

Wealth Distribution and Taxation

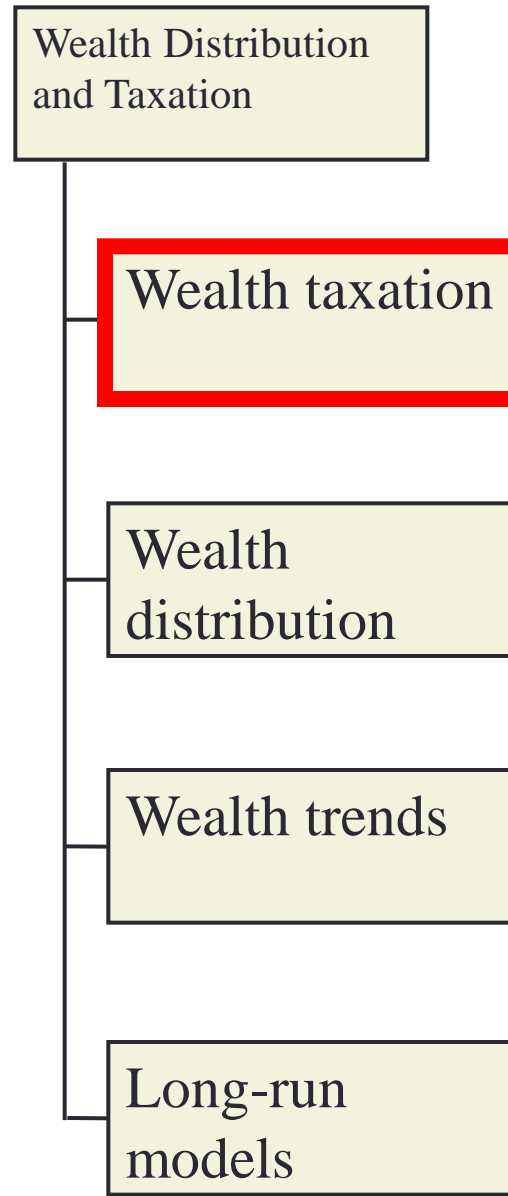
HMRC-HMT Economics of Taxation

<http://darp.lse.ac.uk/HMRC-HMT>

Frank Cowell, 7 December 2015

Overview...

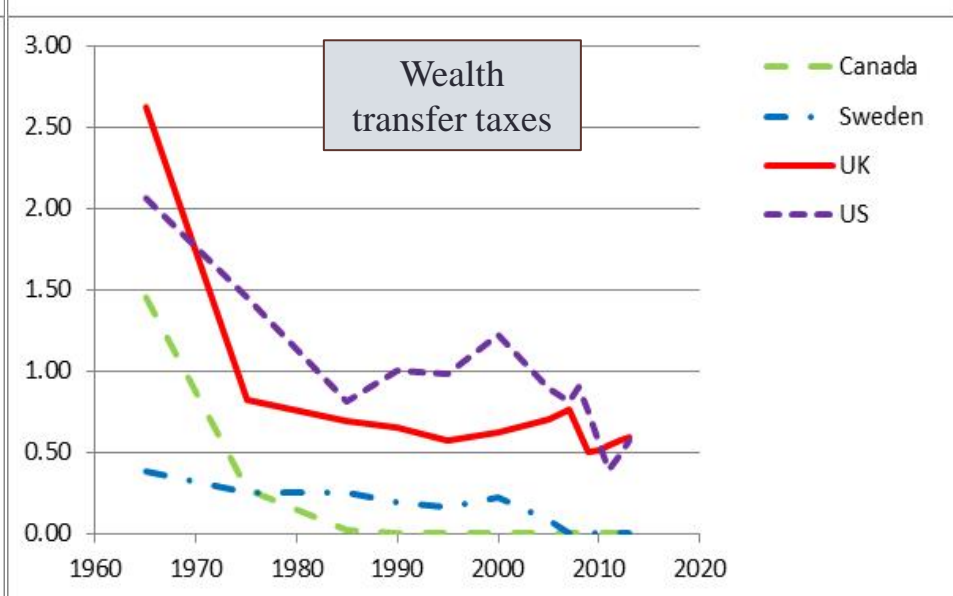
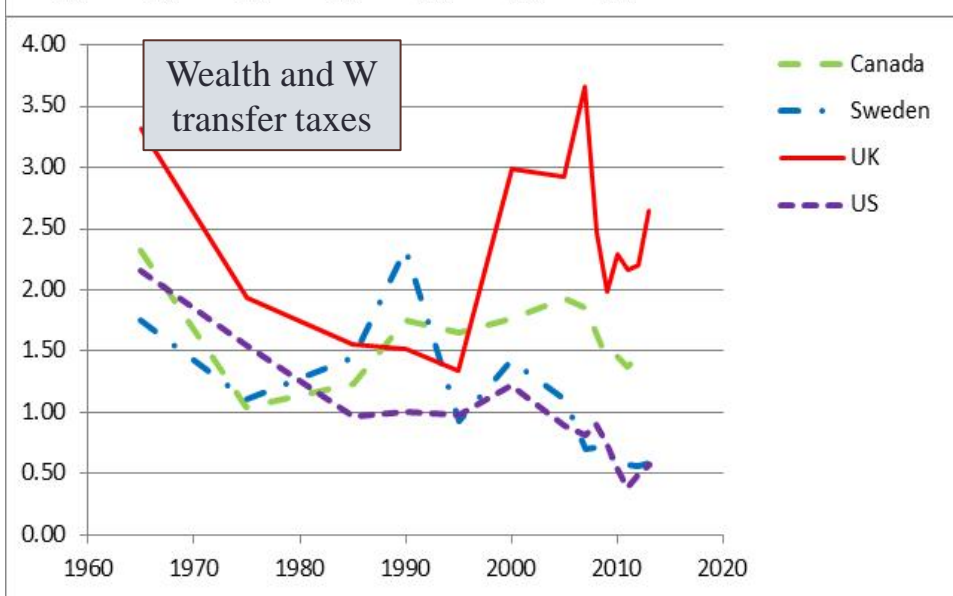
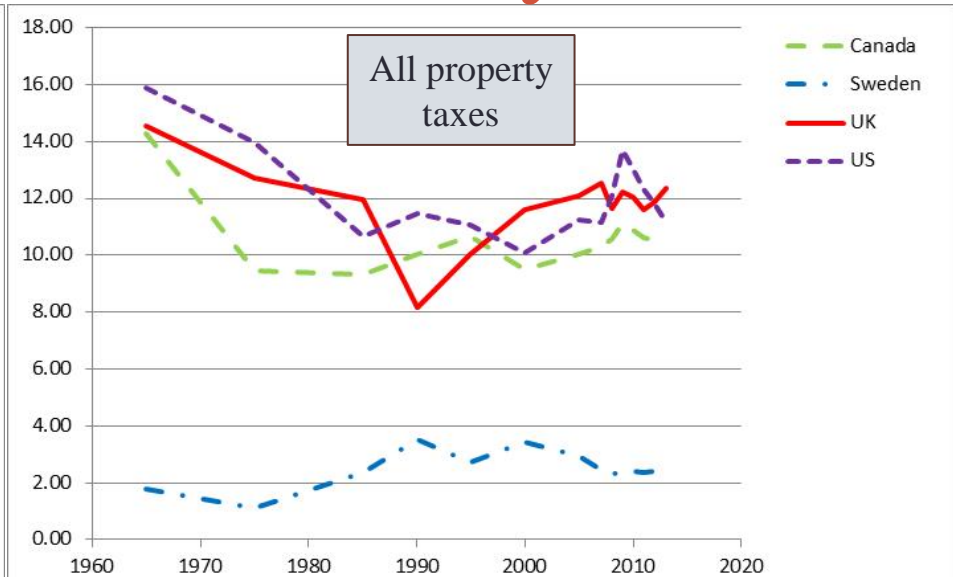
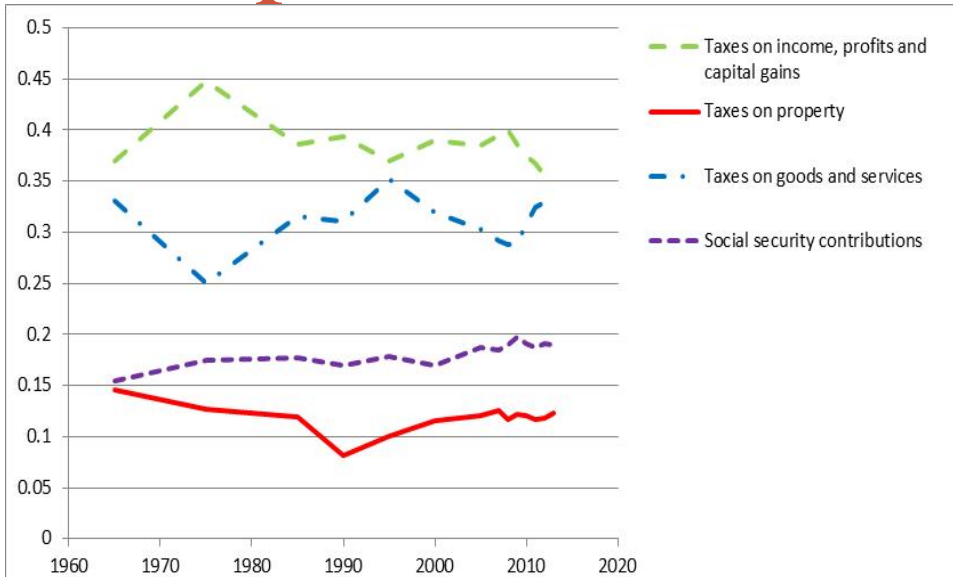
*Why wealth taxation?
Types of tax*



Wealth taxation and its alternatives

- Annual wealth tax:
 - mostly on an overall measure of net worth
 - some specific wealth taxes (property taxes)
- Inheritance / estate tax:
 - taxes on *transfer* of wealth at death
 - inheritance tax: on the beneficiaries of the estate
 - estate tax: on personal representatives of the deceased
- Transfer tax
 - taxes *transfer* of wealth not necessarily at death
- On other side of balance sheet?
 - “asset-based egalitarianism”
 - start-of-life grants
 - state pension provision

Proportion of tax revenue raised by...

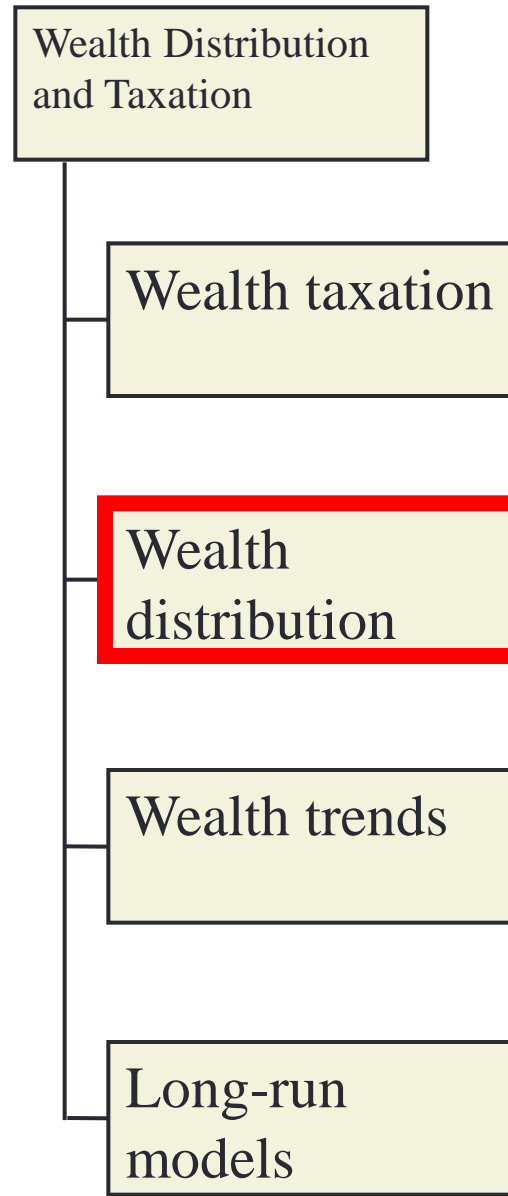


Why wealth taxation?

- Revenue raising is unlikely to be major role
 - revenue raised less than 1% of receipts?
 - see OECD Revenue Statistics
- Efficiency case for or against wealth taxation is unclear
 - ([Cremer and Pestieau 2003](#))
- Equity case for wealth taxation is more promising
 - direct impact of wealth taxation on redistribution must be small
 - in long run taxes may influence savings and bequest behaviour
 - these influence wealth accumulation and inequality

Overview...

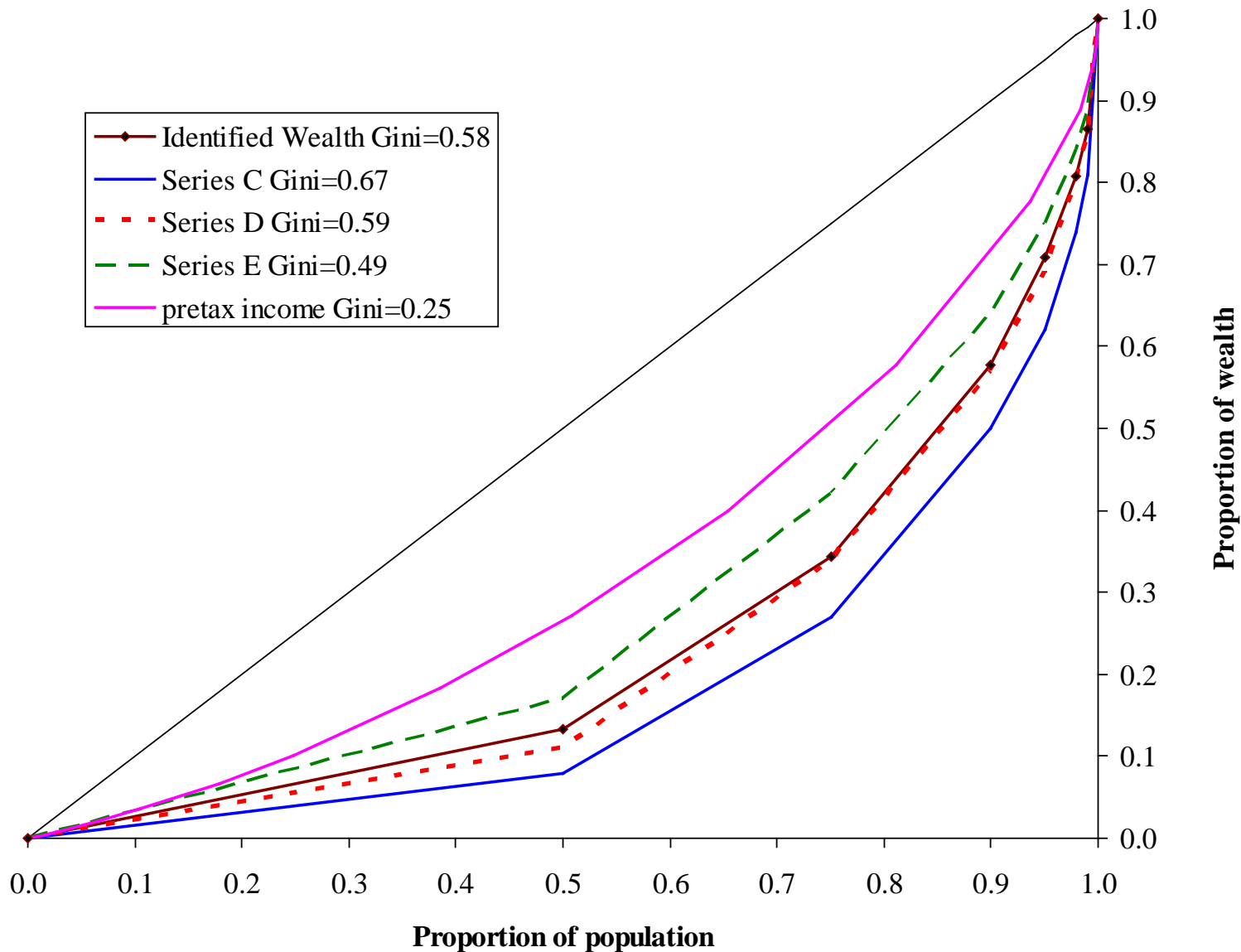
*Definitions,
composition and
inequality*



Wealth concepts: UK example

- British Household Panel Survey
 - fairly comprehensive
 - suffers from standard participation / attrition problems
- Wealth and assets survey
 - uses survey and administrative data – comprehensive
 - newly emerged, so limited time-series analysis
- HMRC Identified personal wealth
 - emerges directly from the estate multiplier method
 - it is clearly biased (missing wealth, missing persons)
 - differs from balance-sheet concept of wealth
- HMRC Series C: marketable wealth only
 - valuation issues addressed
 - excluded population corrected
- HMRC Series D: includes a valuation of pension rights
- HMRC Series E: includes a valuation of state pension rights

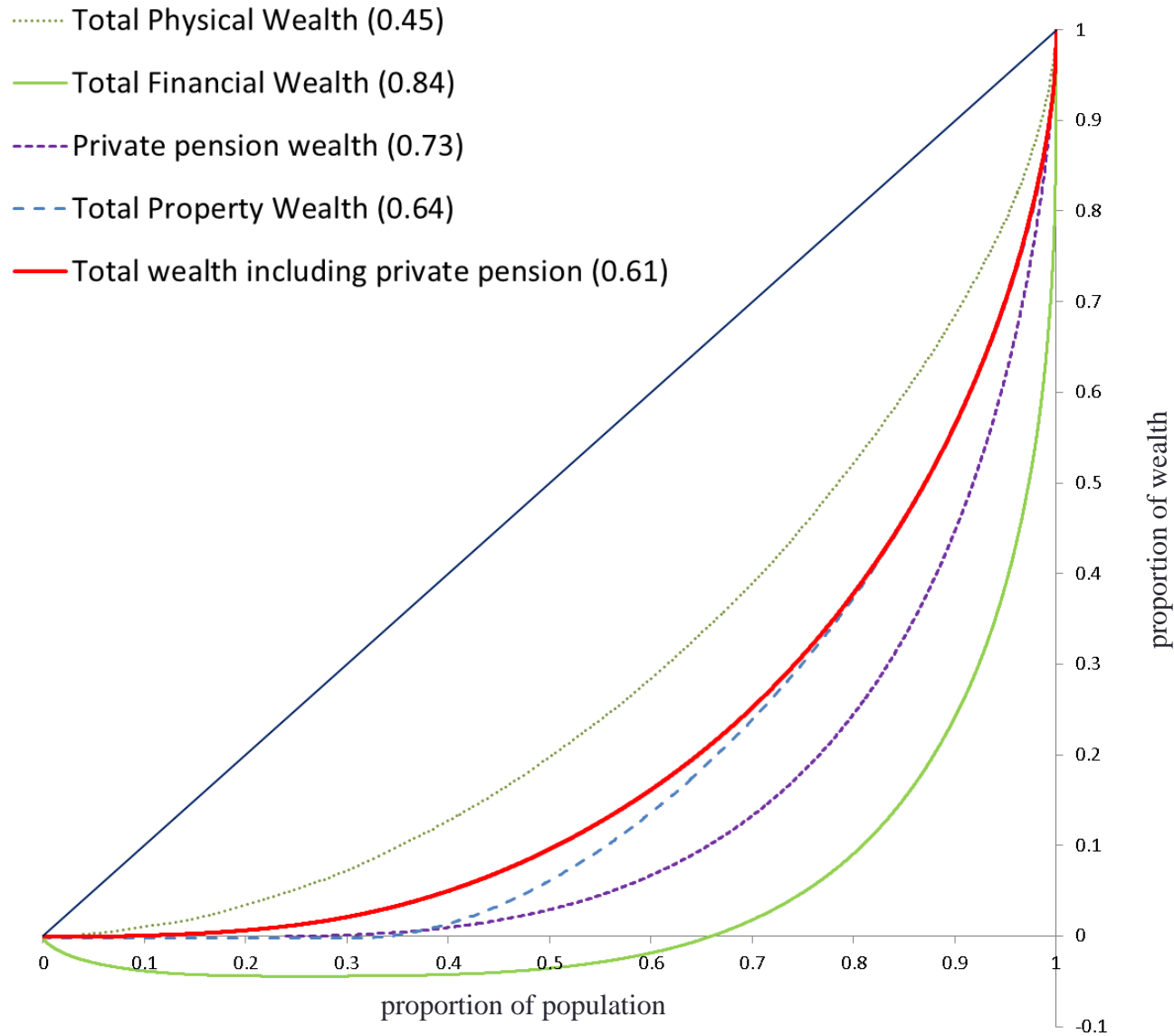
Wealth concepts and inequality



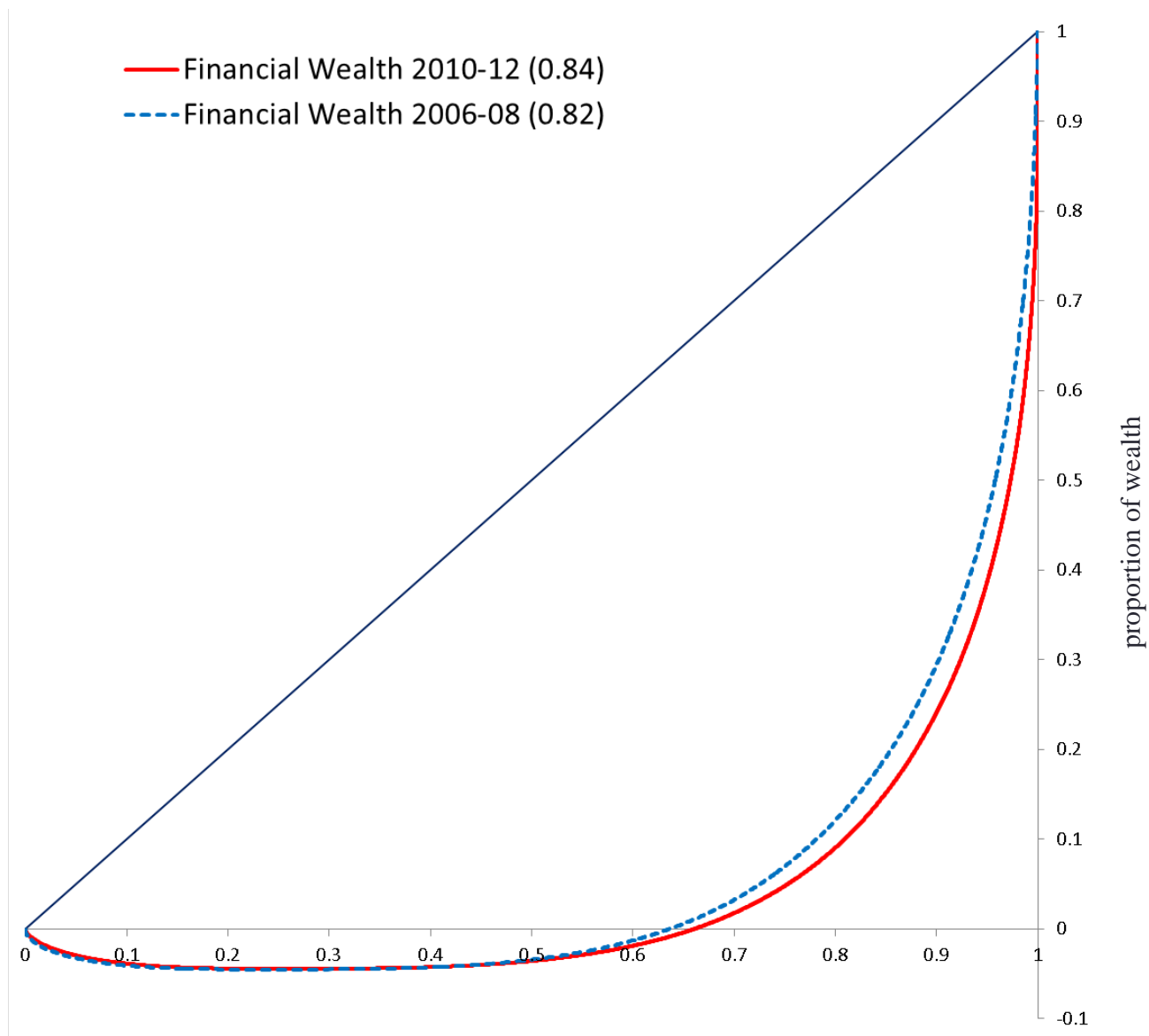
Wealth Distribution: Series C, D, E

	Top 1%	Top 10%	Top 50%	Gini
<i>Marketable wealth (Series C)</i>				
1980	0.19	0.50	0.91	0.65
1985	0.18	0.49	0.91	0.65
1990	0.18	0.47	0.93	0.64
1994	0.19	0.52	0.93	0.67
<i>Marketable wealth and occupational pension rights (Series D)</i>				
1980	0.15	0.43	0.87	0.57
1985	0.14	0.43	0.88	0.58
1990	0.14	0.41	0.89	0.58
1994	0.14	0.43	0.89	0.59
<i>Marketable wealth, occupational +state pension rights (Series E)</i>				
1980	0.11	0.35	0.79	0.46
1985	0.11	0.36	0.80	0.48
1990	0.11	0.35	0.83	0.49
1994	0.11	0.36	0.83	0.49

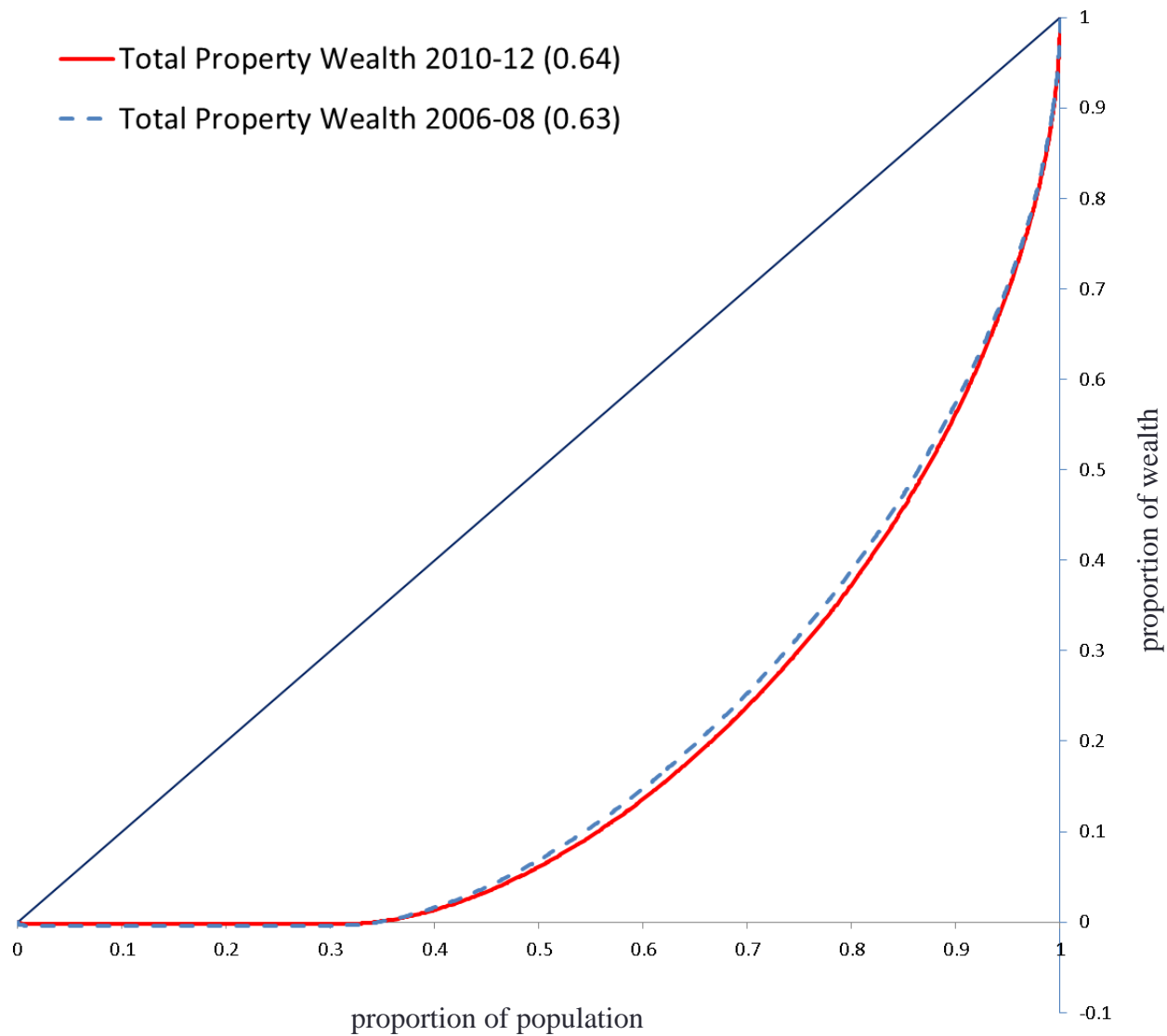
Wealth and assets survey: 2010/12



Financial wealth: WAS 2006/8 to 2010/12



Property wealth: WAS 2006/8 to 2010/12



Pension wealth: WAS 2006/8 to 2010/12

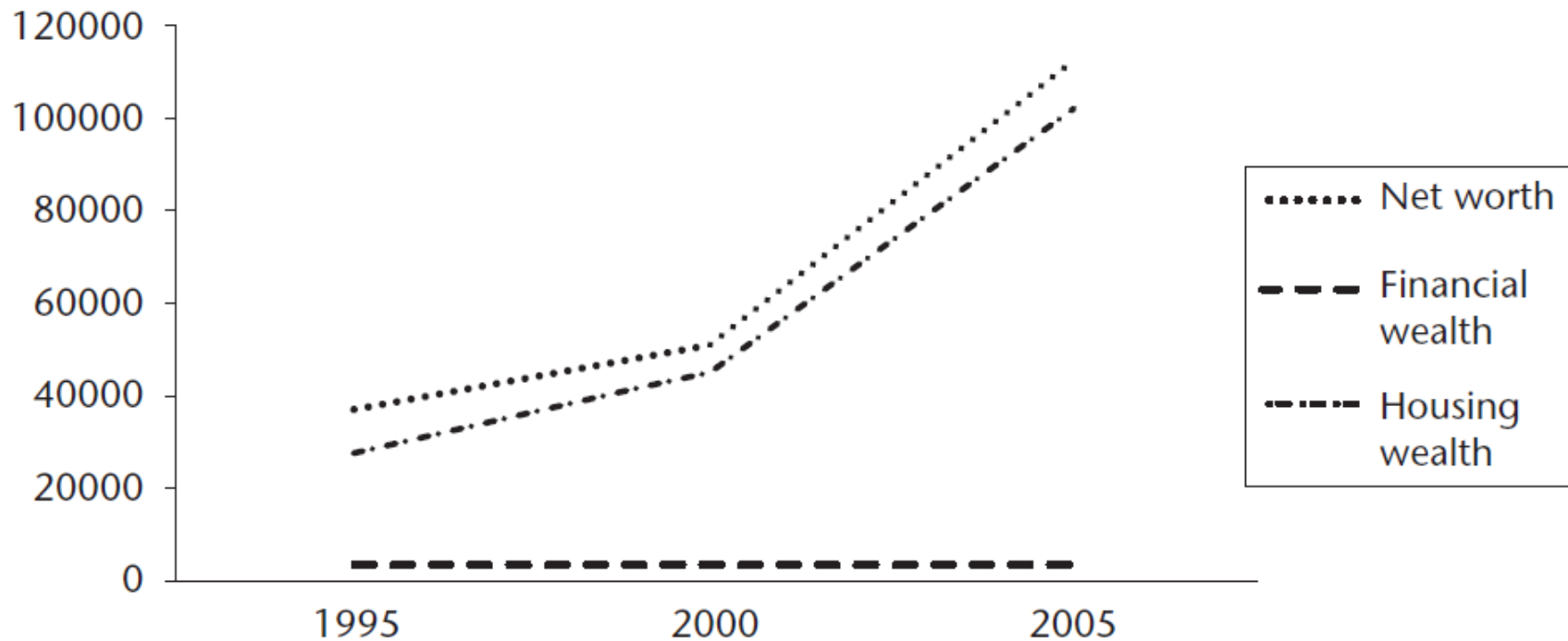


BHPS: Wealth inequality 1995-2005

	Percentiles			Mean	Gini coefficient (%)
	10	50	90		
<i>1995</i>					
Housing wealth	0	27	121	49	65
Financial wealth	-1.9	3	68	26	89
Net worth	-0.1	37	190	76	69
<i>2000</i>					
Housing wealth	0	44	197	75	64
Financial wealth	-4.3	2	53	19	94
Net worth	-0.1	51	247	94	65
<i>2005</i>					
Housing wealth	0	102	306	138	56
Financial wealth	-6.5	3	69	24	98
Net worth	0	113	385	163	59

- Source: Bastagli and Hills (2013)

BHPS: Wealth trends 1995/2005



- Source: Bastagli and Hills (2013)

BHPS: the effect of house prices

	Percentiles			Mean	Gini coefficient (%)
	10	50	90		
<i>1995</i>					
Housing wealth	0	39	129	57	61
Financial wealth	-2.6	3	77	28	89
Net worth	-0.1	47	217	86	65
<i>2005 (actual house prices)</i>					
Housing wealth	0	130	350	165	51
Financial wealth	-4.5	6	80	29	92
Net worth	0	146	427	194	53
<i>2005 (adjusted house prices)</i>					
Housing wealth	0	48	144	64	61
Net worth	-0.6	61	223	93	64

- Source: Bastagli and Hills (2013)

Household portfolio composition – LWS

Wealth components	Canada	Finland	Germany	Italy	Sweden	United Kingdom	US PSID	US SCF
	1999	1998	2002	2002	2002	2000	2001	2001
<i>Non-financial assets</i>	78	84	87	85	72	83	67	62
Principal residence	64	64	64	68	61	74	52	45
Real estate	13	20	23	17	11	9	14	17
<i>Financial assets</i>	22	16	13	15	28	17	33	38
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
<i>Total assets</i>	100	100	100	100	100	100	100	100
<i>Total debt</i>	26	16	18	4	35	21	22	21
Home secured	22	11	15	2	n.a.	18	n.a.	18
<i>Total net worth</i>	74	84	82	96	65	79	78	79

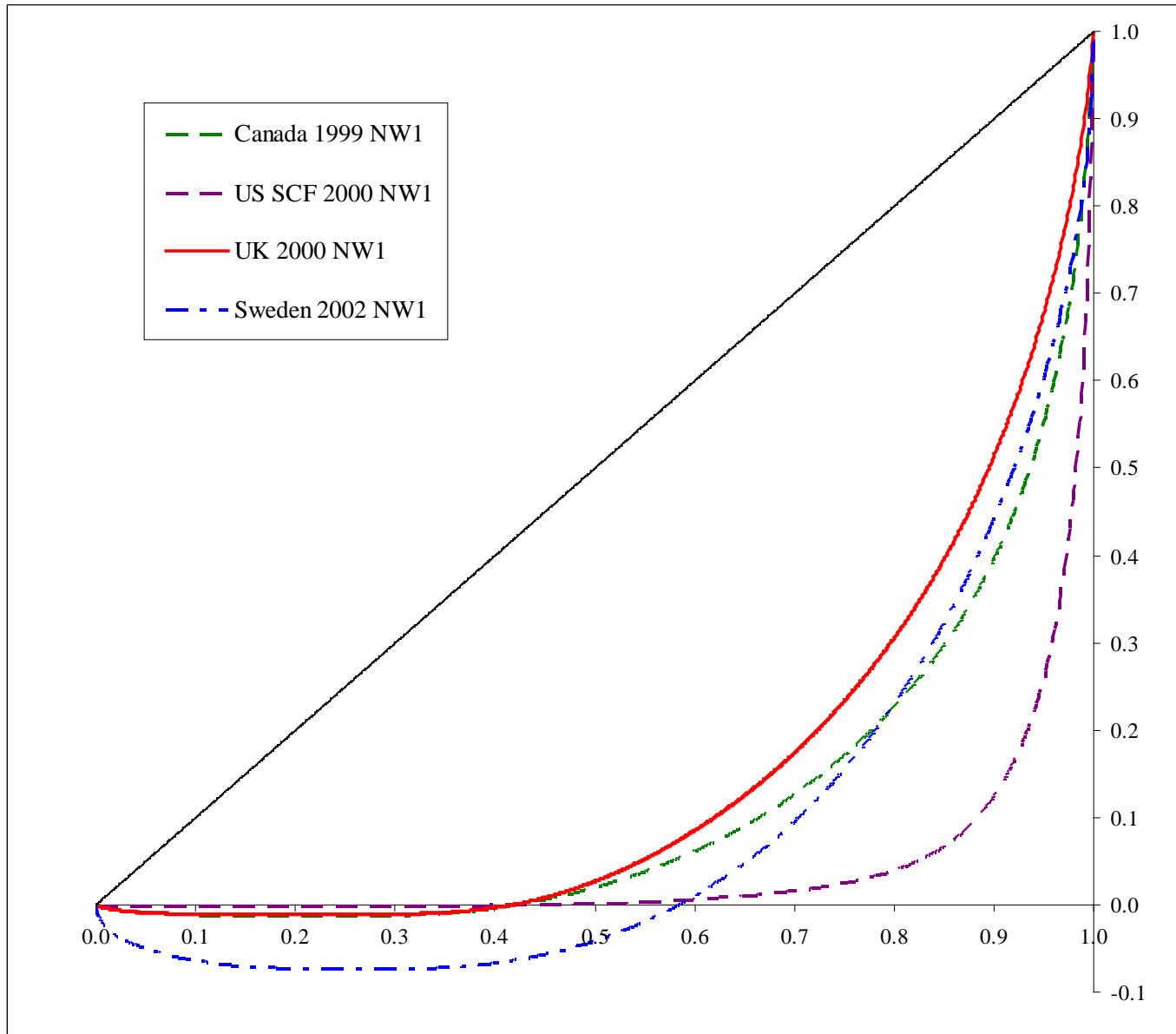
Source: [Sierminska et al \(2006\)](#)

LWS: Wealth inequality in four countries

	<i>Gini</i>	<i>Share</i> <i>Top 10%</i>	<i>Share</i> <i>Top 5%</i>	<i>Share</i> <i>Top 1%</i>
UK	0.665	0.456	0.301	0.101
Sweden	0.893	0.582	0.406	0.175
Canada	0.747	0.532	0.374	0.151
US	0.836	0.705	0.575	0.329

Source: [Cowell \(2013\)](#)

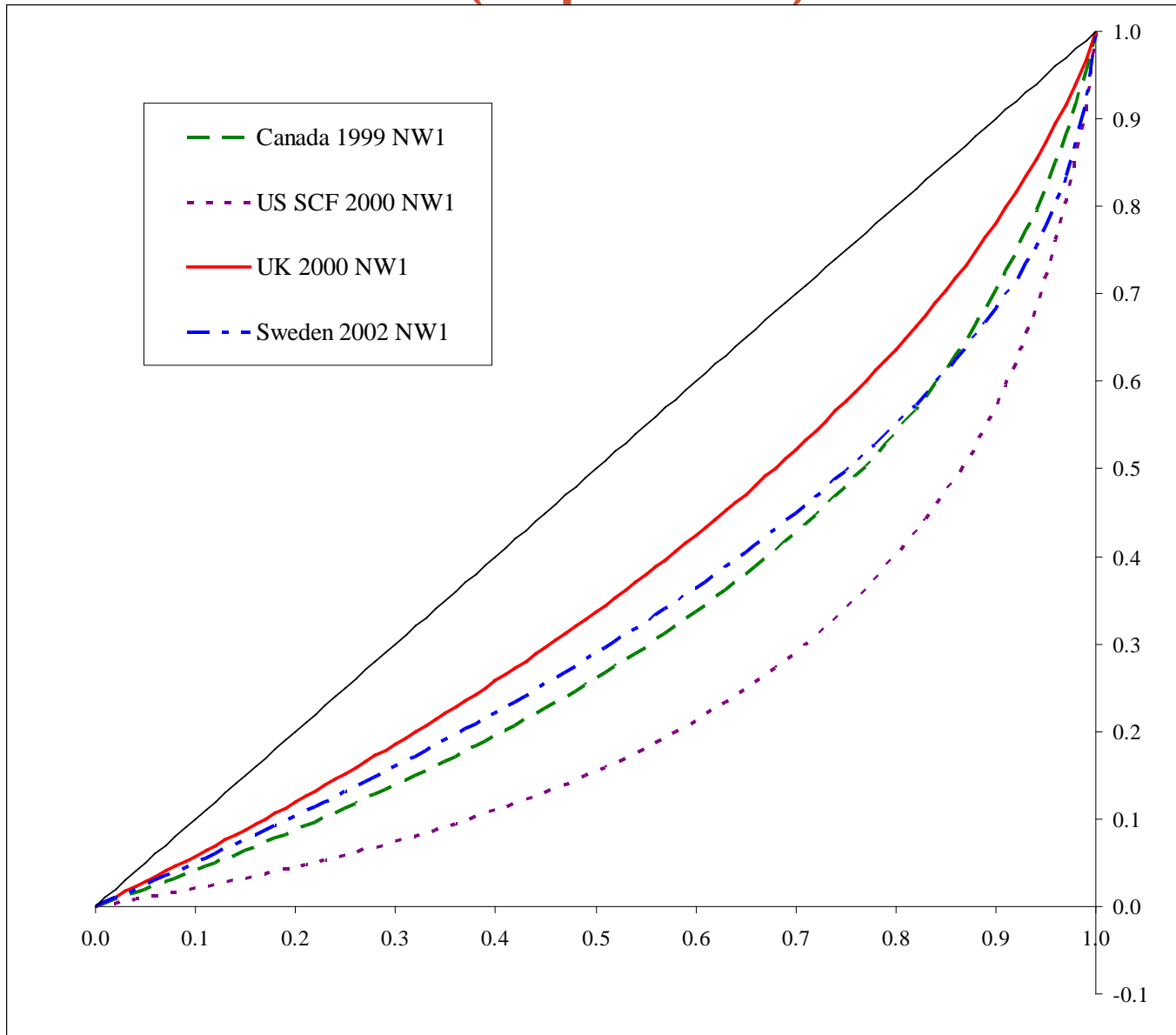
LWS: Net worth



LWS: breakdown by wealth group

	Gini overall	Share rich <i>Top 10%</i>	rich	Gini non-rich	between
UK	0.665	0.456	0.240	0.608	0.356
Sweden	0.893	0.582	0.316	1.045	0.482
Canada	0.747	0.532	0.314	0.707	0.432
US	0.836	0.705	0.525	0.730	0.605
		<i>Top 5%</i>			
UK		0.301	0.206	0.618	0.251
Sweden		0.406	0.314	0.941	0.356
Canada		0.374	0.286	0.702	0.324
US		0.575	0.492	0.735	0.525
		<i>Top 1%</i>			
UK		0.101	0.148	0.644	0.091
Sweden		0.175	0.327	0.891	0.165
Canada		0.151	0.246	0.720	0.141
US		0.329	0.392	0.776	0.319

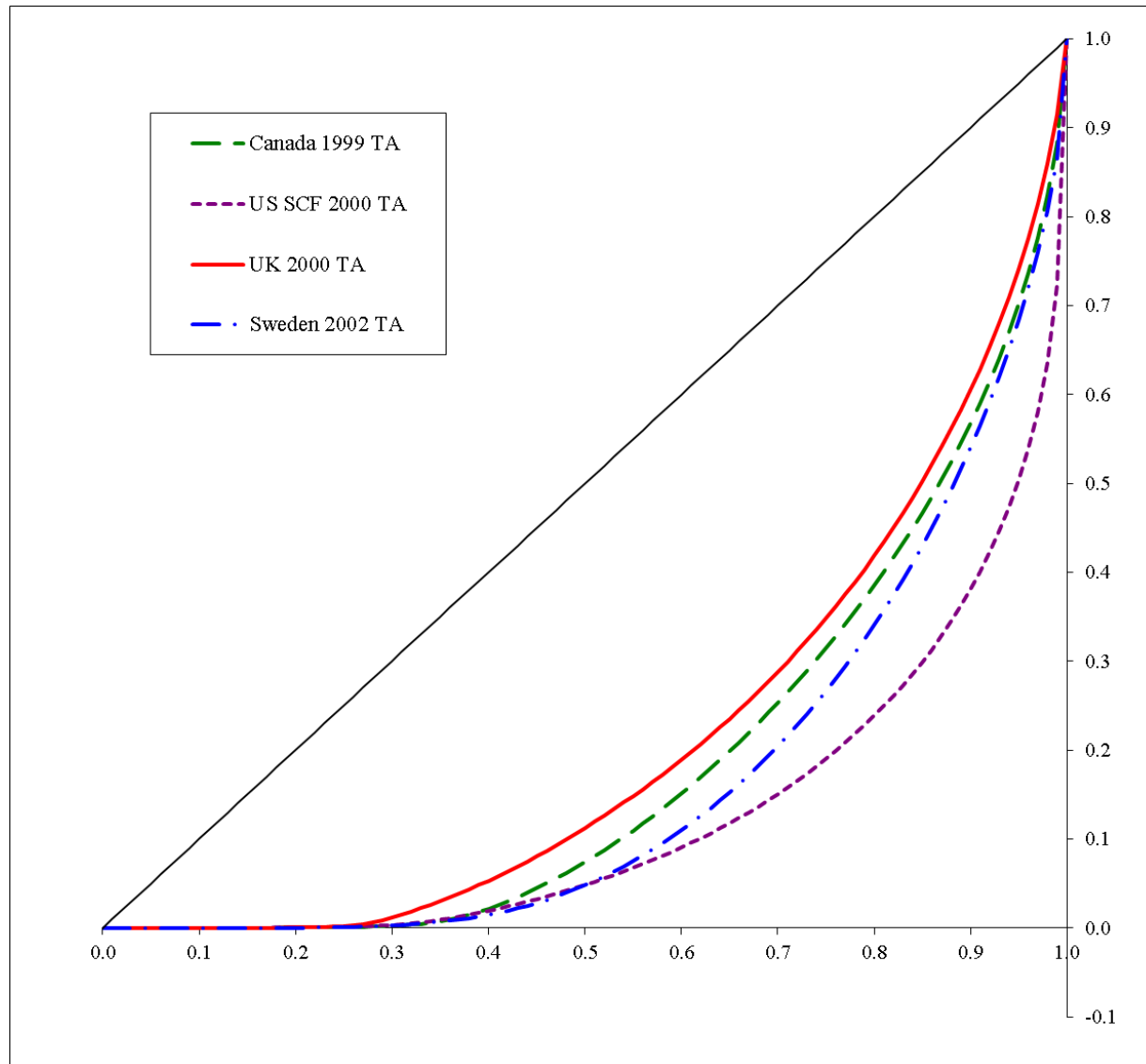
LWS: Net worth (top 10%)



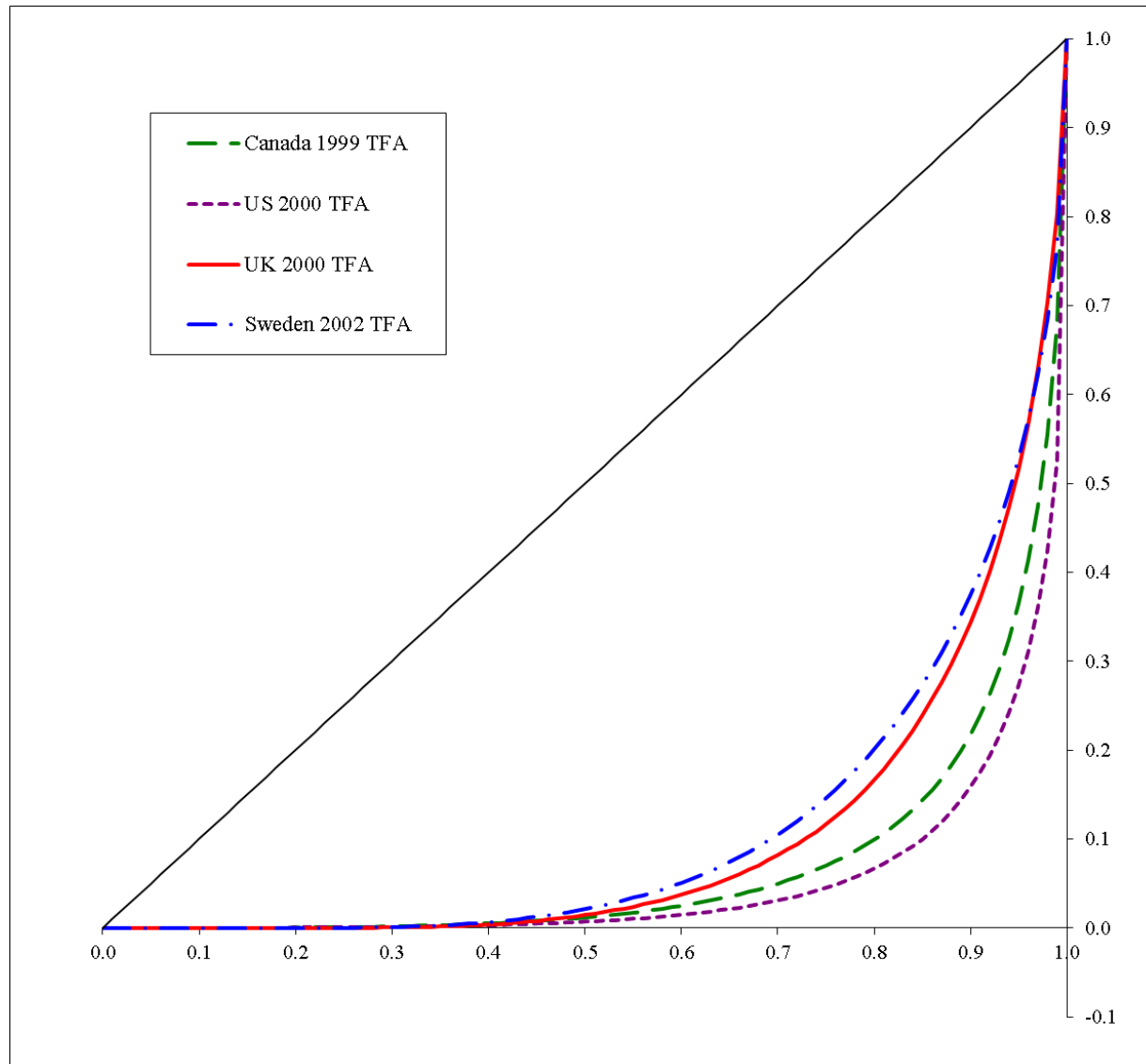
LWS: breakdown by asset type

	Share of...			Gini Coefficient for...				
	Top 10%	Top 5%	Top 1%	All	Top 10%	Top 5%	Top 1%	
	<i>Principal Residence</i>			<i>Principal Residence</i>				
UK	0.315	0.190	0.049	UK	0.565	0.280	0.277	0.318
Sweden	0.374	0.234	0.064	Sweden	0.708	0.372	0.353	0.400
Canada	0.303	0.181	0.056	Canada	0.603	0.350	0.381	0.438
US	0.381	0.260	0.097	US	0.645	0.444	0.440	0.465
	<i>Investment Property</i>			<i>Investment Property</i>				
UK	0.706	0.581	0.295	UK	0.966	0.835	0.770	0.548
Sweden	0.614	0.505	0.328	Sweden	0.949	0.860	0.850	0.839
Canada	0.633	0.466	0.195	Canada	0.930	0.754	0.720	0.660
US	0.809	0.697	0.382	US	0.959	0.812	0.762	0.690
	<i>Financial Assets</i>			<i>Financial Assets</i>				
UK	0.523	0.351	0.120	UK	0.796	0.546	0.546	0.541
Sweden	0.519	0.382	0.201	Sweden	0.778	0.589	0.593	0.542
Canada	0.675	0.537	0.255	Canada	0.860	0.655	0.605	0.553
US	0.801	0.683	0.442	US	0.899	0.688	0.658	0.555

LWS: Total Assets



LWS: Total *Financial Assets*



Functional form for wealth distribution

- Distinctive shape of empirical wealth distribution
- Upper tail appears to conform to Pareto model

- Pareto distribution

- $F(x) = 1 - [x / \underline{x}]^\alpha$
- $f(x) = \alpha \underline{x}^\alpha x^{-\alpha-1}$

- Simple interpretation

- α captures “weight” of tail
- \underline{x} “locates” the distribution

- Inequality

$$\frac{\text{average}}{\text{base}} = \frac{\alpha}{\alpha - 1}$$

$$\text{Gini} = \frac{1}{2\alpha - 1}$$

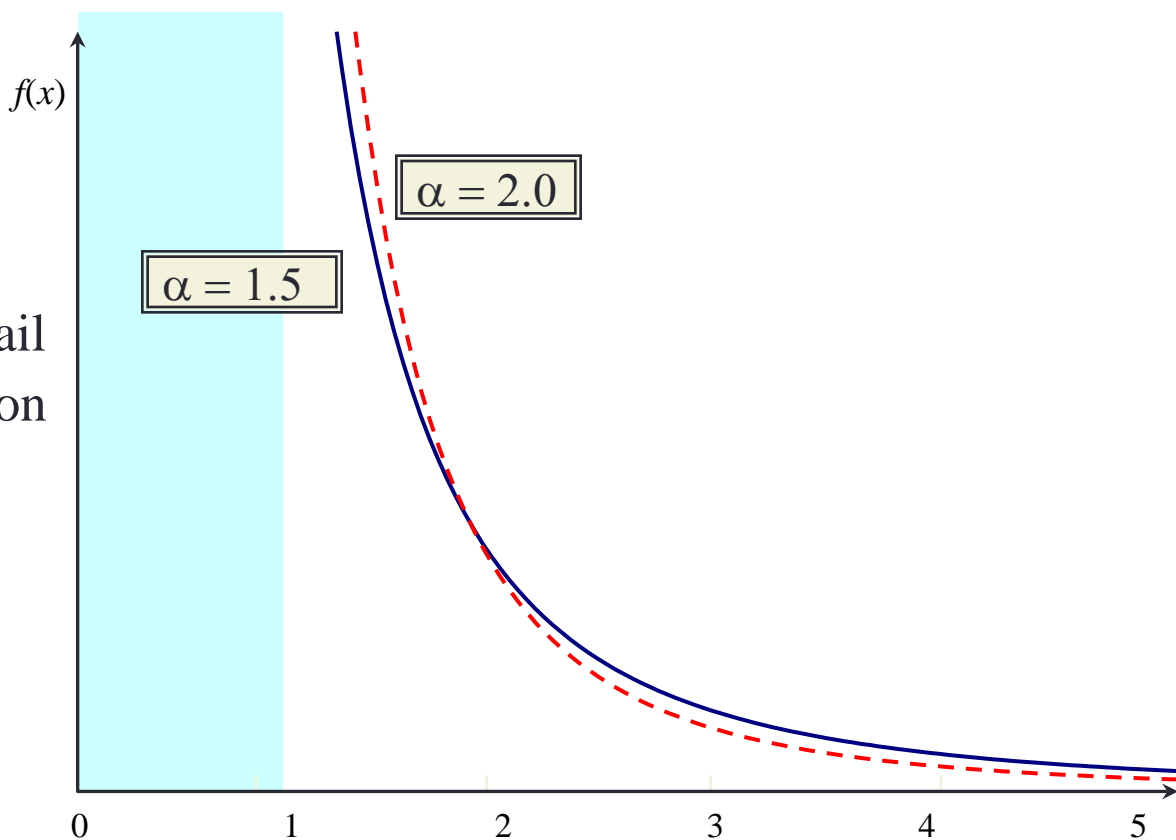
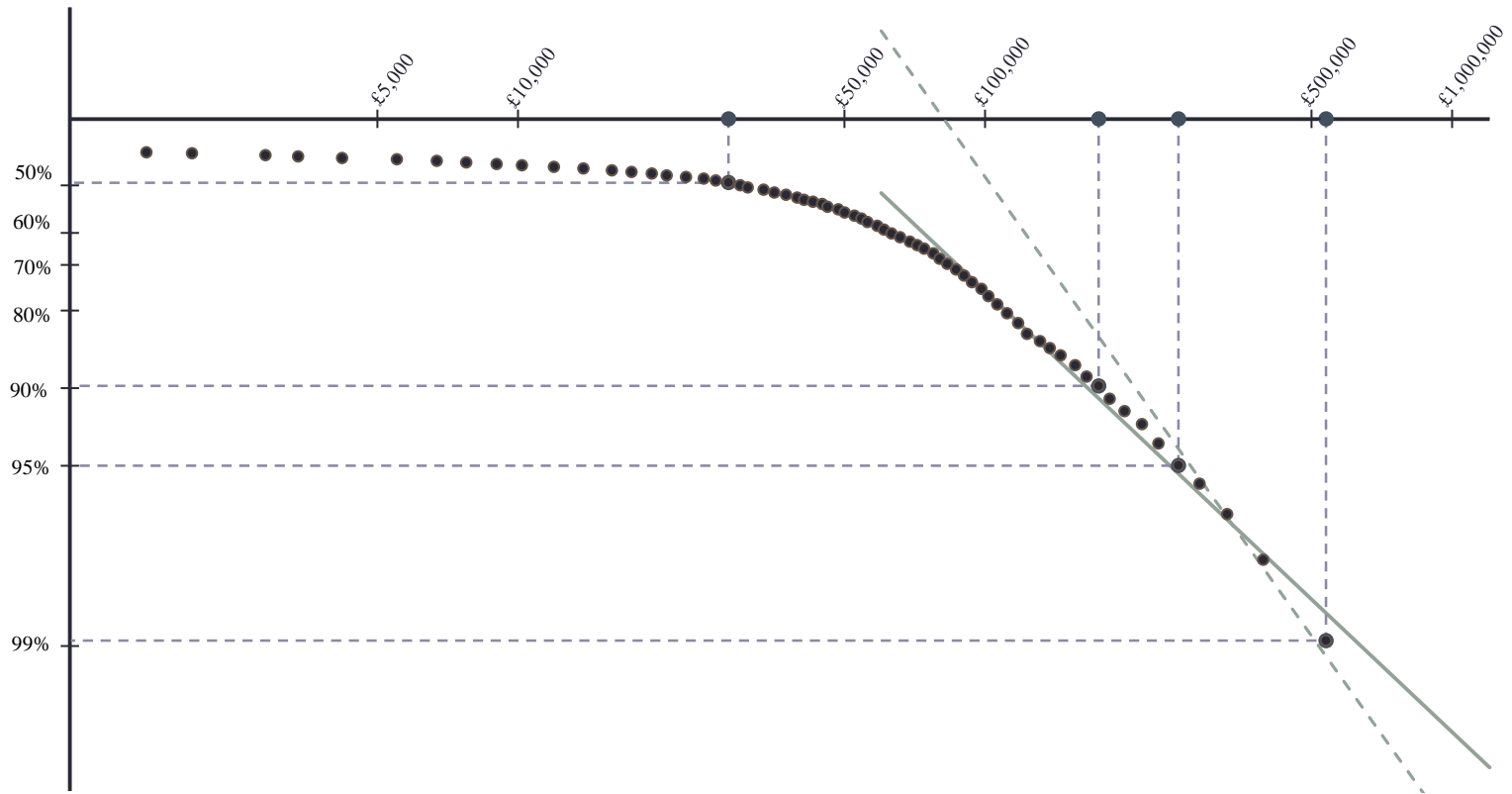


Figure 9. UK Net Worth: Pareto diagram

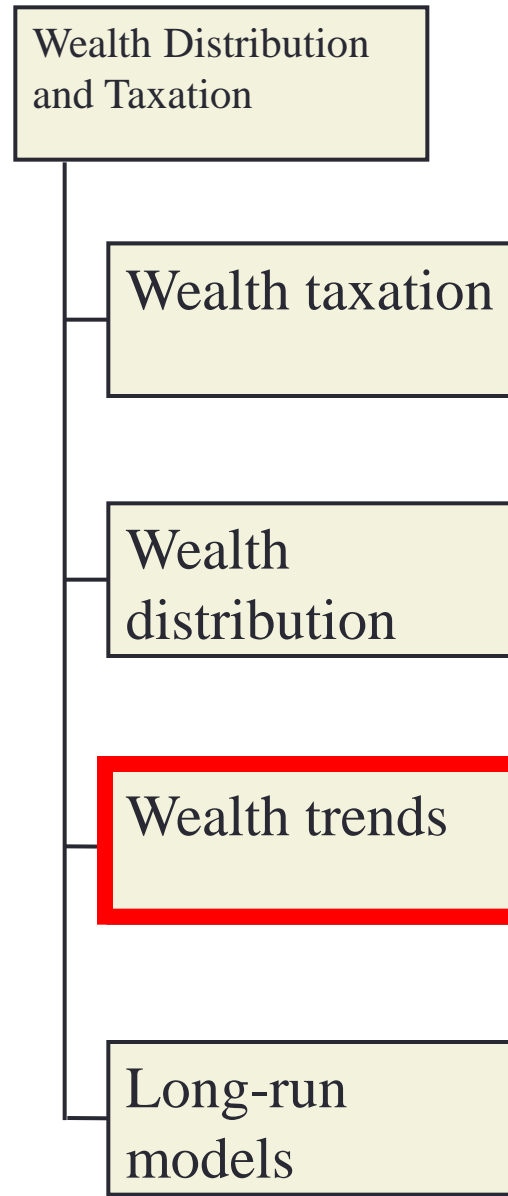


Pareto estimates

<i>Top 10%:</i>	<i>UK</i>	<i>Sweden</i>	<i>Canada</i>	<i>US</i>
OLS	2.55	1.78	1.37	0.48
Robust estimate	1.71	2.10	1.89	1.75
<i>Top 5%:</i>	<i>UK</i>	<i>Sweden</i>	<i>Canada</i>	<i>US</i>
OLS	2.90	1.76	1.53	0.52
Robust estimate	2.08	2.18	2.15	2.06
<i>Top 1%:</i>	<i>UK</i>	<i>Sweden</i>	<i>Canada</i>	<i>US</i>
OLS	3.52	1.52	1.94	0.73
Robust estimate	3.07	1.61	2.58	2.27

Overview...

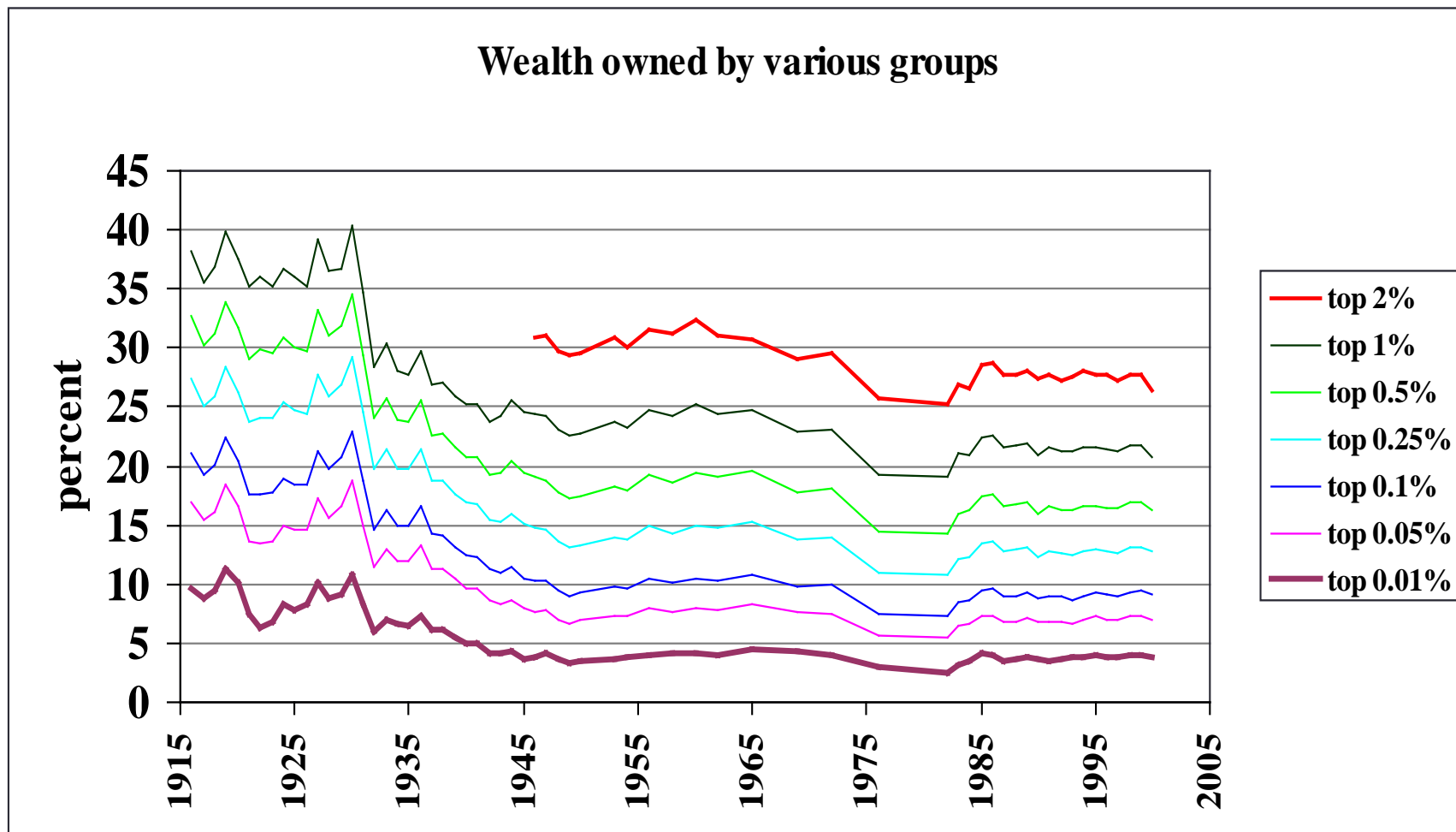
Rising inequality or stability?



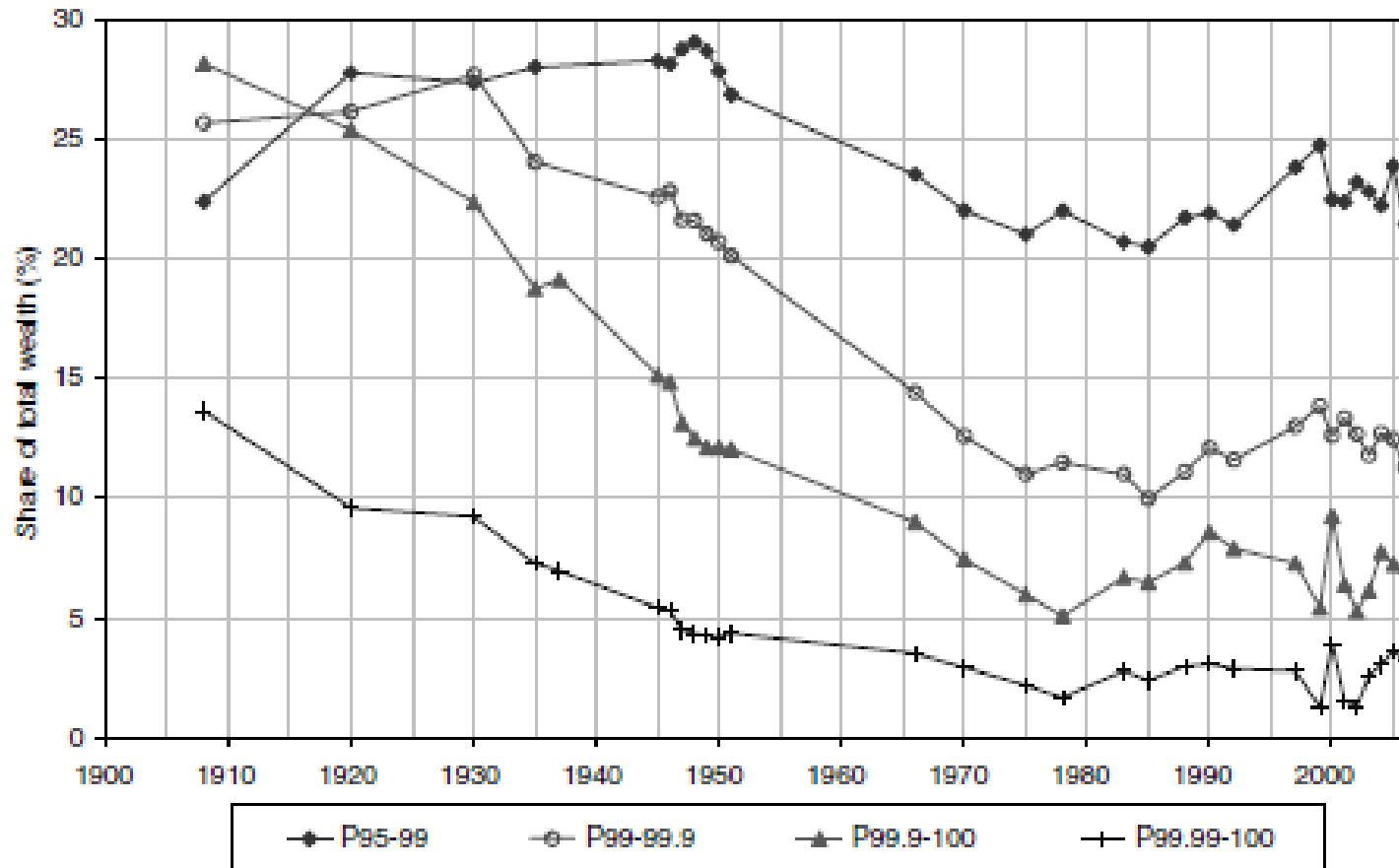
Trends in wealth inequality

- Useful to look at *trends* in distribution
 - what effect of wealth taxation in the past?
 - equalisation?
 - is there a trend toward stability...?
 -or divergence?
- For historical and recent wealth trends in US
 - [Kopczuk and Saez, \(2004\)](#)
 - Substantial time coverage:
 - From early 20th century
- For historical wealth trends in UK
 - [Atkinson et al. \(1989\)](#)
 - Similar time coverage...
 - But incomplete series
 - Recent picture from HMRC data
- Recent evidence from Sweden
 - [Roine and Waldenström \(2009\)](#)

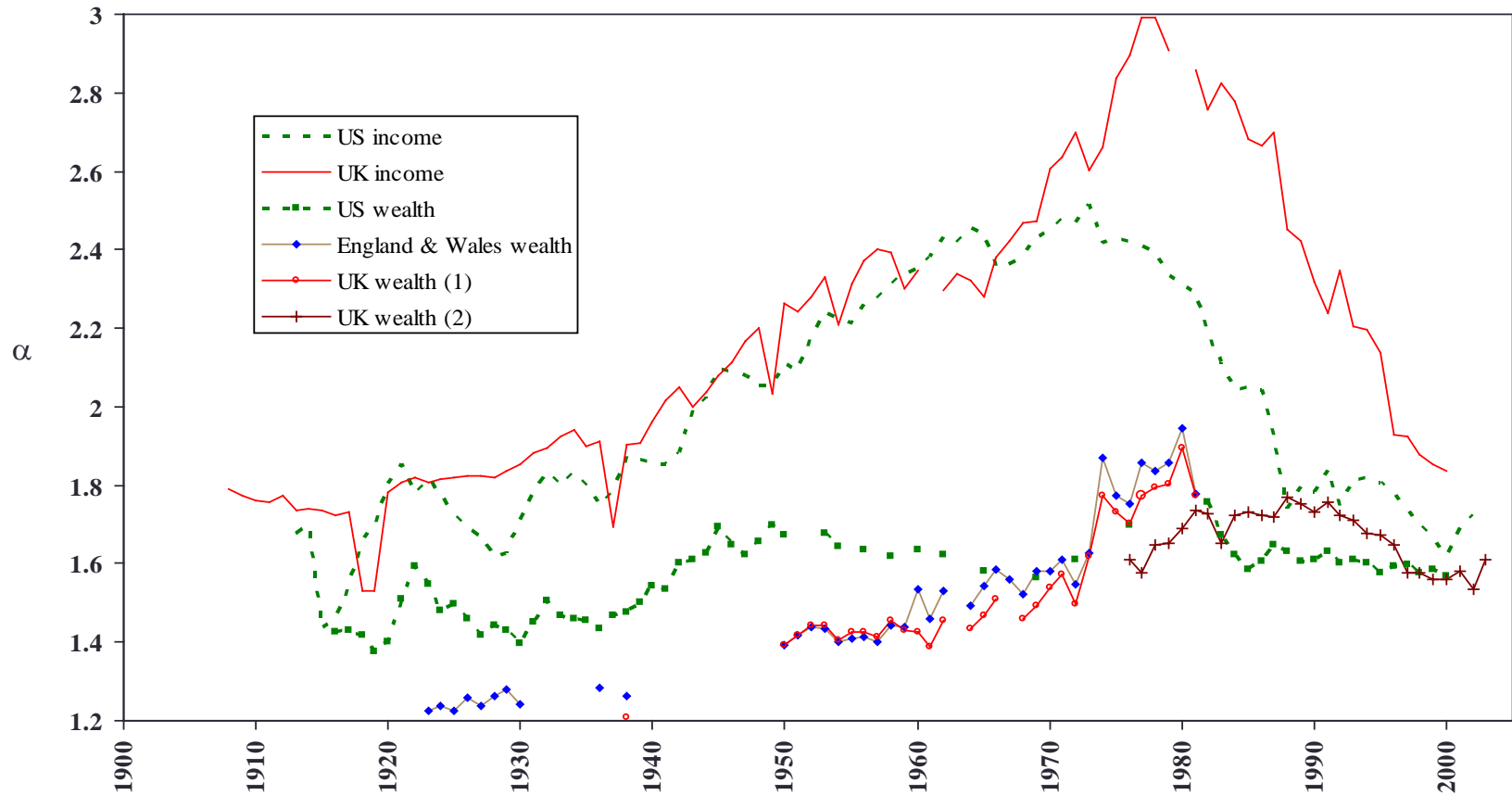
Distribution of wealth US 1916-2000



Sweden: top 5 percent



Pareto's α : USA and UK



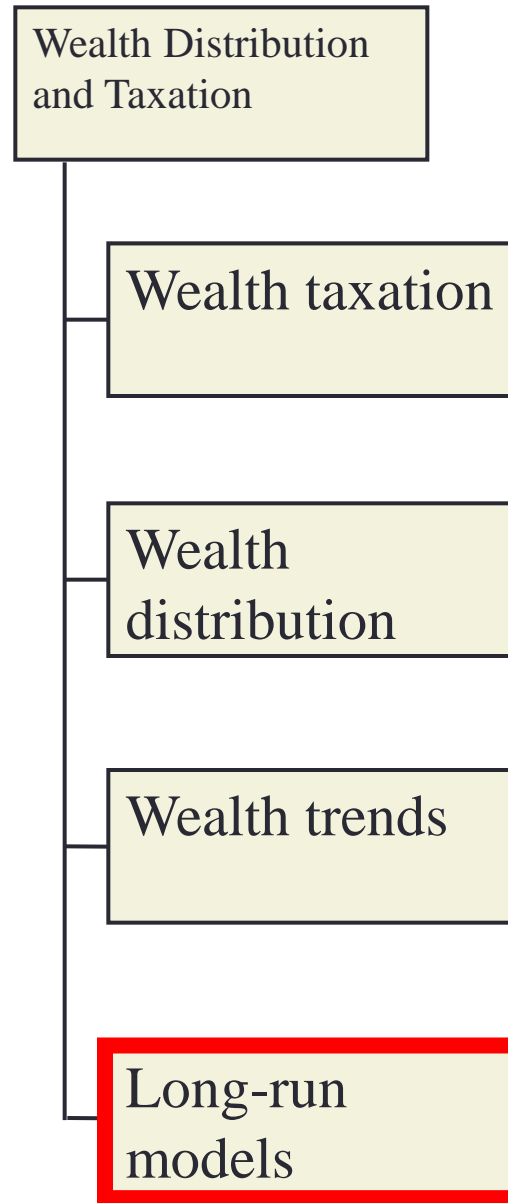
• Sources: see [Cowell \(2011\)](#) Chapter 4

Wealth trends

- UK Inequality falls in early 20th century
 - roughly from first world war
 - substantive rises in income tax and estate duty
- Reductions in inequality continue through mid-century
- US inequality falls from time of great depression
 - Largely attributable to stock prices
 - Large concentration of corporate stock in wealth of very rich
- But US inequality also carried on falling through to 70s
 - Antitrust legislation?
 - Development of estate tax
 - Changing nature of top groups ([Edlund and Kopczuk 2009](#))
- Sweden
 - From World War I until late 20th century equalisation
 - From around 1980 trend reversed

Overview...

*Intergenerational
dynamics*



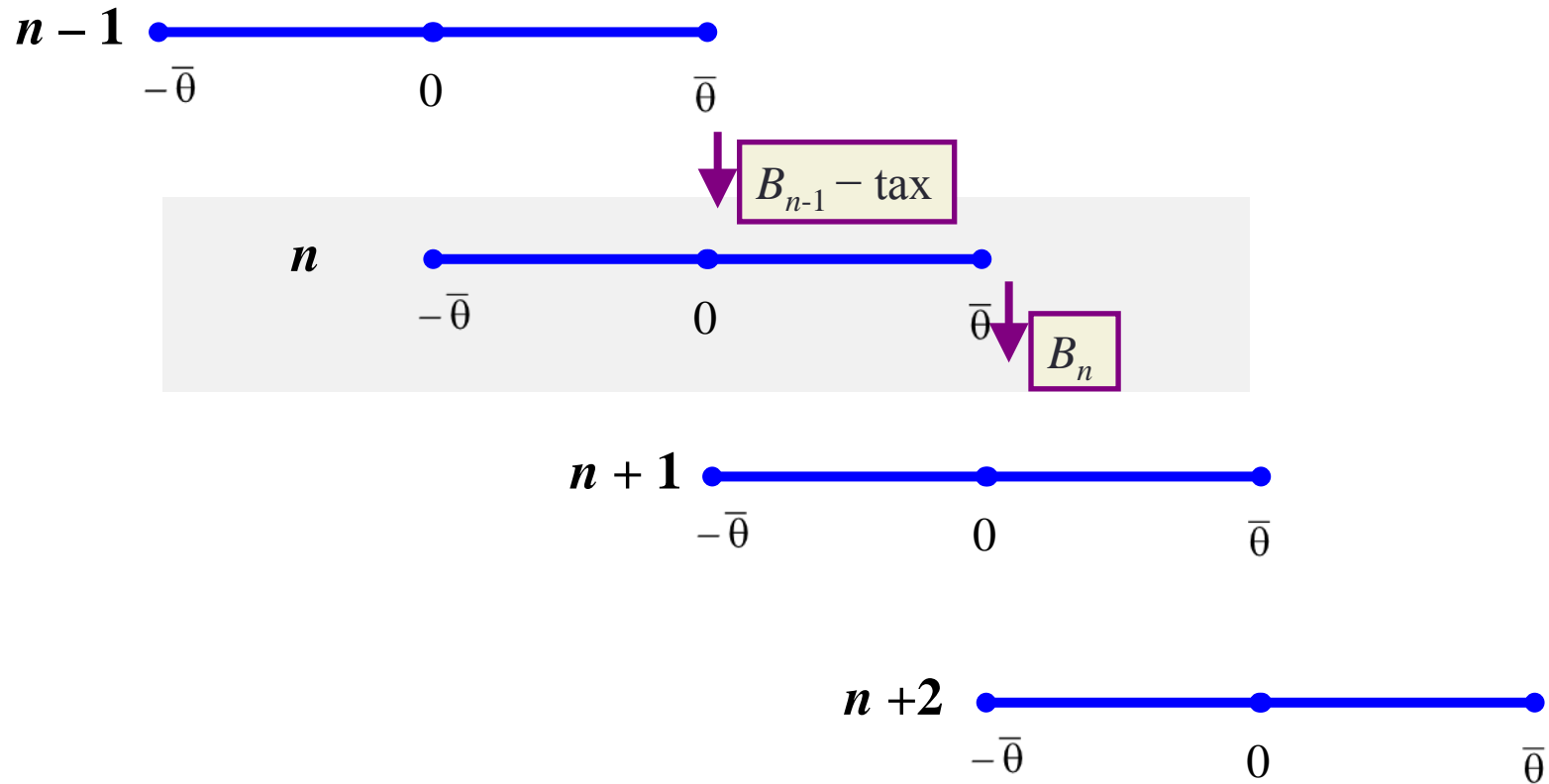
A way forward

- Wealth taxes may work by influencing long-run distribution
 - direct impact of wealth taxes on redistribution will be small
 - small taxes can have big effect on the equilibrium ([Kaplow 2000](#))
- What kind of model?
 - full GE ([DeNardi 2004](#), [Cagetti and DeNardi 2008](#))
 - Piecemeal focus
- Story of wealth distribution in the long run ([Piketty 2000](#)):
 - Specify financial constraints
 - Model preferences / tastes / habits
 - Model exogenous resource flow
 - Specify family formation mechanism
- Preferences: what motivates bequests? ([Kopczuk 2010](#))
 - Altruism
 - Exchange
 - Warm-glow
 - Accident and inertia

Simplified model (1)

- Focus on the role of consumption
 - family features absent
 - interaction between intra-/inter-generational factors
 - ([Champernowne-Cowell 1998](#), [Cowell 2012](#))
- A model of single person-dynasties:
 - person inherits $\bar{\theta}$ years after attaining adulthood
 - dies $\bar{\theta}$ years after inheritance
 - leaves all his terminal wealth to one descendant
- Resources
 - all get the same earnings, $e(\theta)$ at age θ
 - but people may differ in terms of inherited wealth
- Taxation:
 - could introduce income or wealth taxes in model
 - here focus on wealth-transfer taxation
 - simple piecewise linear tax on bequests
 - wealth left in excess of W^* taxed at rate τ

Link between generations

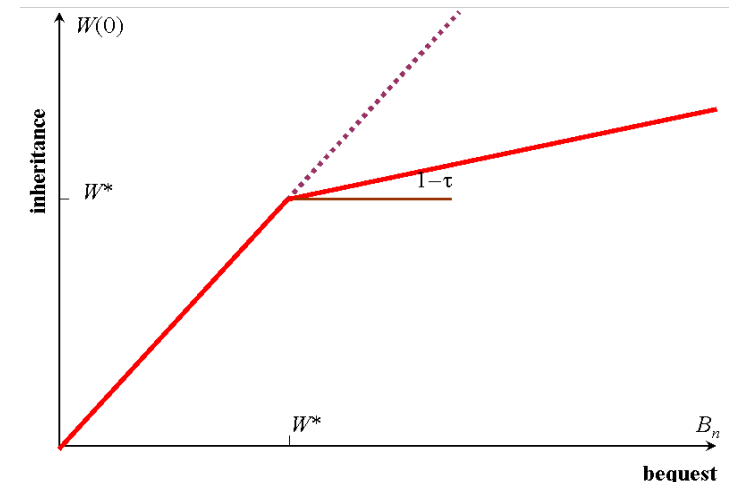


Intra-generational – naïve consumption

- Role of consumption is crucial
- Naïve consumption behaviour:
 - income is given by $y(\theta) = e(\theta) + rW(\theta)$
 - consumption aims at a target level: $c(\theta) = \min \{\bar{c}, y(\theta)\}$
 - earnings are fixed $\bar{c} > \bar{e}$
- Wealth accumulation:
 - given initial wealth $W(0)$: $W(\theta) = \max \{W(0)e^{r\theta} - B^* [e^{r\theta} - 1], 0\}$, $B^* = \frac{\bar{c} - \bar{e}}{r}$
 - rising/falling wealth: $W(0) \gtrless B^*$
- $W(0)$ will be determined by intergenerational link

Inter-generational

- Role of taxation is crucial:
 - bequest tax: $\max \{ \tau [B - W^*], 0 \}$
- Bequest determined by intragenerational component



- terminal wealth: $B_n = W(\bar{\theta})$
- tax determines starting wealth (inheritance) for next generation
- from tax function: $W(0) = \min \{ B_n, [1 - \tau]B_n + \tau W^* \}$
- Get a model of bequest dynamics:
 - connect n and $n+1$: $B_{n+1} = \max \{ \min \{ B_n, [1 - \tau]B_n + \tau W^* \} e^{r\bar{\theta}} - B^* [e^{r\bar{\theta}} - 1], 0 \}$
 - use the difference operator $\Delta B_n := B_{n+1} - B_n$
 - $\Delta B_n := \max \{ \min \{ B_n [e^{r\bar{\theta}} - 1], [[1 - \tau]e^{r\bar{\theta}} - 1] B_n + \tau W^* e^{r\bar{\theta}} \} - B^* [e^{r\bar{\theta}} - 1], -B_n \}$

Bequest Dynamics

- Overall equation:

$$\Delta B_n := \max \{ \min \{ B_n [e^{r\bar{\theta}} - 1], [(1 - \tau)e^{r\bar{\theta}} - 1] B_n + \tau W^* e^{r\bar{\theta}} \} - B^* [e^{r\bar{\theta}} - 1], -B_n \}.$$

- Break this down by tax regime

- For low bequests (below W^*)

- dynamics: $\Delta B_n = [B_n - B^*] [e^{r\bar{\theta}} - 1]$

- equilibrium: $B_n = B^*$

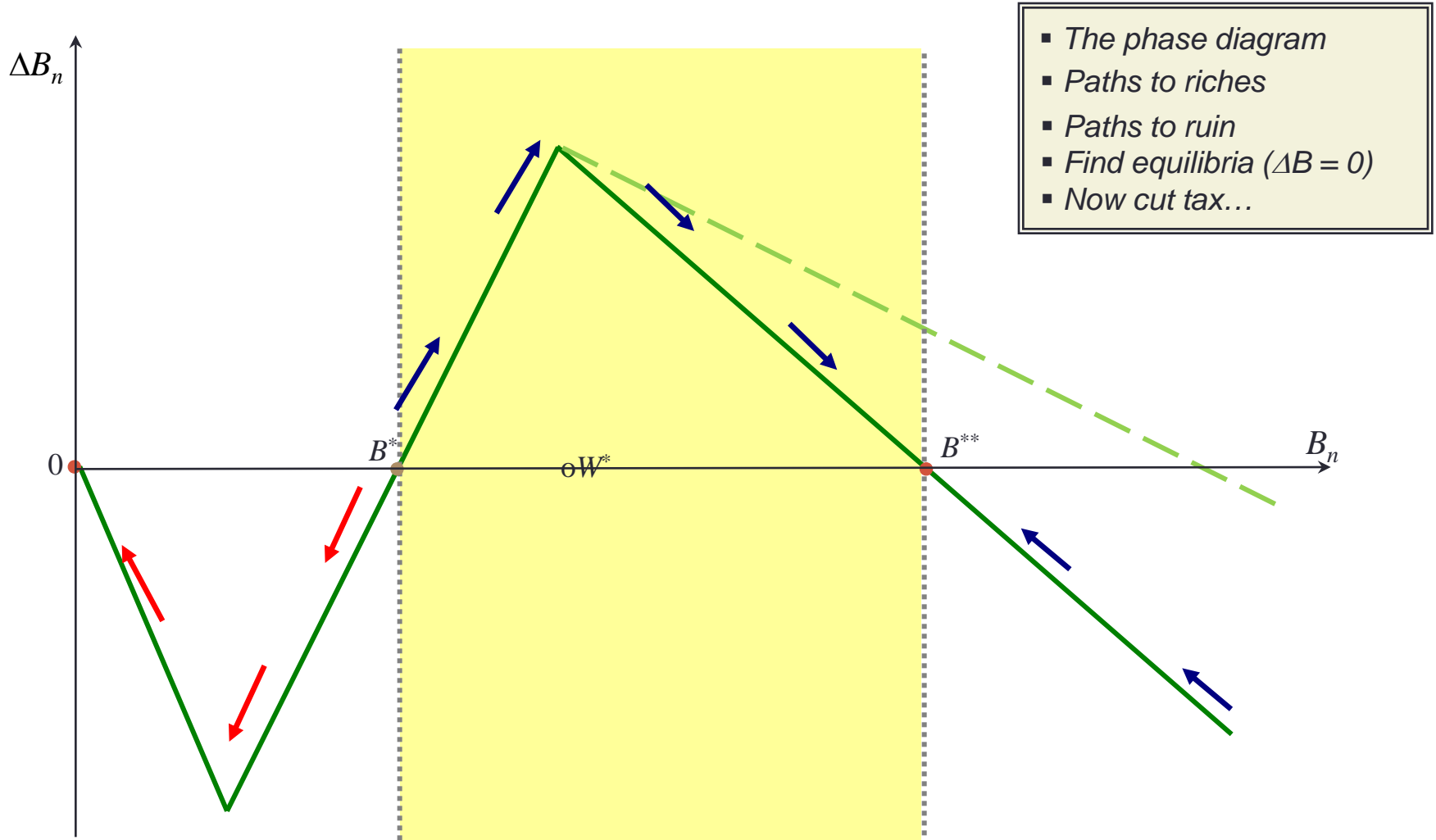
- For high bequests (above W^*)

- dynamics: $\Delta B_n = [1 - [1 - \tau]e^{r\bar{\theta}}] [B^{**} - B_n]$

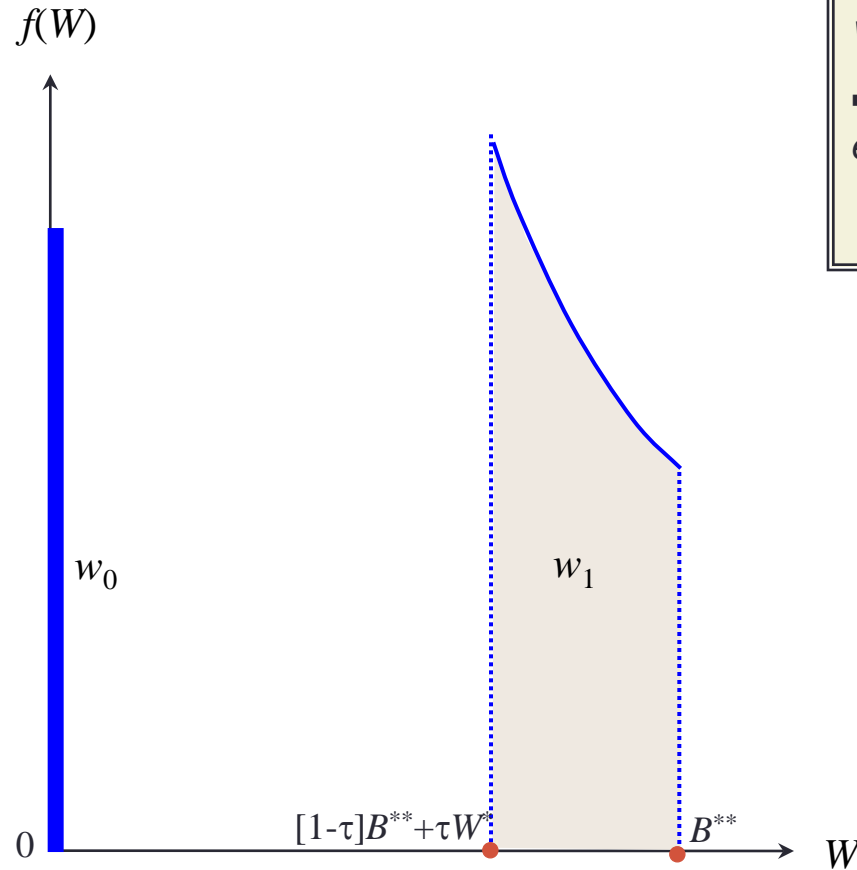
- equilibrium: $B^{**} := \frac{\tau W^* - B^* [1 - e^{-r\bar{\theta}}]}{\tau - 1 + e^{-r\bar{\theta}}}$

$$\frac{\partial B^{**}}{\partial \tau} = - \frac{[1 - e^{-r\bar{\theta}}] [W^* - B^*]}{[\tau - 1 + e^{-r\bar{\theta}}]^2} < 0$$

Bequest Dynamics: naïve consumption



Wealth distribution overall



- *Distribution of W amongst wealthy*
- *Take into account lower equilibrium*

Alternative consumption version

- Consumption proportional to lifetime resources ([Becker-Tomes 1979](#))

- lifetime earnings:
$$E = \bar{e} \frac{e^{r\bar{\theta}} - 1}{r}$$

- revised bequest equation:
$$B_{n+1} = s[\min\{B_n, [1 - \tau]B_n + \tau W^*\} + E]e^{r\bar{\theta}}$$

- Bequest dynamics:

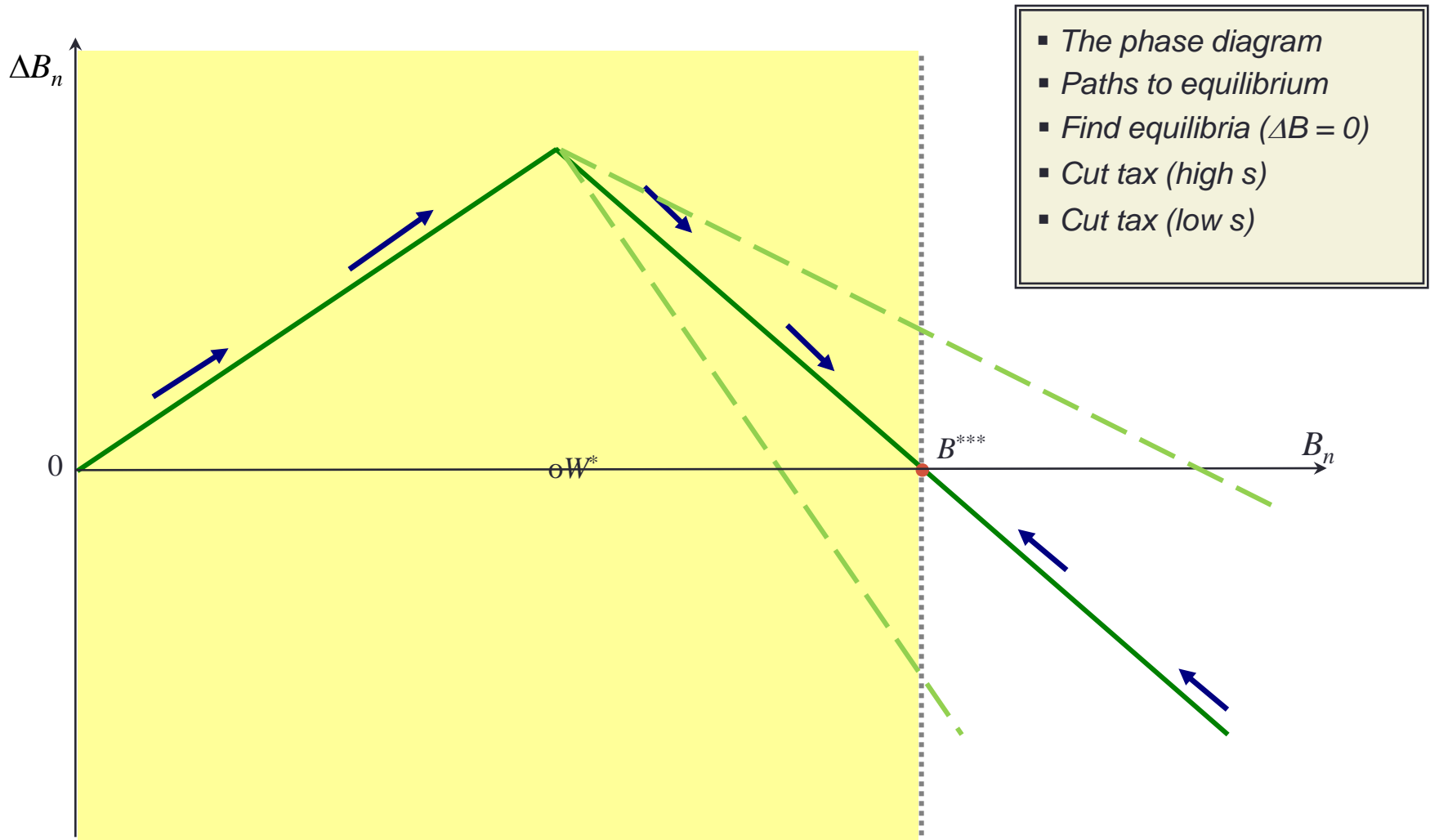
- difference equation:

$$\Delta B_n = \min\left\{B_n [se^{r\bar{\theta}} - 1], [s[1 - \tau]e^{r\bar{\theta}} - 1]B_n + s\tau W^* e^{r\bar{\theta}}\right\} + sEe^{r\bar{\theta}}$$

- equilibrium:
$$B^{***} := s \frac{\tau W^* + E}{e^{-r\bar{\theta}} - s[1 - \tau]}$$

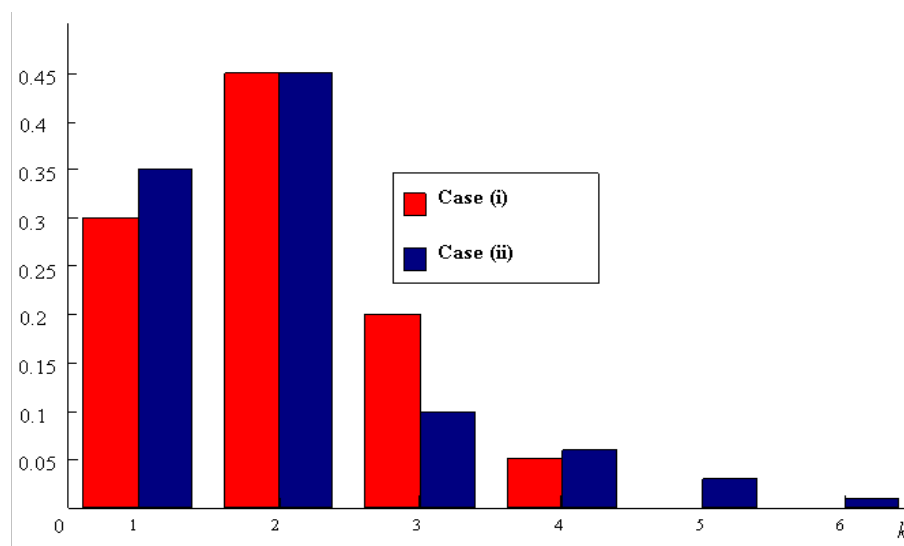
$$\frac{\partial B^{***}}{\partial s} = \frac{\tau W^* + E}{e^{-r\bar{\theta}} - s[1 - \tau]} + \frac{s[1 - \tau][\tau W^* + E]}{[e^{-r\bar{\theta}} - s[1 - \tau]]^2} > 0, \quad \frac{\partial B^{***}}{\partial \tau} = s \frac{e^{-r\bar{\theta}} W^* - s[E + W^*]}{[e^{-r\bar{\theta}} - s[1 - \tau]]^2}$$

Bequest Dynamics: alternative consumption



Simplified model (2)

- Focus on family formation ([Champernowne-Cowell 1998](#))
 - each generation is a discrete unit
 - pairs always consist of people with equal wealth
 - no-one benefits from more than one bequest
 - bequest is divided equally amongst the k kids (k given)
- Model applies to upper wealth levels – above specified wealth level W^*
- For any $W > W^*$, the proportion of testators with k kids is p_k :
 - independent of W
 - $p_k \geq 0$
 - $\sum_k p_k = 1$
 - $\sum_k k p_k = 2$
 - two examples:



Equilibrium distribution

- Let F_n, F_{n+1} be the wealth distribution in generations $n, n+1$
 - $F_n(W)$ is the proportion of the population in generation n with wealth $\leq W$
 - We have equilibrium if $F_n = F_{n+1} = F$
- Take a person with wealth W in a family where parents had k kids
 - if parental wealth was W' per head bequest must have been $2[1-\tau]W'$
 - so each kid would get $2[1-\tau]W'/k$
 - therefore $W' = kW/2[1-\tau]$
 - given that there are p_k such families: $F_{n+1}(W) = \sum_k \frac{1}{2}k p_k F_n(kW/2[1-\tau])$
- Equilibrium requires

$$F(W) = \sum_k \frac{1}{2}k p_k F(kW/2[1-\tau])$$
- Only functional form that permits a solution for all W is Paretian

$$F(W) = 1 - AW^{-\alpha}$$
- So the equilibrium condition is:

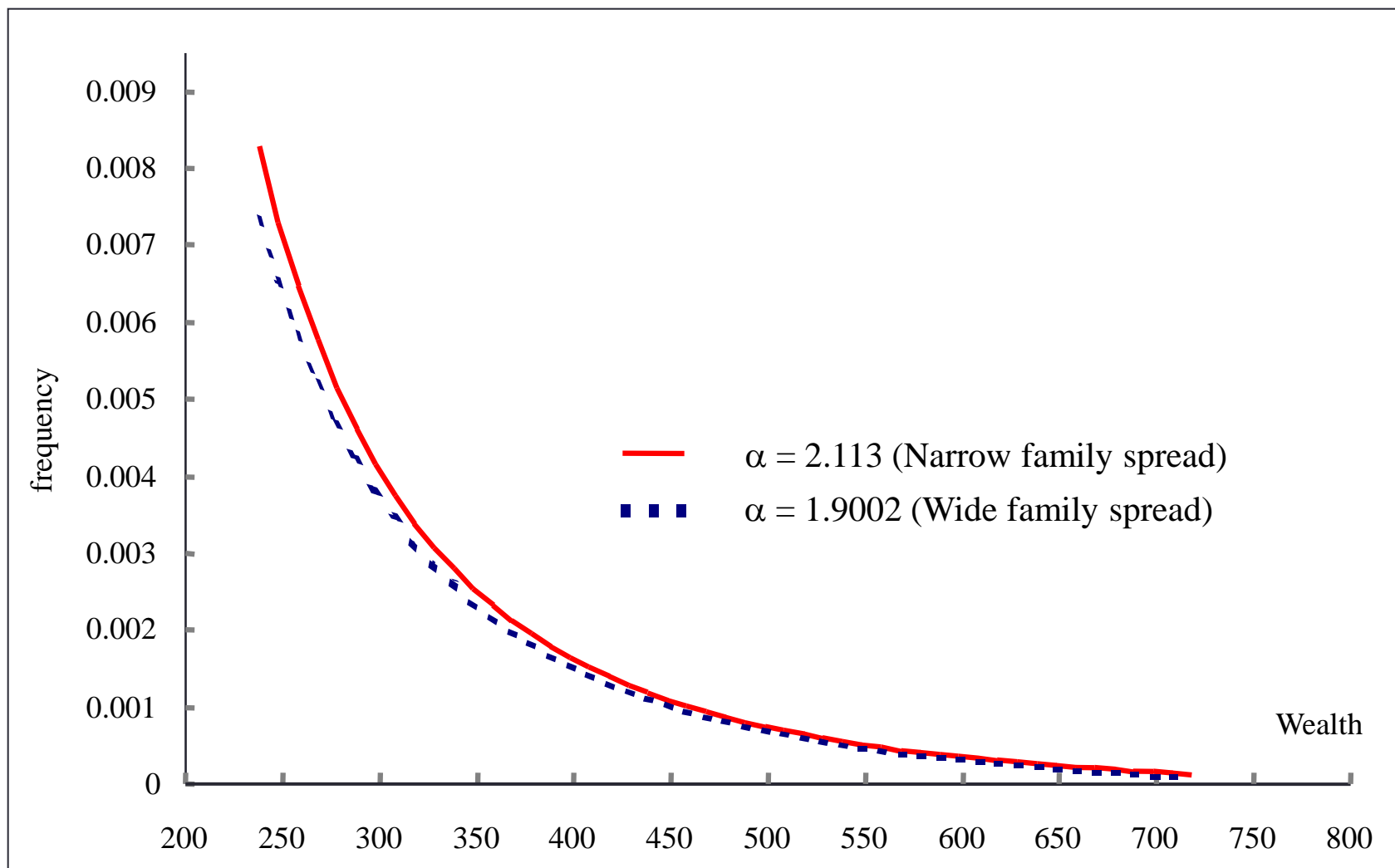
$$\sum_{k=1}^K p_k \left[\frac{k}{2} \right]^{1-\alpha} = [1 - \tau]^{-\alpha}$$

Tax: Equilibrium Wealth Distribution

- Higher tax produces lower long-run inequality
- If tax is too low – no long-run equilibrium
- Quite low tax rates produce values similar to actual economies.

$\tau(\%)$	<i>(i) Narrow</i>		<i>(ii) Wide</i>	
	α	<i>Gini</i>	α	<i>Gini</i>
2	1.22	0.410	-	-
5	1.55	0.323	1.42	0.352
10	2.11	0.237	1.90	0.263
15	2.73	0.183	2.44	0.205
20	3.43	0.146	3.07	0.163
25	4.28	0.117	3.86	0.130

Equilibrium Distribution $\tau = 10\%$



Summary

- Dynastic model produces a bifurcation
 - Convergence to equilibrium distribution
 - Inequality within and between groups
 - Source of inequality lies in savings behaviour
- Role of uncertainty captured in savings behaviour
- Family structure affects long-run equilibrium
 - spread out families reduce effectiveness of taxation
- Tweaking the models would modify this a little
 - Variation in income
 - Out-of-class marriage
 - ([Champernowne-Cowell 1998](#))
- Potentially major role for taxation

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