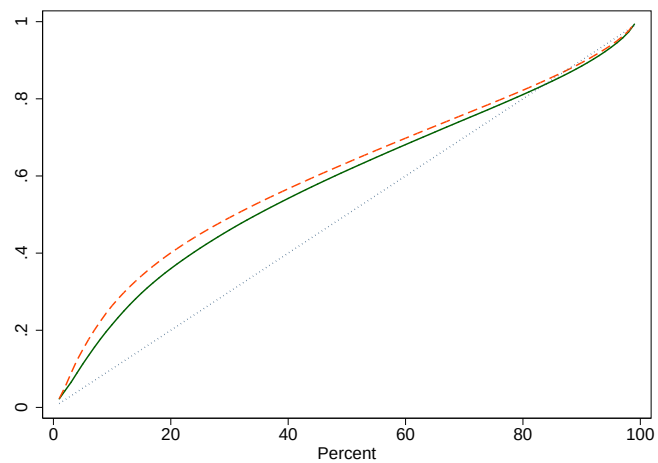
$$M(u) = \frac{1}{u\mu} \int_0^u F^{-1}(t)\, dt$$

$$= \begin{cases} 0 & \text{if } u = 0 \\ \frac{L(u)}{u} & \text{if } 0 < u \leq 1 \end{cases}$$

Lorenz curve

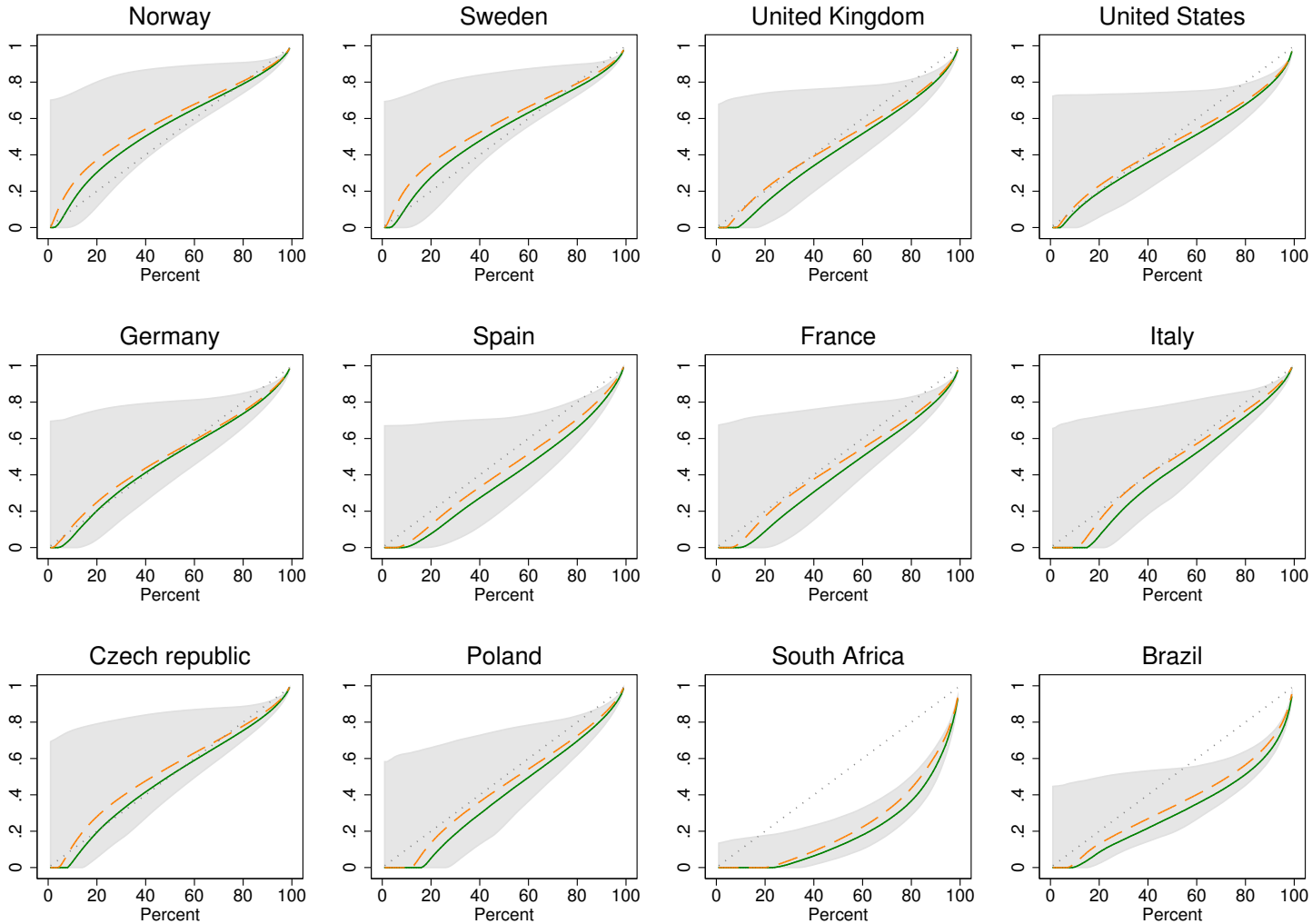


Normalized Lorenz curve



Contributions to inequality

Normalized Lorenz curves for pre-tax earnings

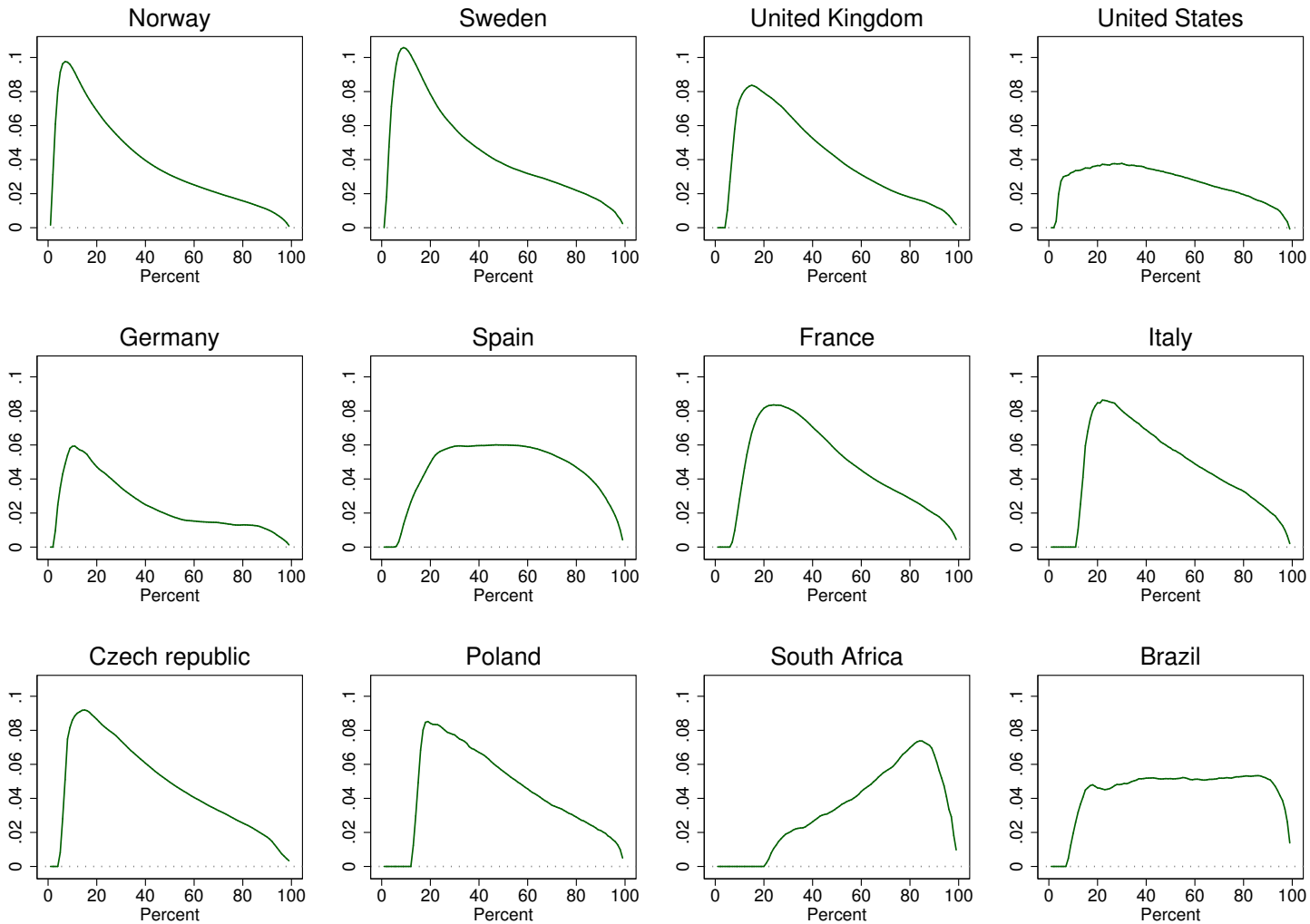


Solid green is observed, dashed orange hypothetical. Shaded area possible distributions between perfect positive and negative assortative mating.

▸ Lorenz

Contributions to inequality

Flocking curves $\Gamma_L(u) = \frac{L_r(u) - L(u)}{u}$



▸ Lorenz

Ranking flocking curves

Notation

- An inequality associated flocking curve is defines as Flocking curves $\Gamma_L(u) = \frac{L_r(u) - L(u)}{u}$
- Following a "dual approach", a welfare function can be defined as

$$J_p(L) = 1 + \int_0^1 up'(u)\frac{L(u)}{u}\, du$$

  where $p(u)$ is a weighting on quantile u (non-negative, non-increasing)
- One family of flocking together measures is $\Delta_p(L) = J_p(L_r) - J_p(L)$

Ranking flocking curves

Main theoretical results

Theorem

Let Γ_{L_1} and Γ_{L_2} be two flocking curves. Then the following are equivalent:

(i) Γ_{L_1} *first degree dominates* Γ_{L_2}
i.e. $\Gamma_{L_1}(u) \leq \Gamma_{L_2}(u)$ *for all* u *and strictly for some*

(ii) Γ_{L_2} *can be obtained from* Γ_{L_1} *by a sequence of correlation increasing transfers*

(iii) $\Delta_p(L_1) < \Delta_p(L_2)$ *for all positive increasing functions* p

- Informally, there is more flocking under L_2 than under L_1
- Mirrors results on Lorenz dominance and inequality measurement

Ranking flocking curves

Implementation

- Compare a class of inequality measures under the observed and counter factual income distribution
  - Using a single measure does not tell the whole story
- Specifically we use the measures

$$C_k = \int_0^1 u^k dM(u)$$

- C_2 is the Gini coefficient.
- C_1 emphasizes low incomes more and C_3 high incomes more
- Construct differences $\Delta_i = C_i - C_{ir}$

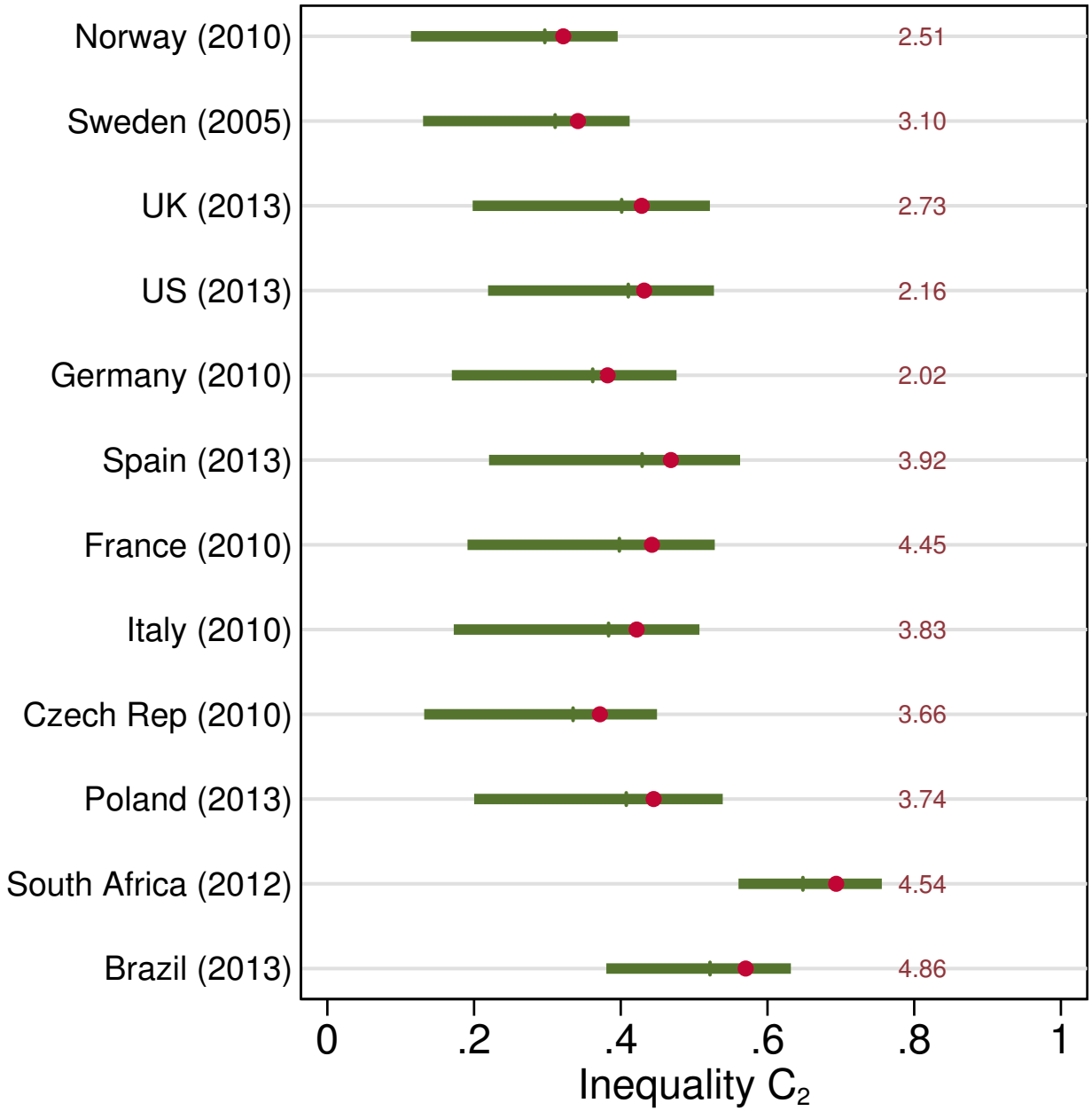
Flocking

Visualization

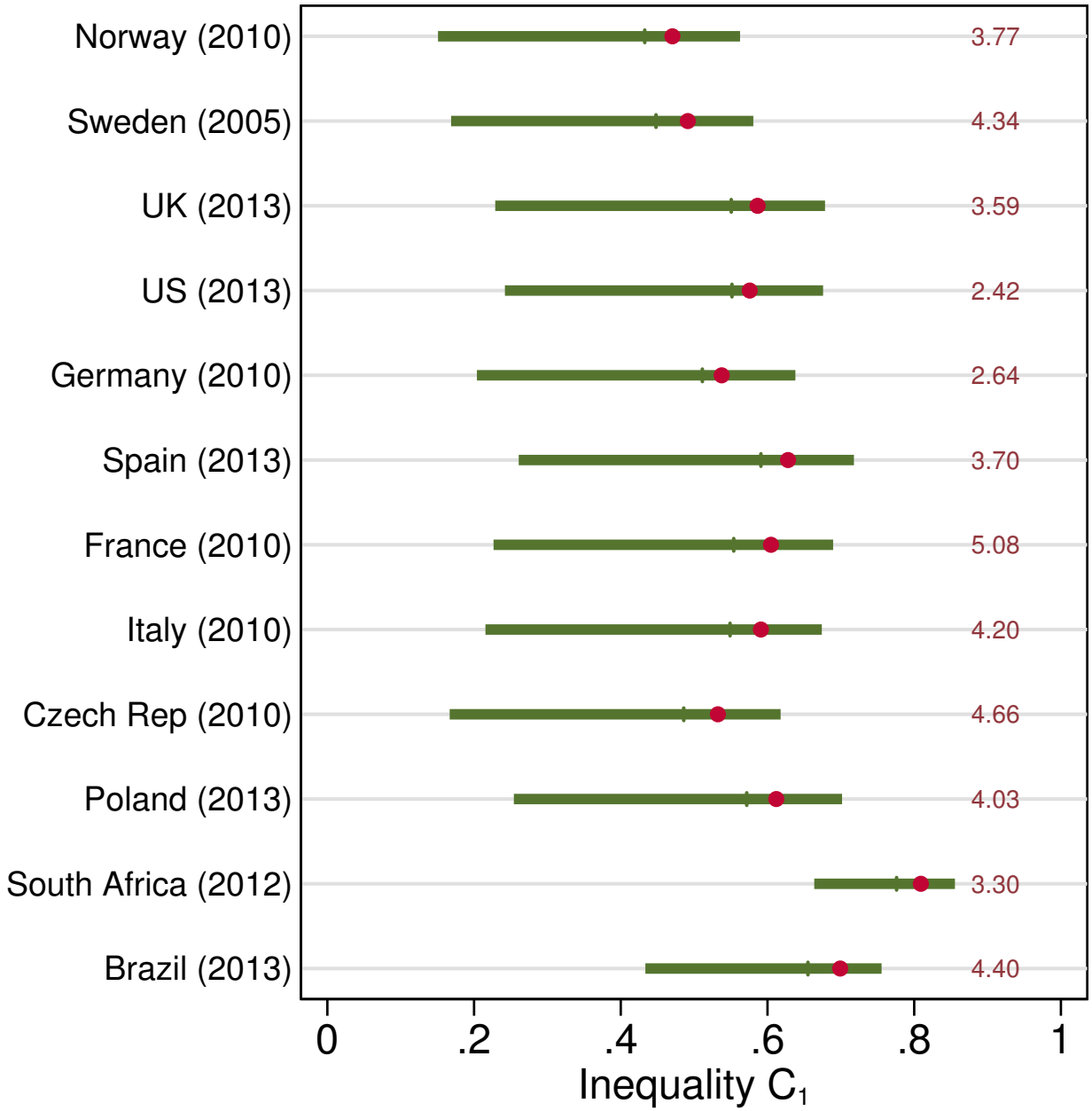
For each income distribution and choice of i

- C Actual inequality
- C_+ with perfect assortative mating
- C_- with perfect inverse assortative mating
- C_r with random mating

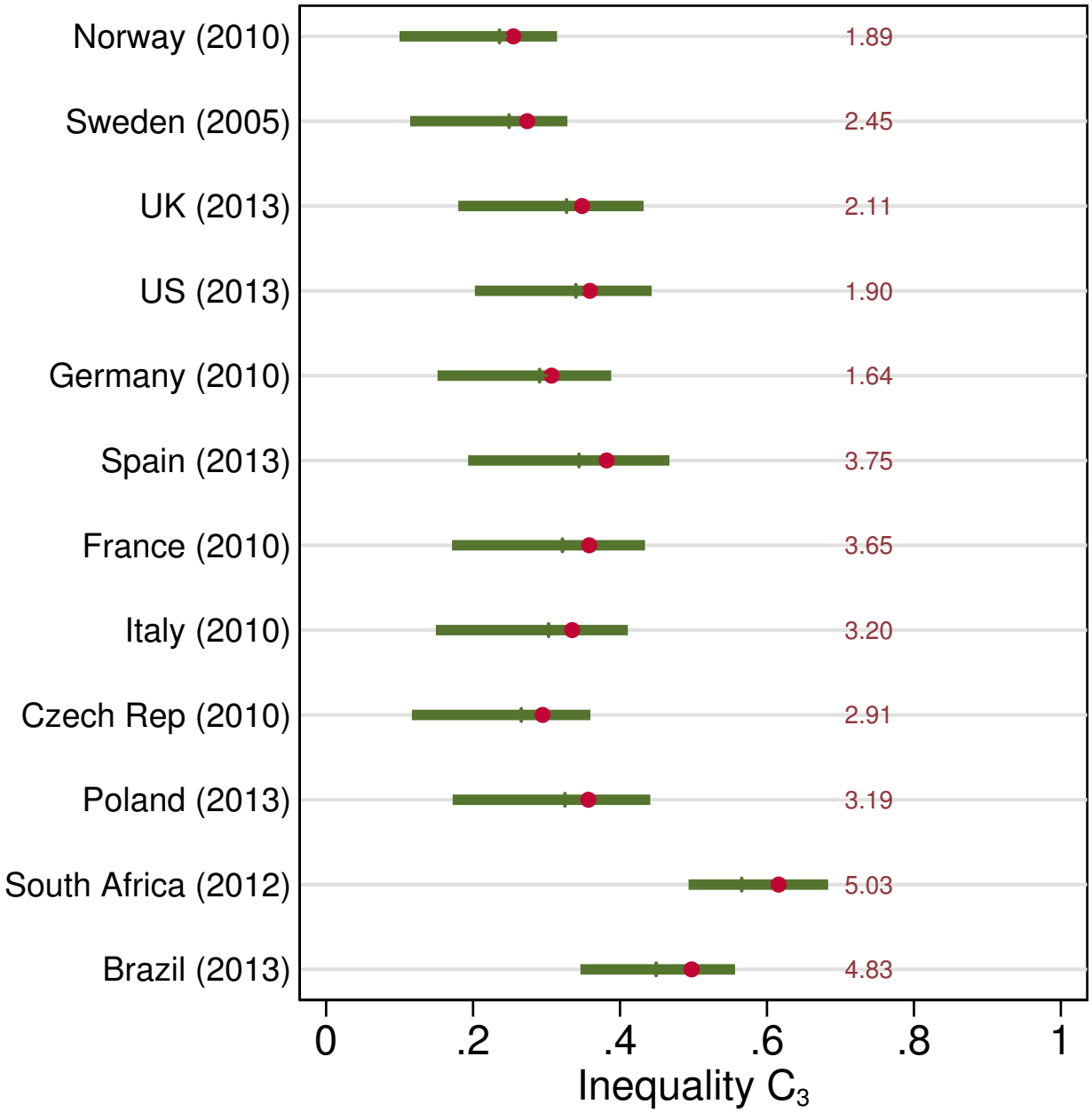
C_2 wage income: The Gini



C_1 wage income: Focus on low incomes



C_3 wage income earnings: Focus on high incomes



Analyzing assortative mating

Additional data

- Log GDP/capita (WDI)
- Average female labor force participation (WDI)
- Nordic country

NB What follows are only correlations!

Assortative mating ($\Delta_i = C_i - C_{ir}$)

Earnings, Gini

	(1)	(2)	(3)	(4)
Inequality	0.0665**	0.0831**	0.0852***	0.0953***
	(2.66)	(2.61)	(3.51)	(3.34)
Log GDP		0.00377	0.00338	0.00361
		(0.97)	(1.02)	(1.10)
Female lab part			0.000360***	0.000284*
			(2.84)	(1.98)
Nordic country				0.00777
				(1.37)
N	254	232	223	223
r2	0.147	0.164	0.232	0.255

Assortative mating ($\Delta_i = C_i - C_{ir}$)

Earnings, C_1 measure

	(1)	(2)	(3)	(4)
Inequality	0.0207	0.0475	0.0502*	0.0659**
	(0.71)	(1.31)	(1.93)	(2.20)
Log GDP		0.00654	0.00612*	0.00631*
		(1.54)	(1.76)	(1.85)
Female lab part			0.000478***	0.000372**
			(3.78)	(2.68)
Nordic country				0.0115*
				(1.79)
N	254	232	223	223
r2	0.0112	0.0396	0.159	0.207

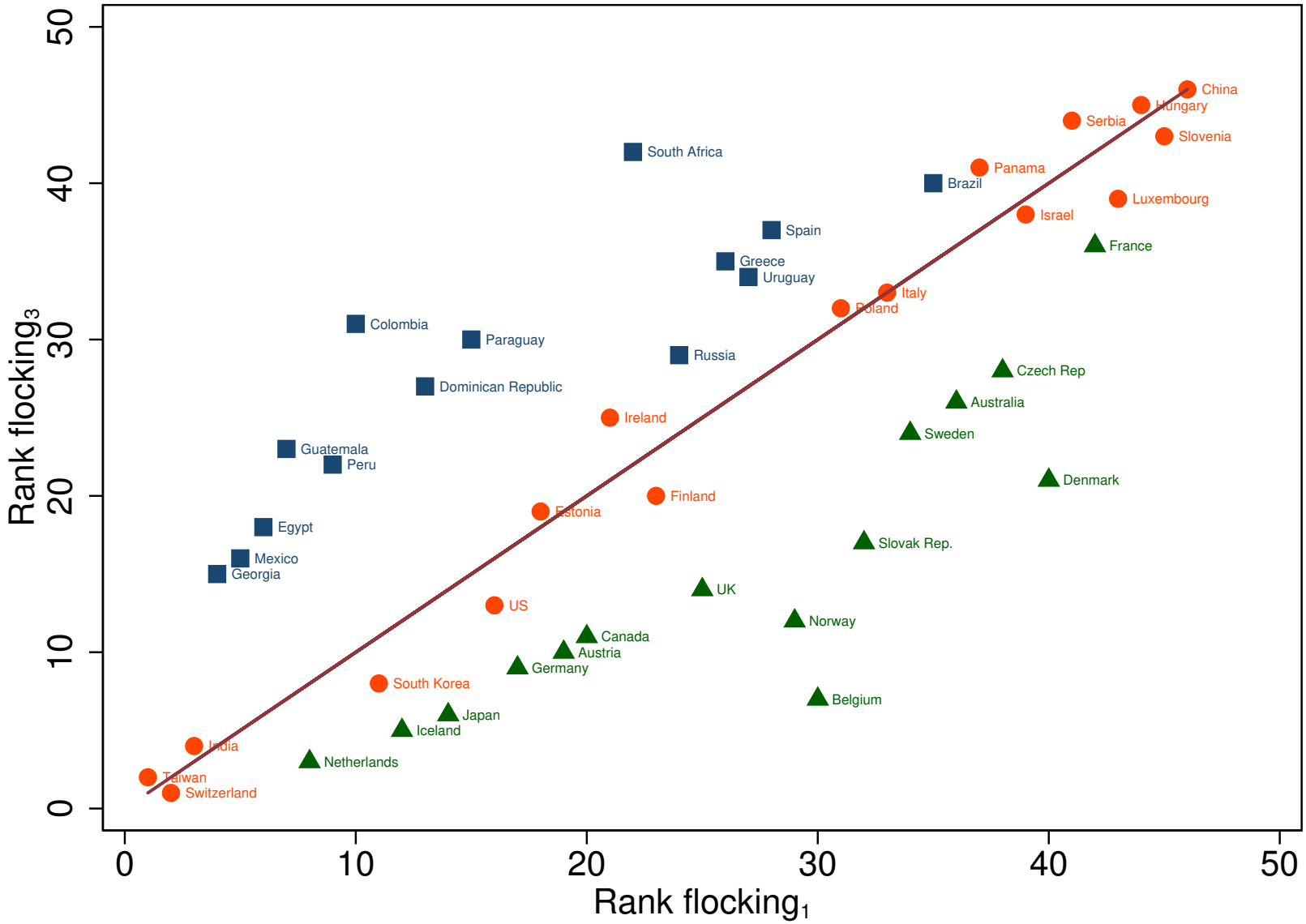
Assortative mating ($\Delta_i = C_i - C_{ir}$)

Earnings, C_3 measure

	(1)	(2)	(3)	(4)
Inequality	0.0875***	0.0967***	0.0983***	0.106***
	(3.80)	(3.32)	(4.29)	(3.98)
Log GDP		0.00185	0.00148	0.00167
		(0.55)	(0.49)	(0.56)
Female lab part			0.000279**	0.000222
			(2.39)	(1.66)
Nordic country				0.00563
				(1.17)
N	254	232	223	223
r2	0.269	0.278	0.327	0.341

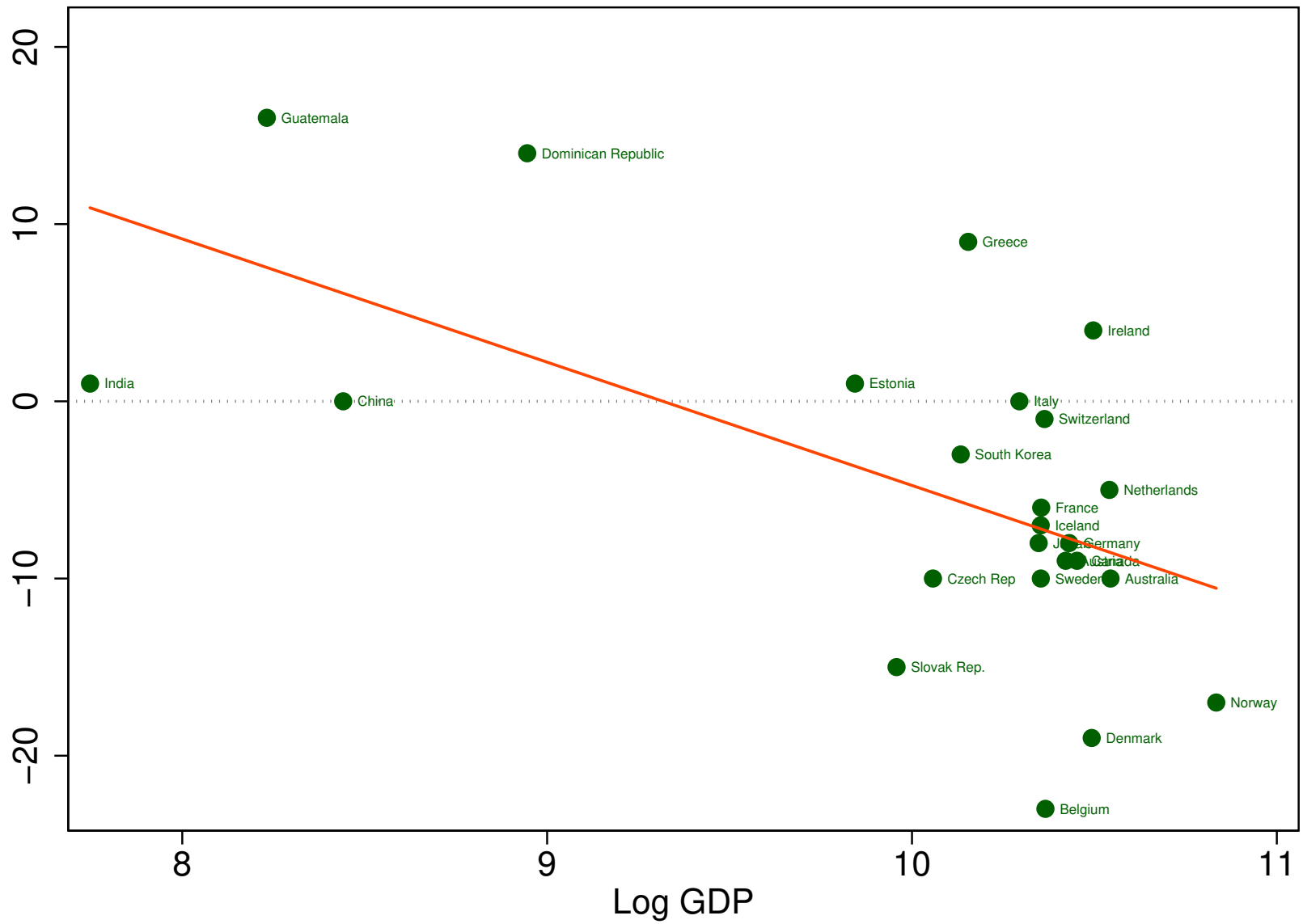
Where does assortative mating take place?

Δ_1 vs Δ_3, wage income – ranks



Where does assortative mating take place?

The role of income



Where does assortative mating take place?

Explaining the difference

	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP	-6.956***		-2.273	-2.208	-16.84*	-3.069
	(-3.00)		(-0.52)	(-0.49)	(-1.82)	(-0.64)
C2 Inequality		68.19***	40.39	39.27	101.3***	28.45
		(4.76)	(1.36)	(1.31)	(3.01)	(0.81)
Female lab part				-0.0697	0.279	0.0255
				(-0.30)	(0.68)	(0.09)
Welfare state generosity					0.0292	
					(0.11)	
Nordic country						-4.938
						(-1.21)
N	24	46	24	24	15	24
r2	0.343	0.488	0.404	0.407	0.558	0.430

Summary ... so far

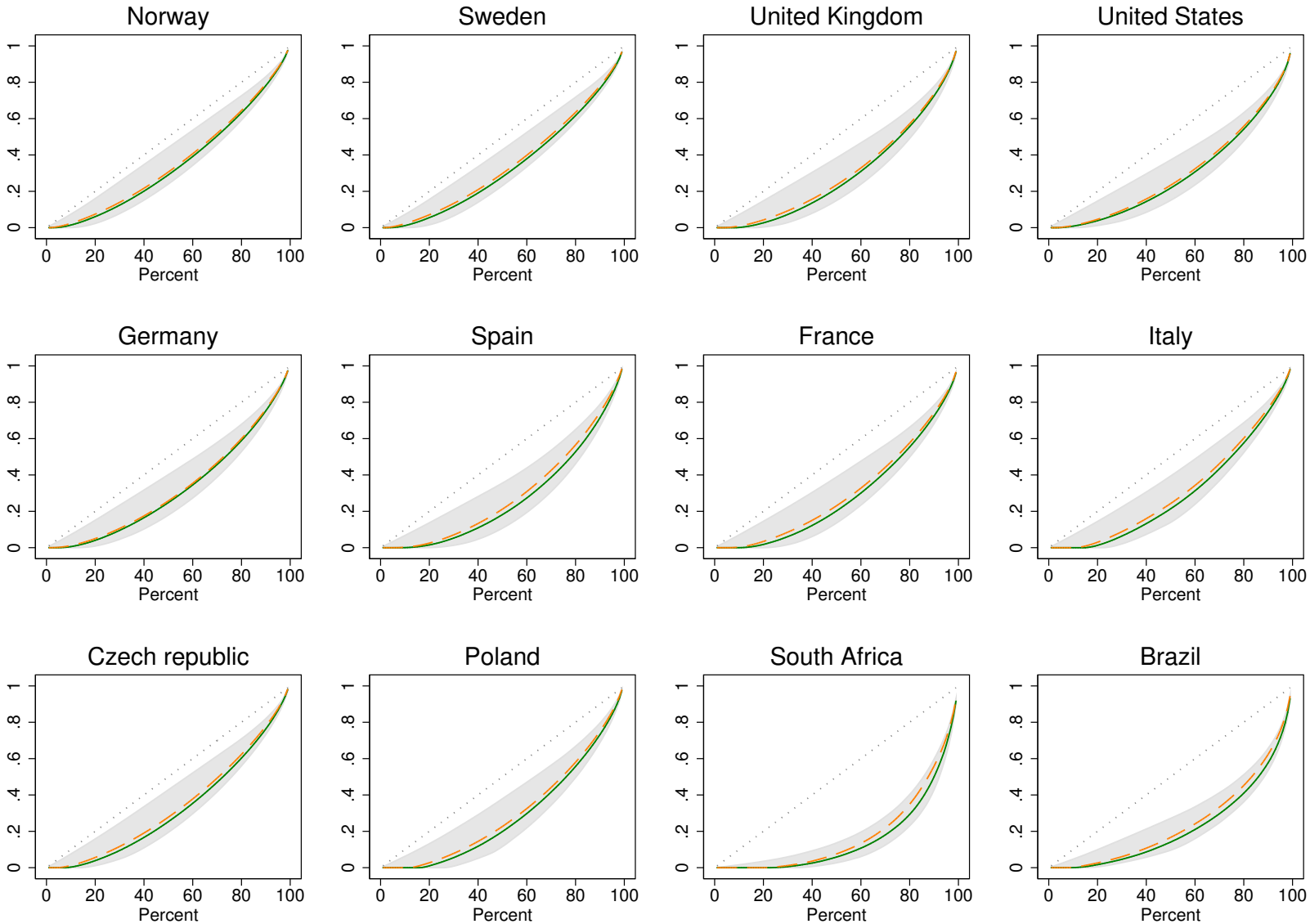
- Intra-household sharing rules affects individual benefits of couple formation and hence choice of spouse
- We present an extension of inequality measurement to measure the inequality effects of assortative mating
  - Nordic counties: Effect of matching at the bottom
  - Middle income countries: Effect of matching at the top
- More inequality driven by assortative mating seems to be correlated with gender equality

Future work

- Difference wage income – disposable income:
  The role of the welfare state
- Use Norwegian register data
  - Mating among the super rich
- Evolution over time
  US vs Norway
- Model the couple formation
- Labor supply?

Thank you!

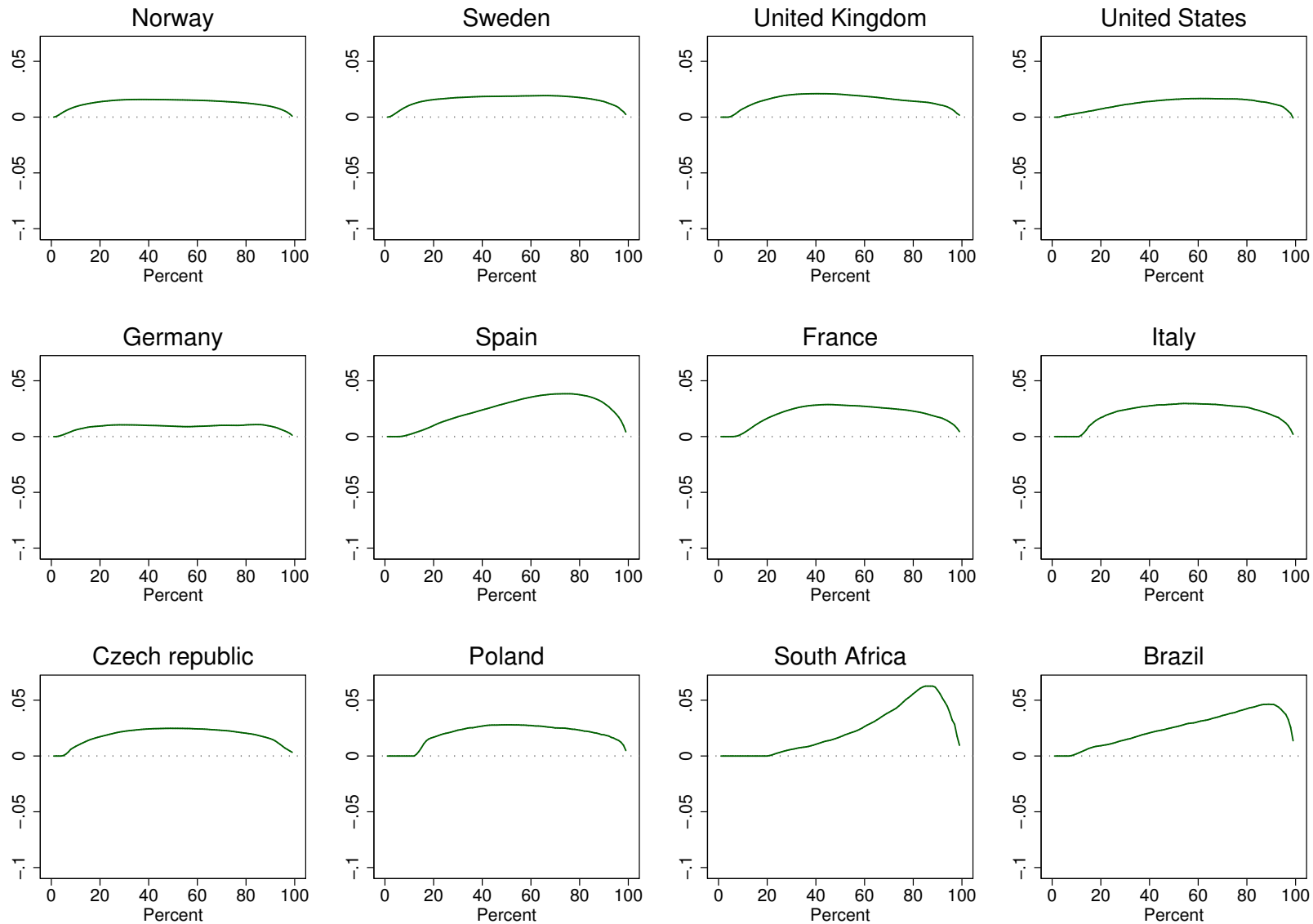
Lorenz curves for earnings



Solid green is observed, dashed orange hypothetical. Income is pre-tax wage income, excluding zero incomes.

◂ Back

Ψ, difference between Lorenz curves for wage incomes



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