

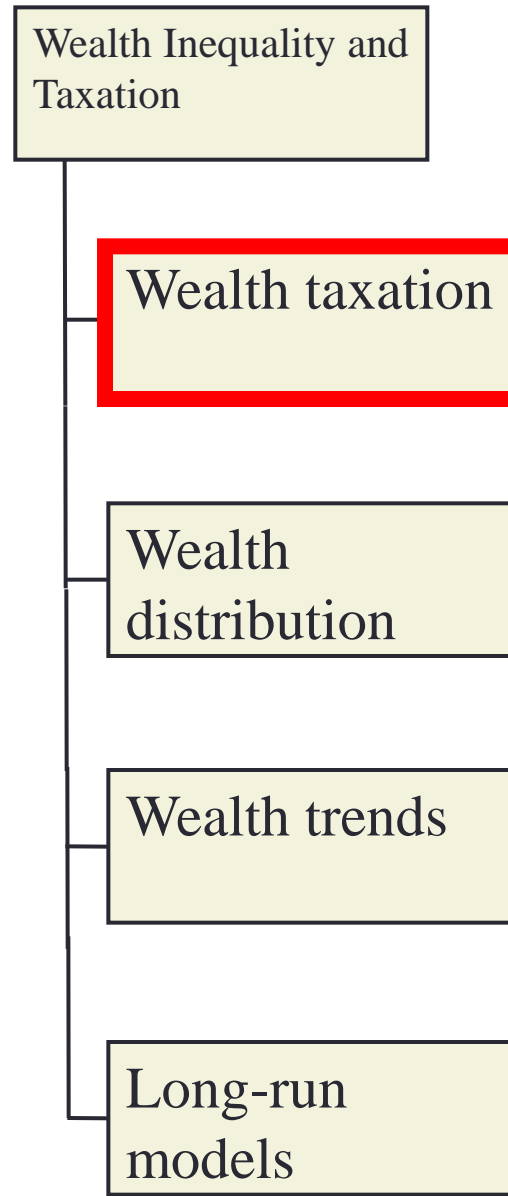
# Wealth inequality and the taxation of wealth transfers

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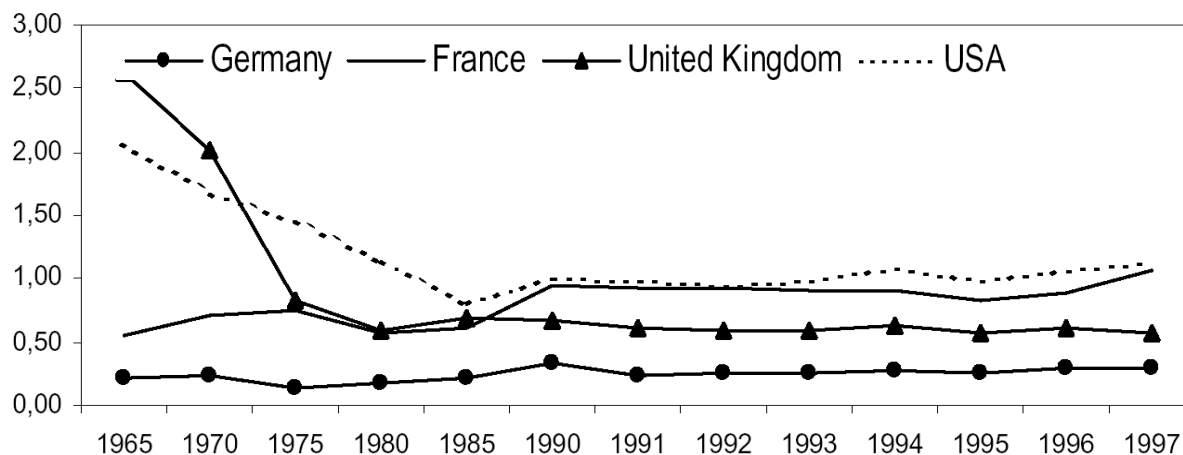
Frank Cowell: Winter School, Canazei, January 2012

# Overview...

*Why wealth taxation?  
Types of tax*



# Why wealth taxation?



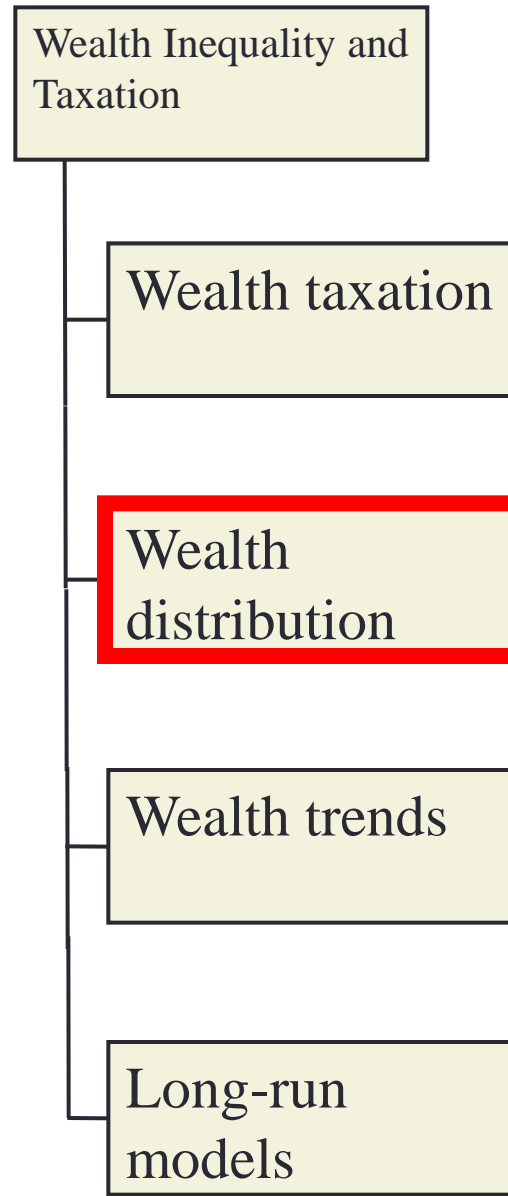
- Revenue raising is unlikely to be major role
  - revenue raised less than 1% of receipts?
  - see OECD Revenue Statistics (2000)
- Efficiency case for or against wealth taxation is unclear
  - ([Cremer and Pestieau 2003](#))
- Equity case for wealth taxation is more promising
  - direct impact of wealth taxation on redistribution must be small
  - in long run taxes may influence savings and bequest behaviour
  - these influence wealth accumulation and inequality

# 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

# 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 no 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

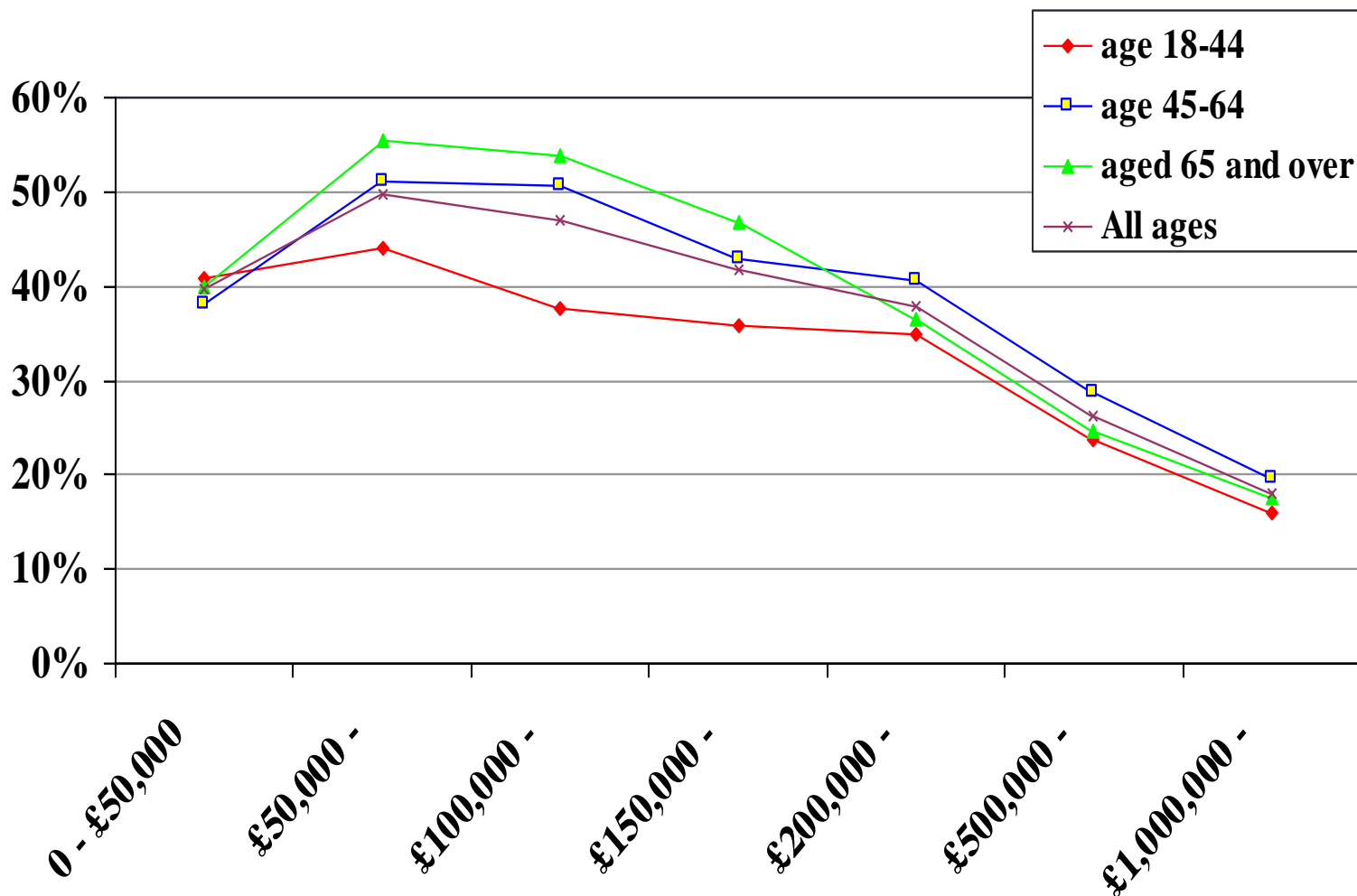
# HMRC “Identified wealth” 2003

net capital value of estate	Securities	Cash	Loans, mortgages etc	Policies of insurance	Residential buildings	Other Buildings and Land	Other assets	Net as % gross	Mortgages	Other debts
0 - £50,000	4.6%	22.7%	5.6%	8.9%	47.6%	0.1%	10.5%	61.0%	5.7%	33.4%
£50000 - £100,000	4.5%	16.2%	3.0%	14.6%	55.0%	0.0%	6.8%	83.3%	4.1%	12.6%
£100000 - £150,000	3.9%	14.0%	2.4%	18.6%	55.2%	0.1%	5.8%	84.4%	4.3%	11.3%
£150000 - £200,000	4.5%	14.4%	0.7%	12.1%	59.4%	1.6%	7.5%	89.0%	4.9%	6.1%
£200000 - £500,000	8.5%	12.8%	0.9%	12.6%	54.7%	1.5%	9.0%	89.7%	6.5%	3.8%
£500000 - £1000,000	17.6%	11.2%	1.6%	7.6%	42.5%	5.3%	14.1%	93.8%	3.9%	2.3%
£1,000,000 and over	23.8%	10.8%	1.9%	5.0%	28.1%	8.1%	22.4%	94.2%	2.9%	3.0%

- Residential buildings about 50% of net worth, except for £500,000+
- Debts concentrated amongst those with less than £100,000
- Securities concentrated amongst the rich

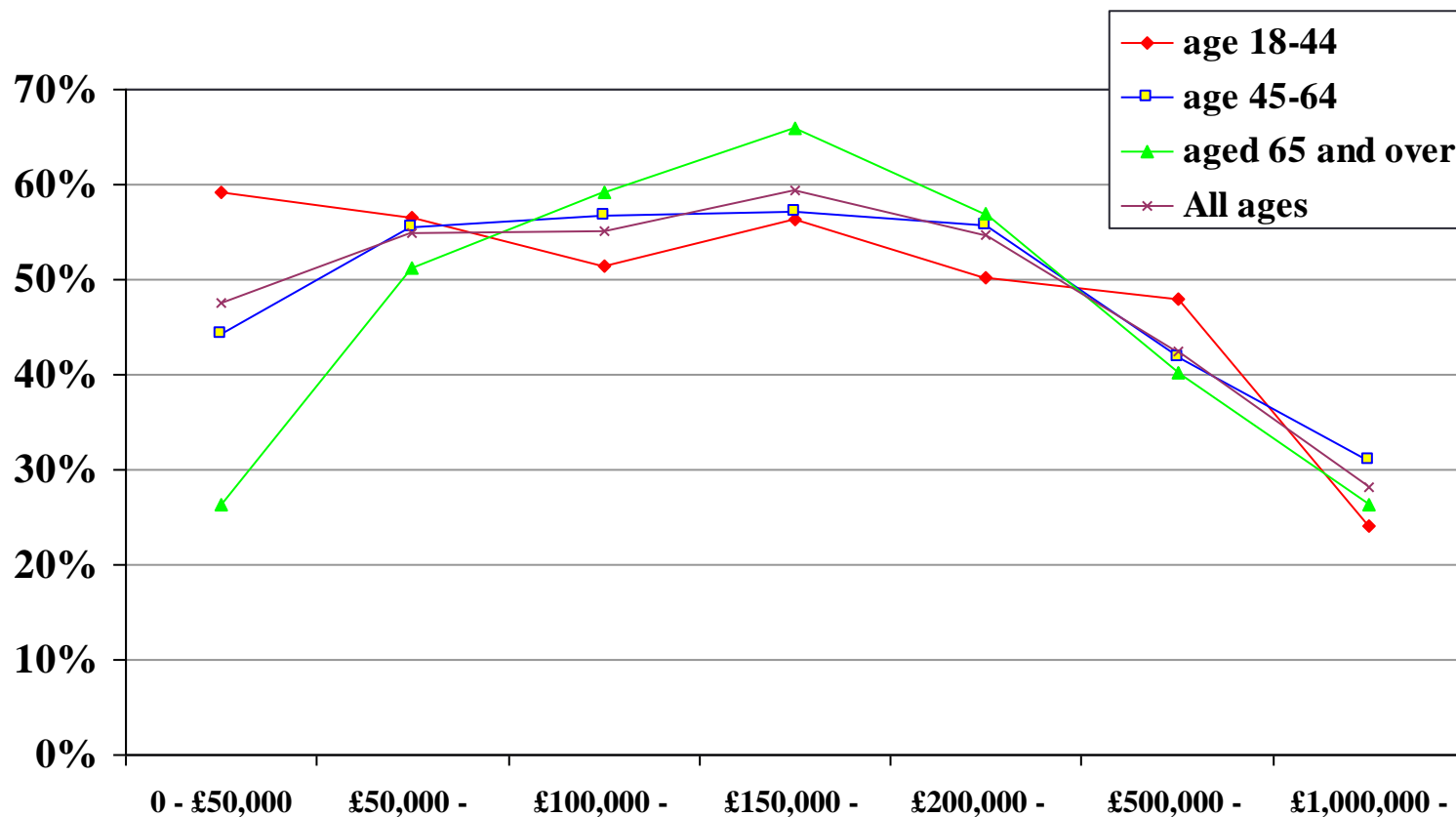
Source: [HMRC statistics](#) table 13.2

# Proportion of wealth in residential buildings. UK 1999

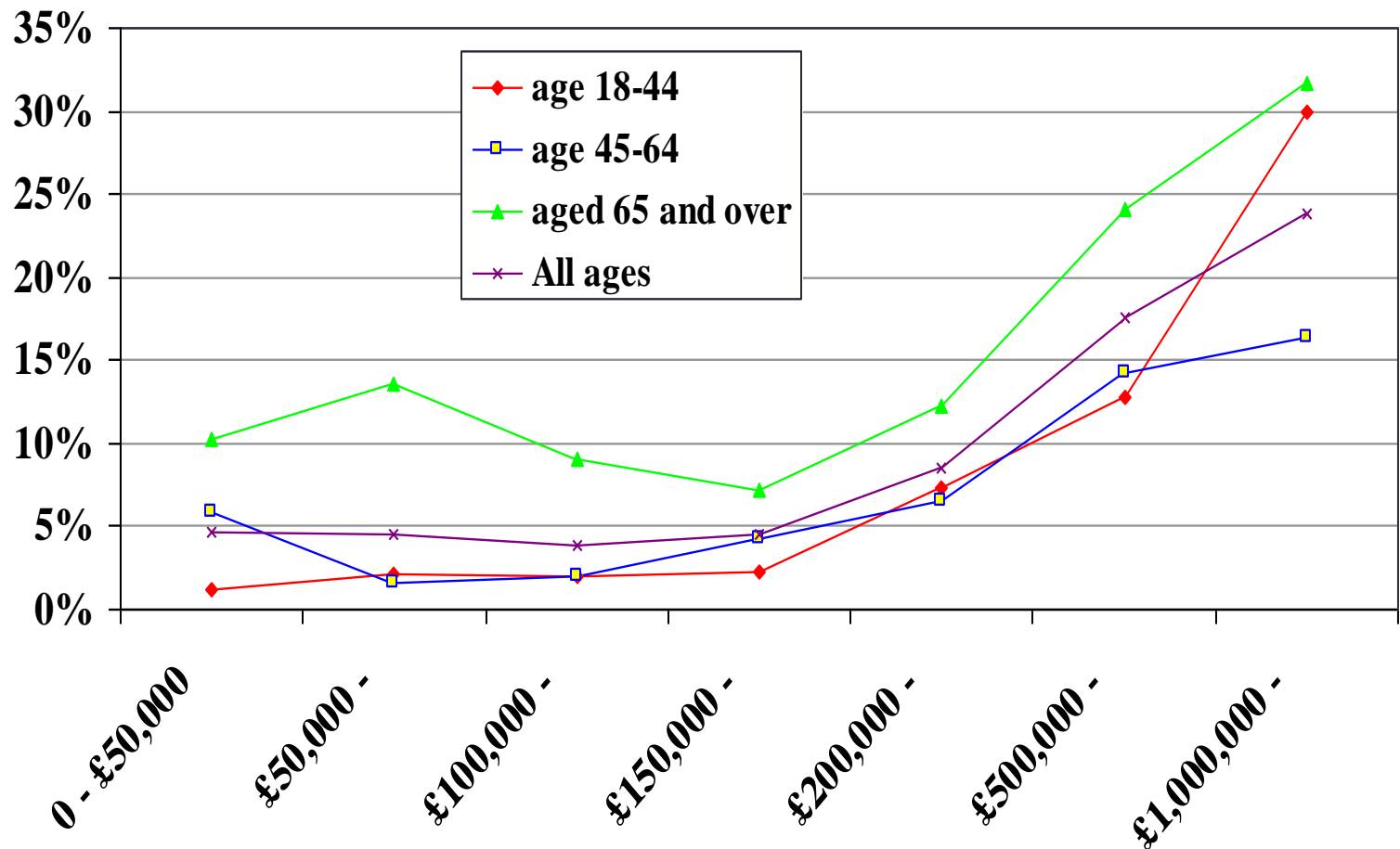




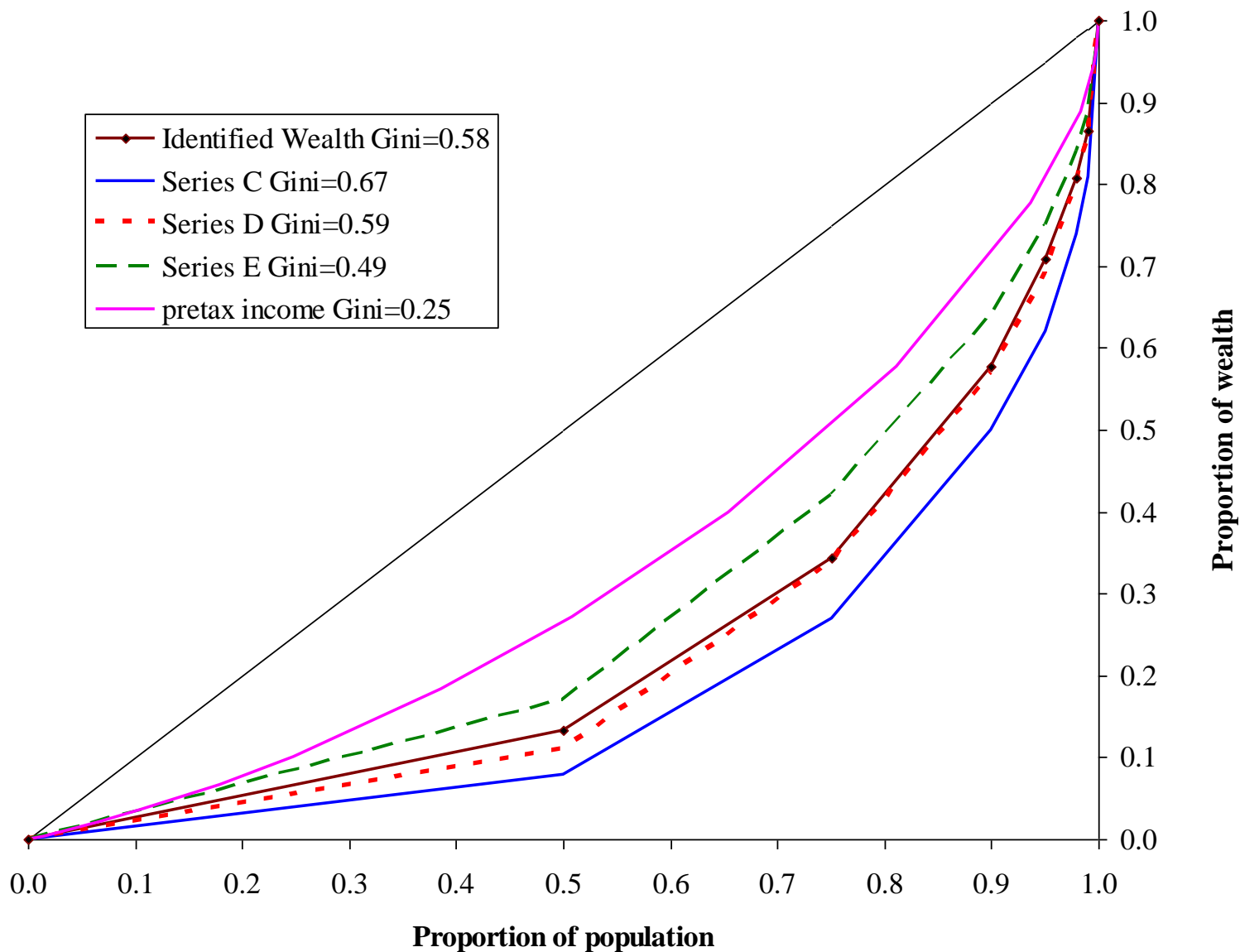
# Proportion of wealth in residential buildings. UK 2003



# Proportion of wealth in securities. UK 2003



# Wealth concepts and inequality

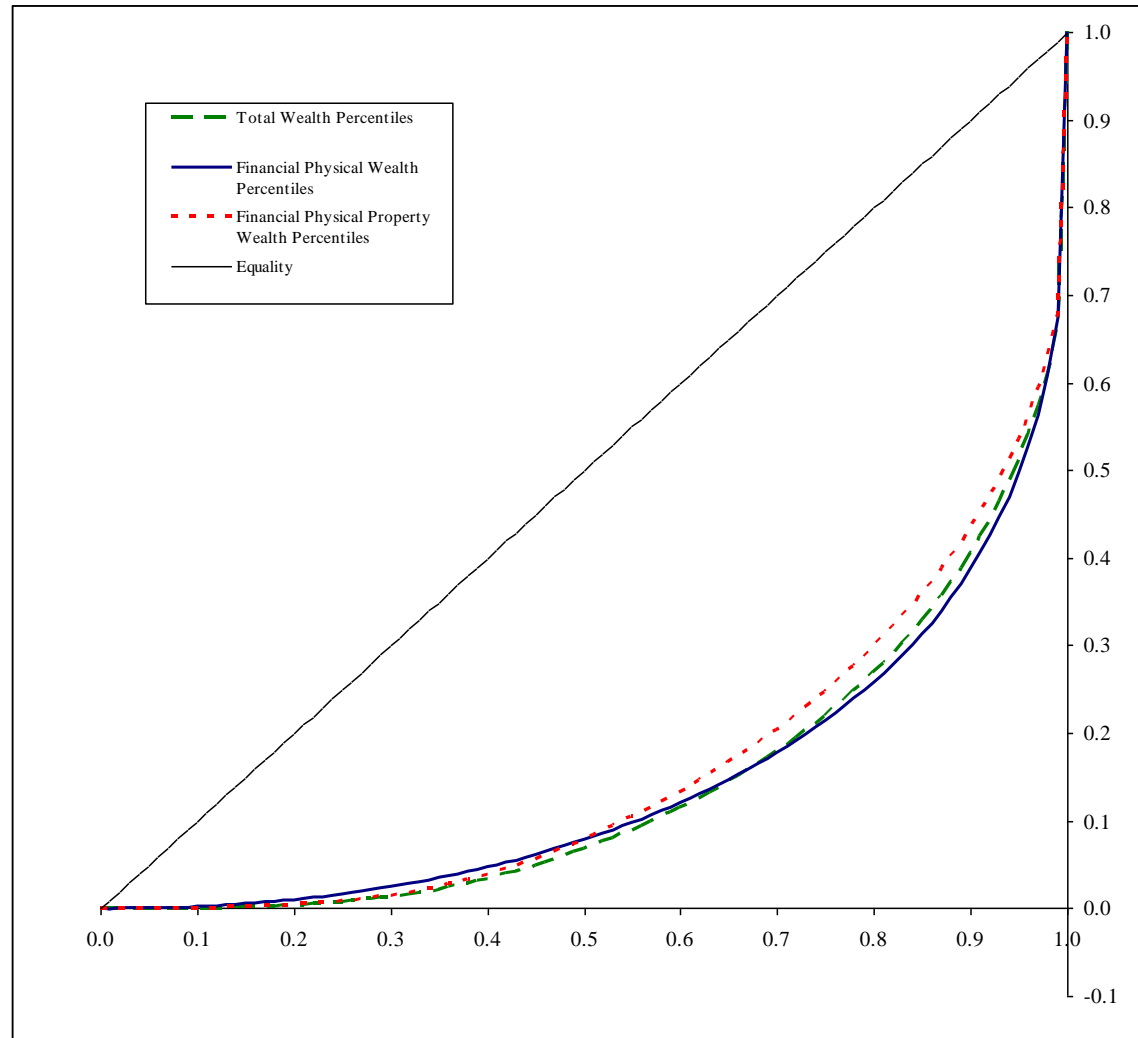


# Household portfolio composition – LWS

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 \(2006\)](#)

# UK: WAS 2009

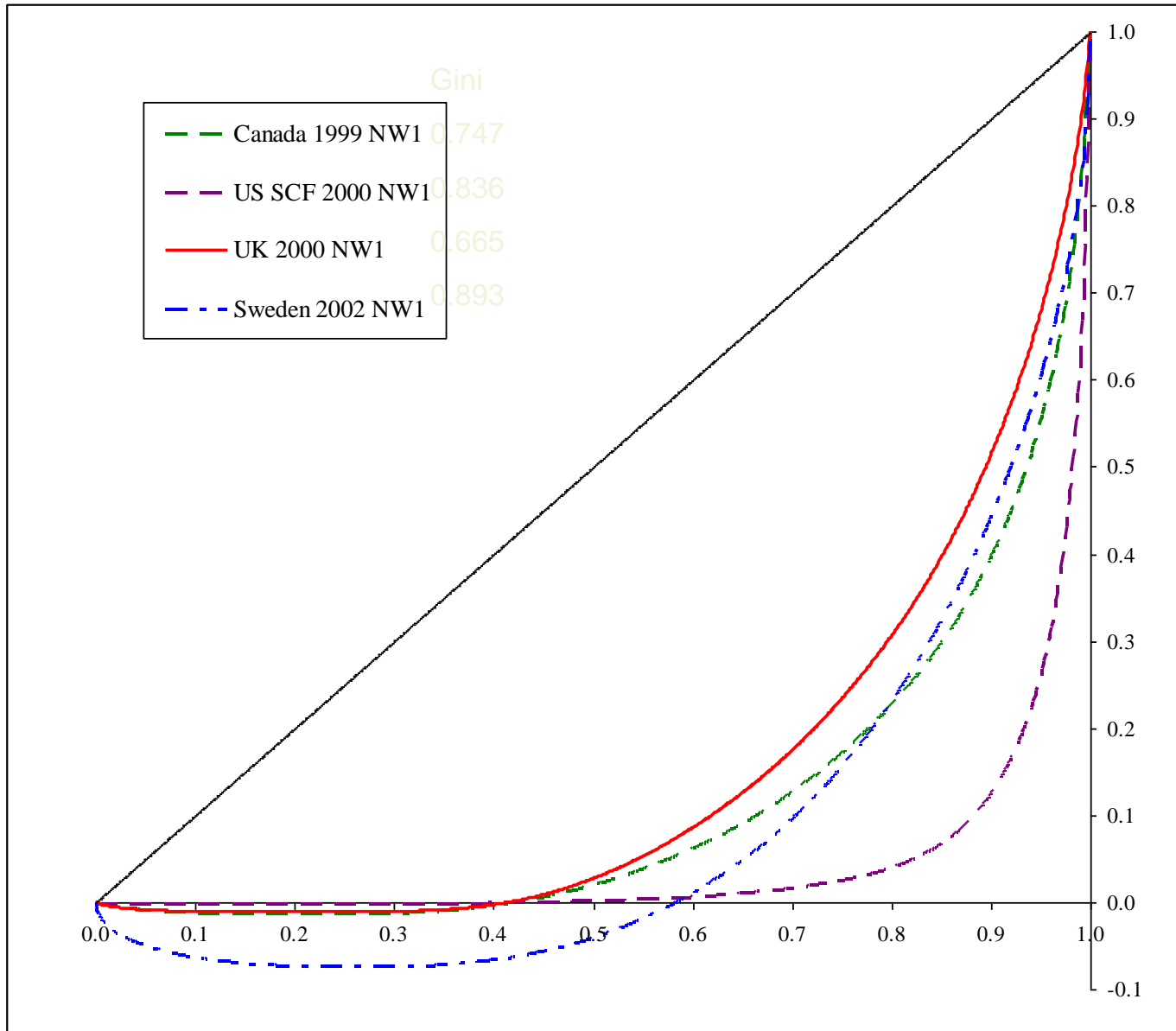


# LWS: Wealth inequality in four countries

	<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 \(2012\)](#)

# LWS: Net worth

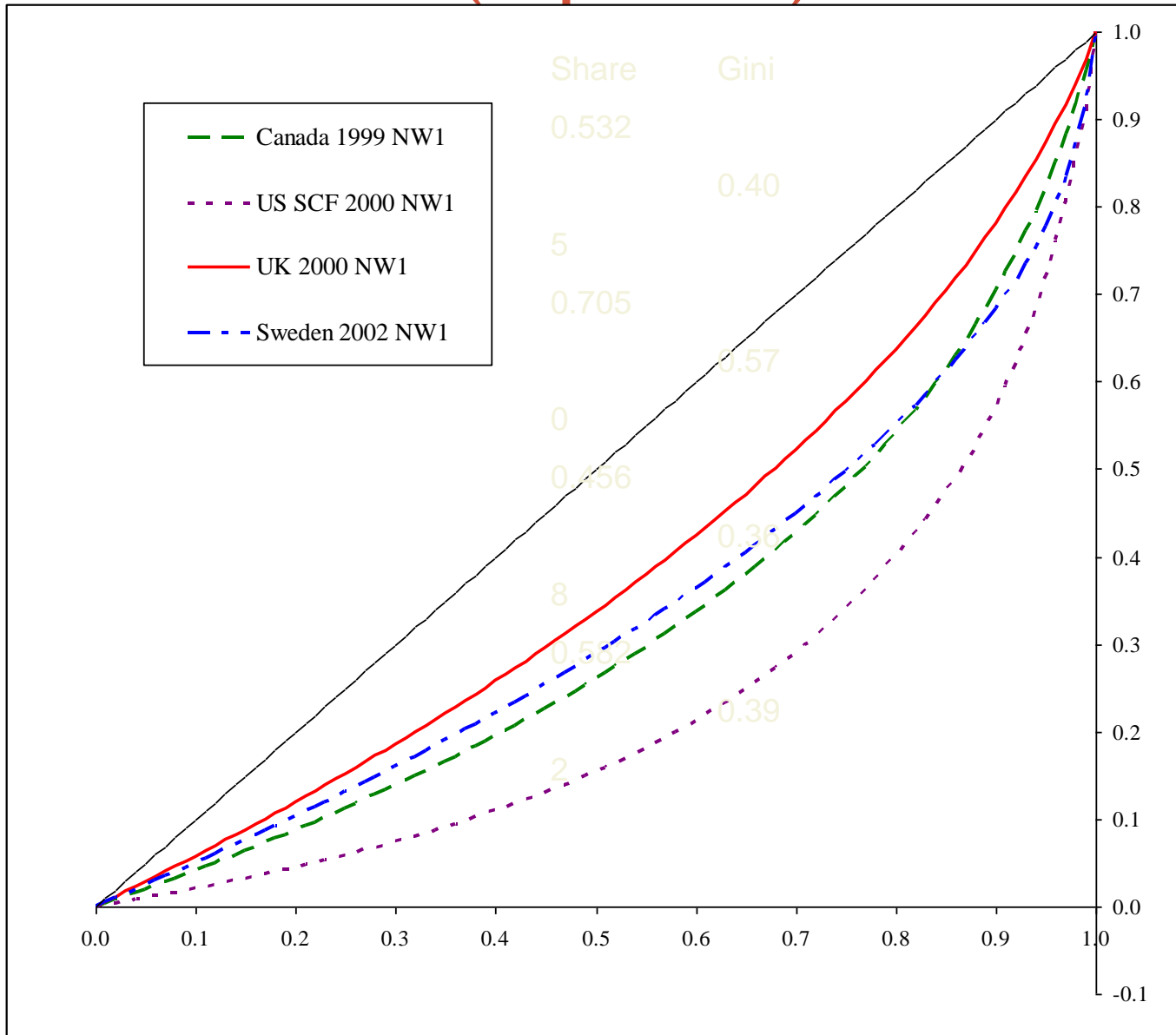


# LWS: breakdown by wealth group

	<b>Gini overall</b>	<b>Share rich <i>Top 10%</i></b>	<b>rich</b>	<b>Gini non-rich</b>	<b>between</b>
UK	0.665	0.456	0.260	0.607	0.356
Sweden	0.893	0.582	0.314	1.045	0.482
Canada	0.747	0.532	0.293	0.710	0.432
US	0.836	0.705	0.349	0.779	0.605
		<i>Top 5%</i>			
UK		0.301	0.223	0.618	0.251
Sweden		0.406	0.316	0.941	0.356
Canada		0.374	0.261	0.703	0.324
US		0.575	0.318	0.748	0.525
		<i>Top 1%</i>			
UK		0.101	0.157	0.644	0.091
Sweden		0.175	0.326	0.891	0.165
Canada		0.151	0.132	0.721	0.141
US		0.329	0.198	0.777	0.319



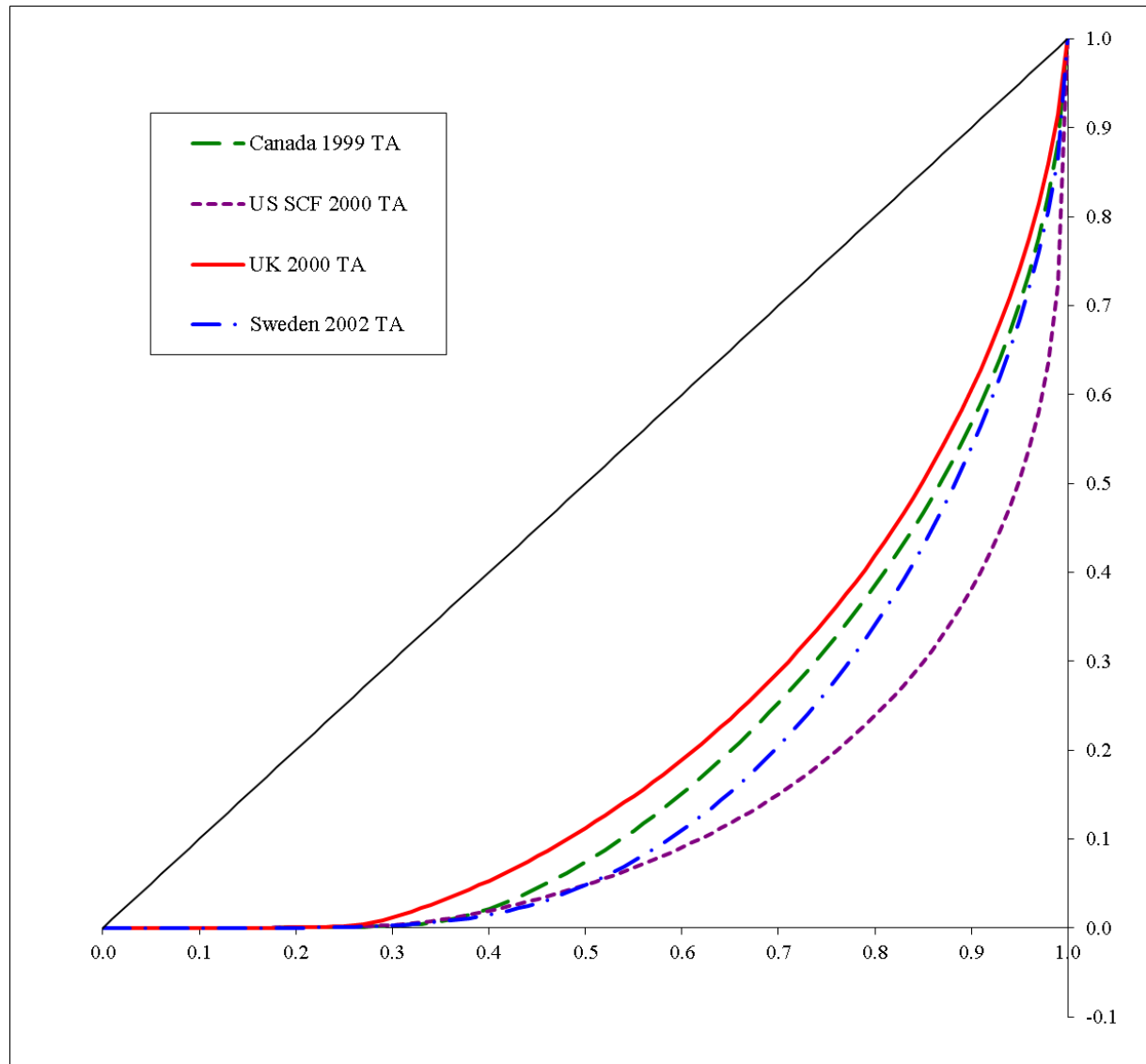
# LWS: Net worth (top 10%)



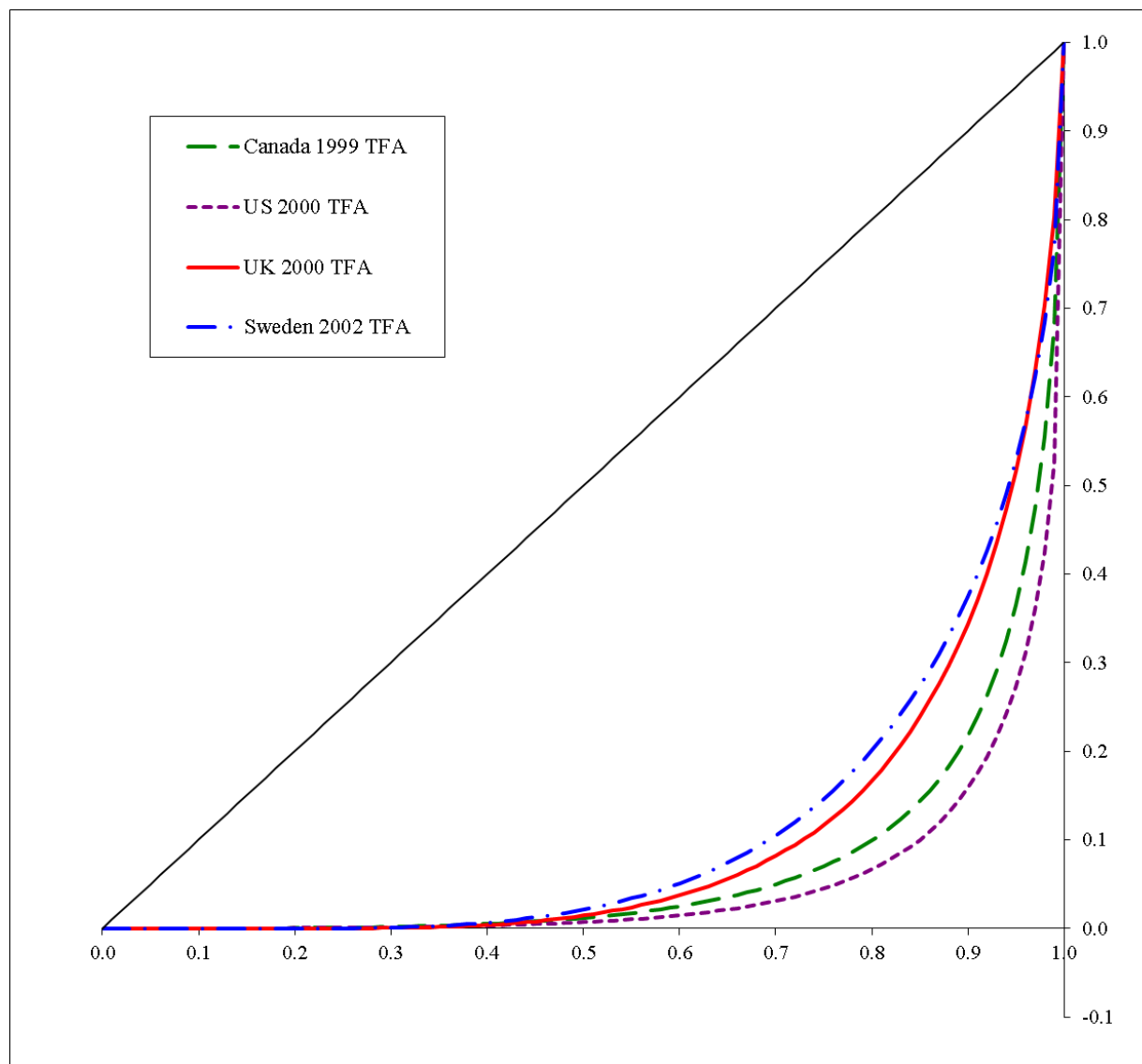
# LWS: breakdown by asset type

	Share of...			Gini Coefficient				
	Top 10%	Top 5%	Top 1%	All	Top 10%	Top 5%	Top 1%	
	<i>Principal Residence</i>			<i>Principal Residence</i>				
UK	0.339	0.201	0.051	UK	0.559	0.274	0.284	0.308
Sweden	0.346	0.209	0.050	Sweden	0.708	0.369	0.355	0.429
Canada	0.269	0.146	0.036	Canada	0.603	0.372	0.435	0.416
US	0.168	0.073	0.024	US	0.645	0.484	0.500	0.449
	<i>Investment Property</i>			<i>Investment Property</i>				
UK	0.653	0.540	0.302	UK	0.966	0.860	0.793	0.582
Sweden	0.680	0.579	0.386	Sweden	0.949	0.847	0.839	0.827
Canada	0.645	0.493	0.096	Canada	0.930	0.727	0.672	0.674
US	0.784	0.606	0.415	US	0.959	0.700	0.747	0.750
	<i>Financial Assets</i>			<i>Financial Assets</i>				
UK	0.484	0.346	0.120	UK	0.799	0.584	0.548	0.543
Sweden	0.534	0.401	0.213	Sweden	0.778	0.587	0.593	0.509
Canada	0.743	0.609	0.357	Canada	0.860	0.616	0.553	0.195
US	0.977	0.863	0.506	US	0.899	0.510	0.417	0.294

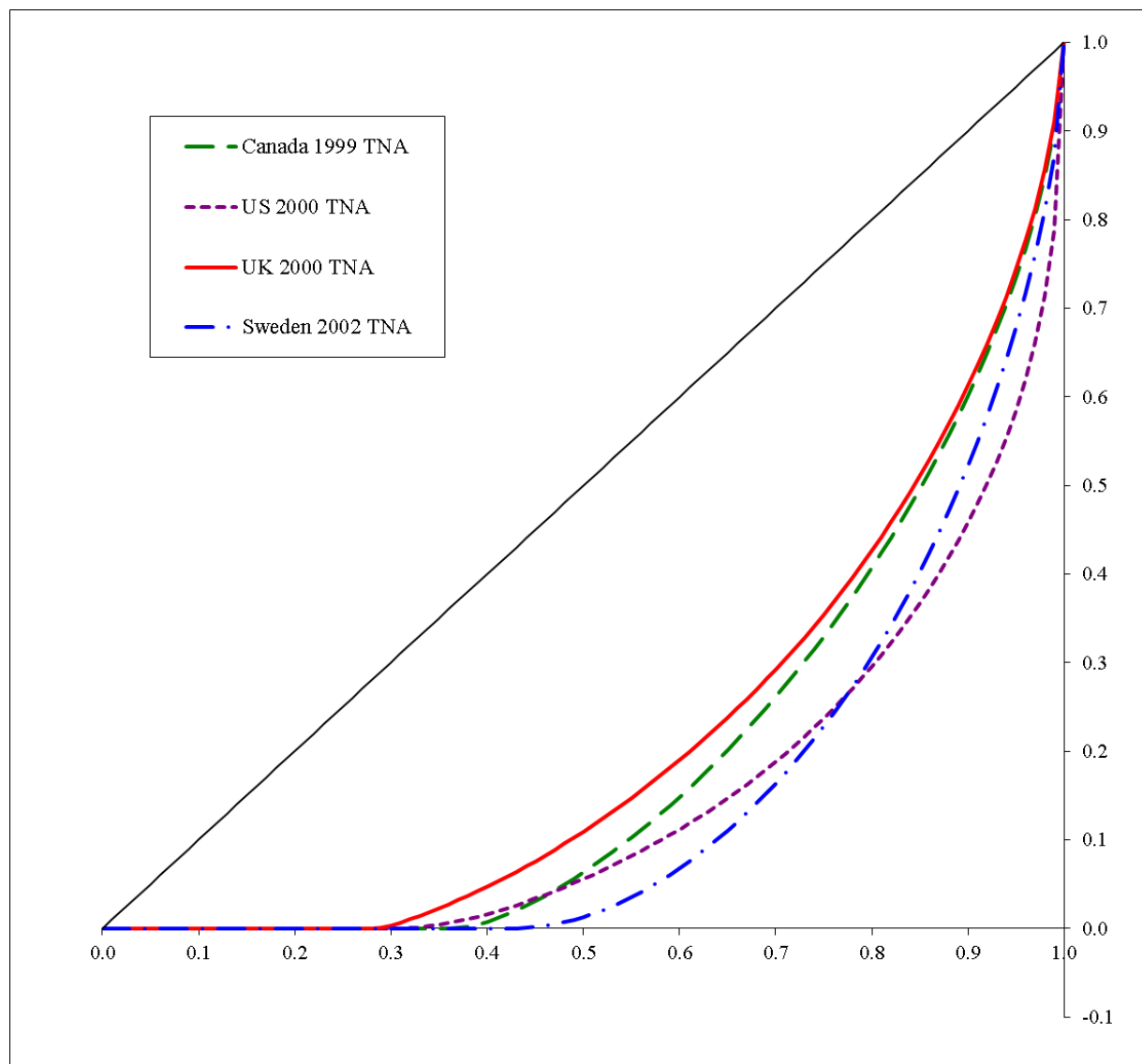
# LWS: Total Assets



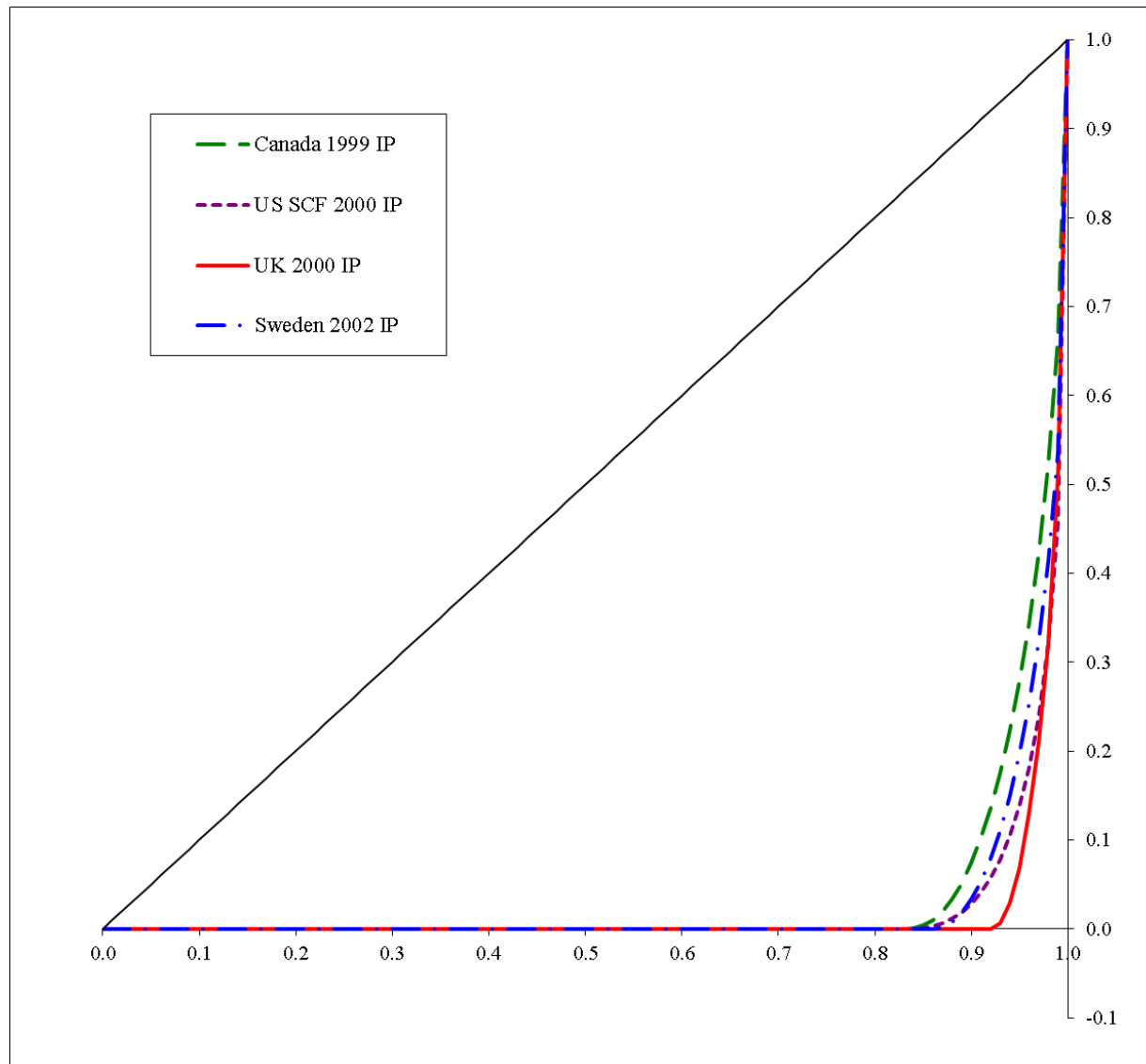
# LWS: Total *Financial Assets*



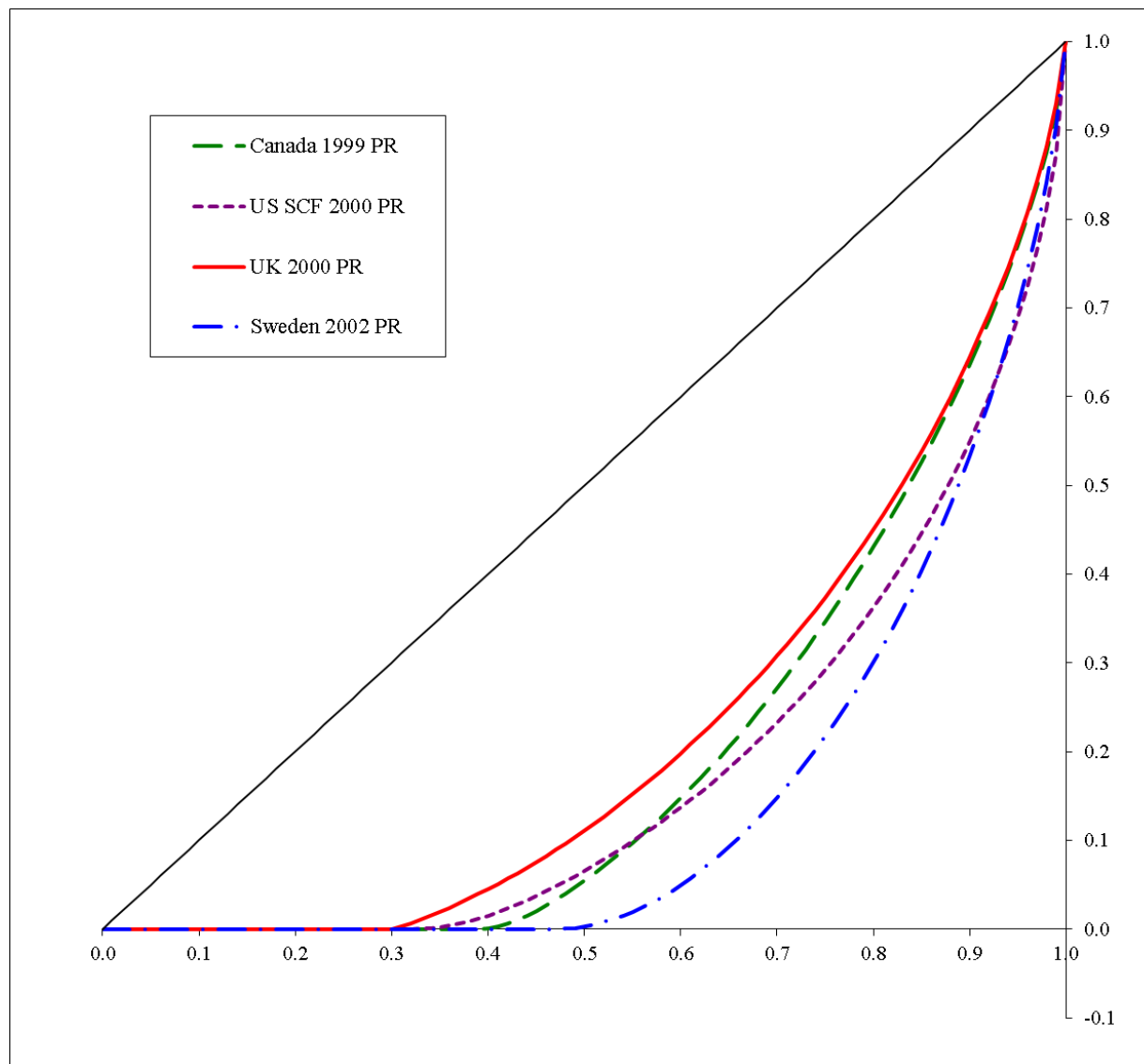
# LWS: Total *Nonfinancial* Assets



# LWS: Investment property



# LWS: Principal residence

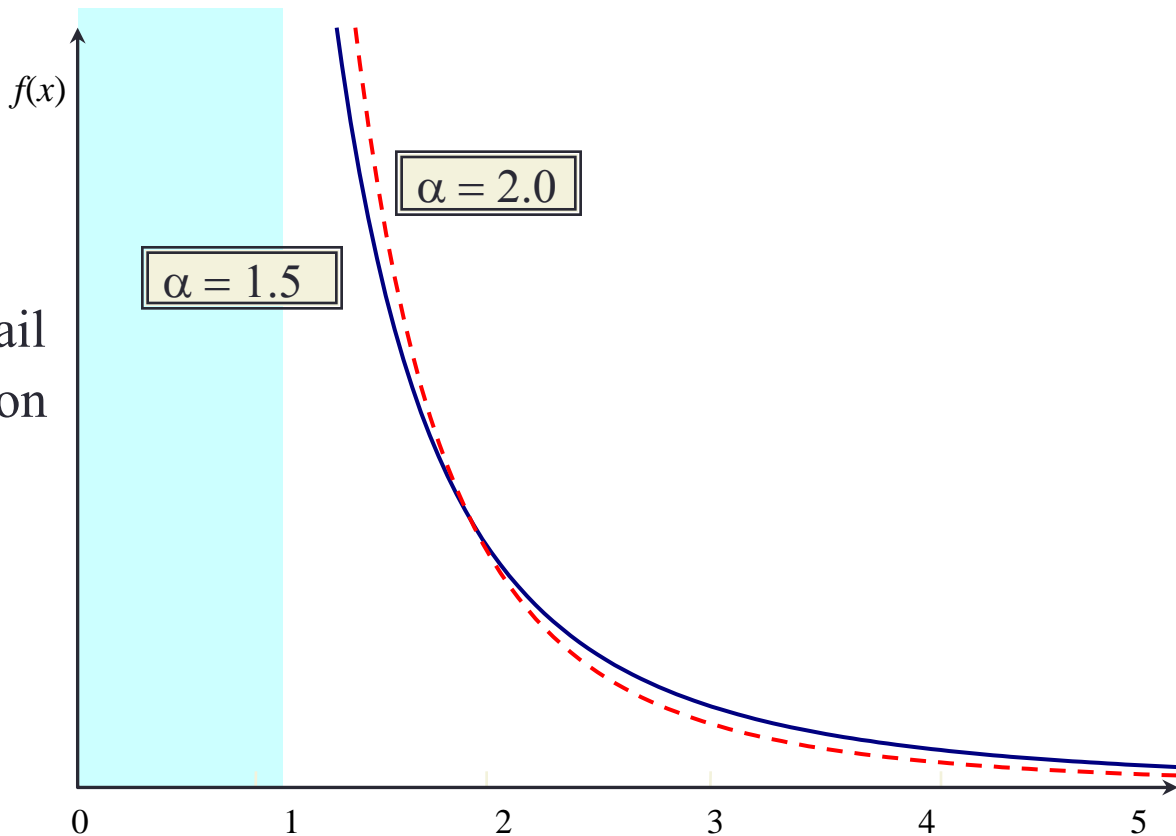


# Functional form for wealth distribution

- Distinctive shape of empirical wealth distribution
- Upper tail appears to conform to Pareto model
- Pareto distribution
  - $F(x) = 1 - [ \underline{x} / x ]^\alpha$
  - $f(x) = \alpha \underline{x}^\alpha x^{-\alpha-1}$
- Simple interpretation
  - $\alpha$  captures “weight” of tail
  - $\underline{x}$  “locates” the distribution
- Inequality

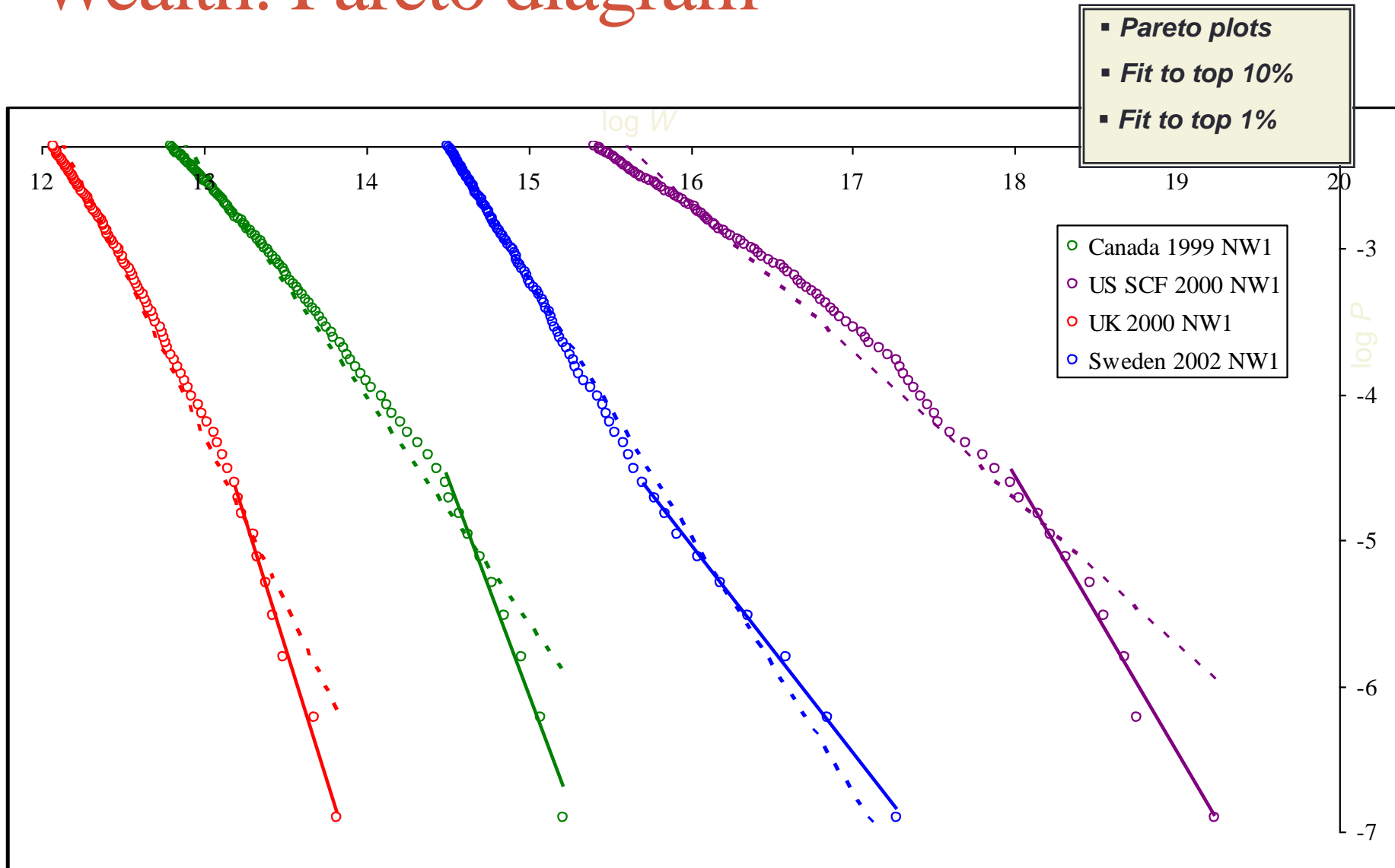
$$\frac{\text{average}}{\text{base}} = \frac{\alpha}{\alpha - 1}$$

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





# Wealth: Pareto diagram

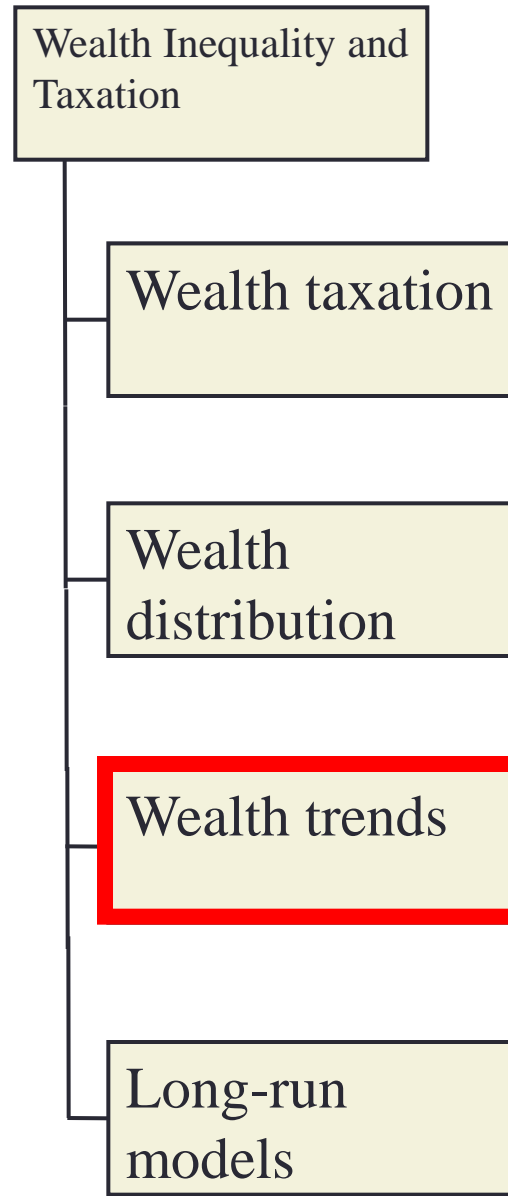


# Pareto estimates

Top 10:				
	Canada	US	UK	Sweden
OLS	1.48	0.85	2.37	1.78
Robust M-estimate	2.10	1.98	1.96	2.30
Indirect Robust estimate	1.89	1.75	1.71	2.10
Top 5:				
	Canada	US	UK	Sweden
OLS	1.74	1.11	2.71	1.70
Robust M-estimate	2.35	2.27	2.30	2.39
Indirect Robust estimate	2.15	2.06	2.08	2.18
Top 1:				
	Canada	US	UK	Sweden
OLS	3.29	1.95	3.52	1.43
Robust M-estimate	2.87	2.53	3.38	1.95
Indirect Robust estimate	2.58	2.27	3.07	1.61

# Overview...

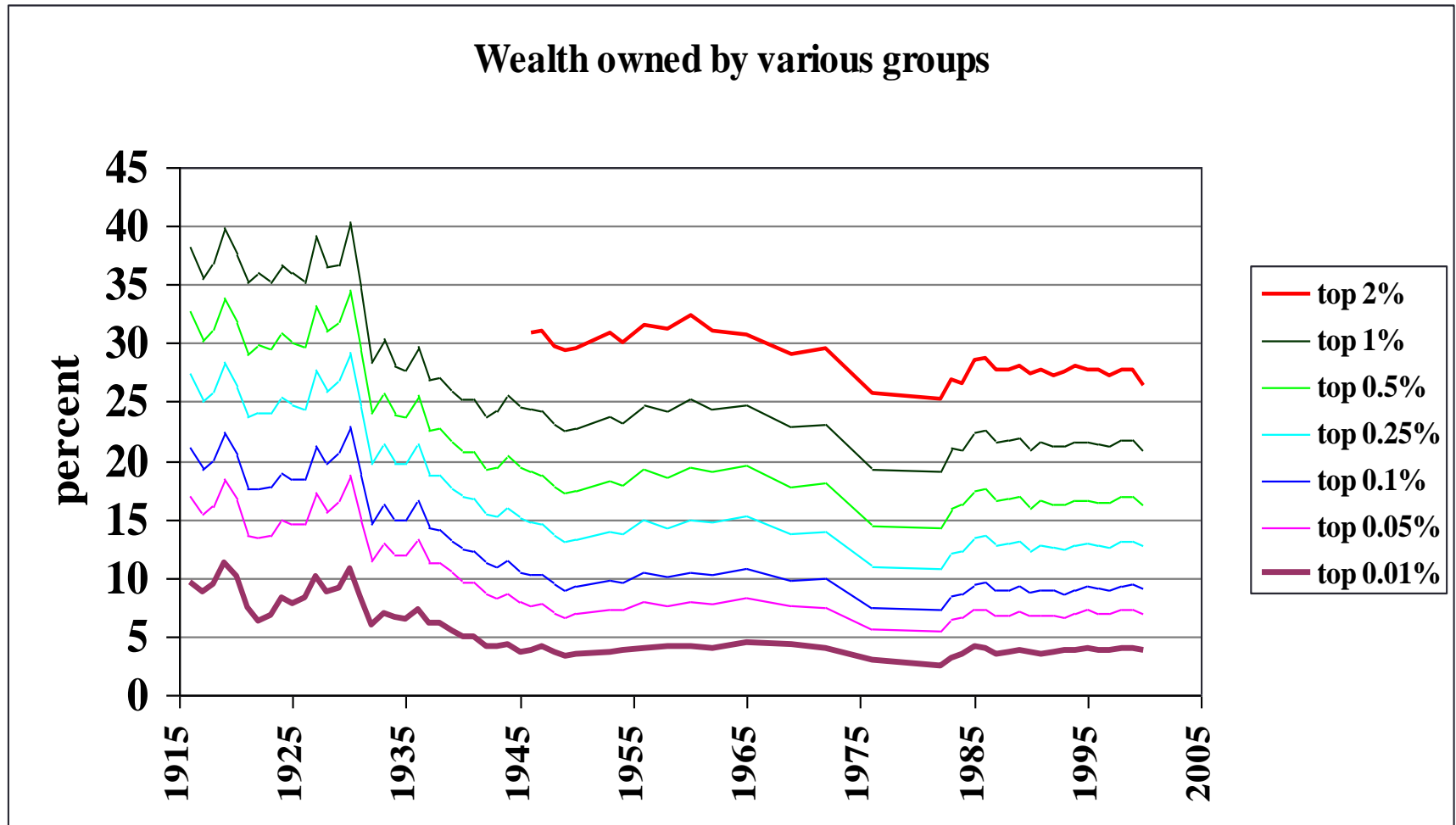
*Rising inequality or stability?*



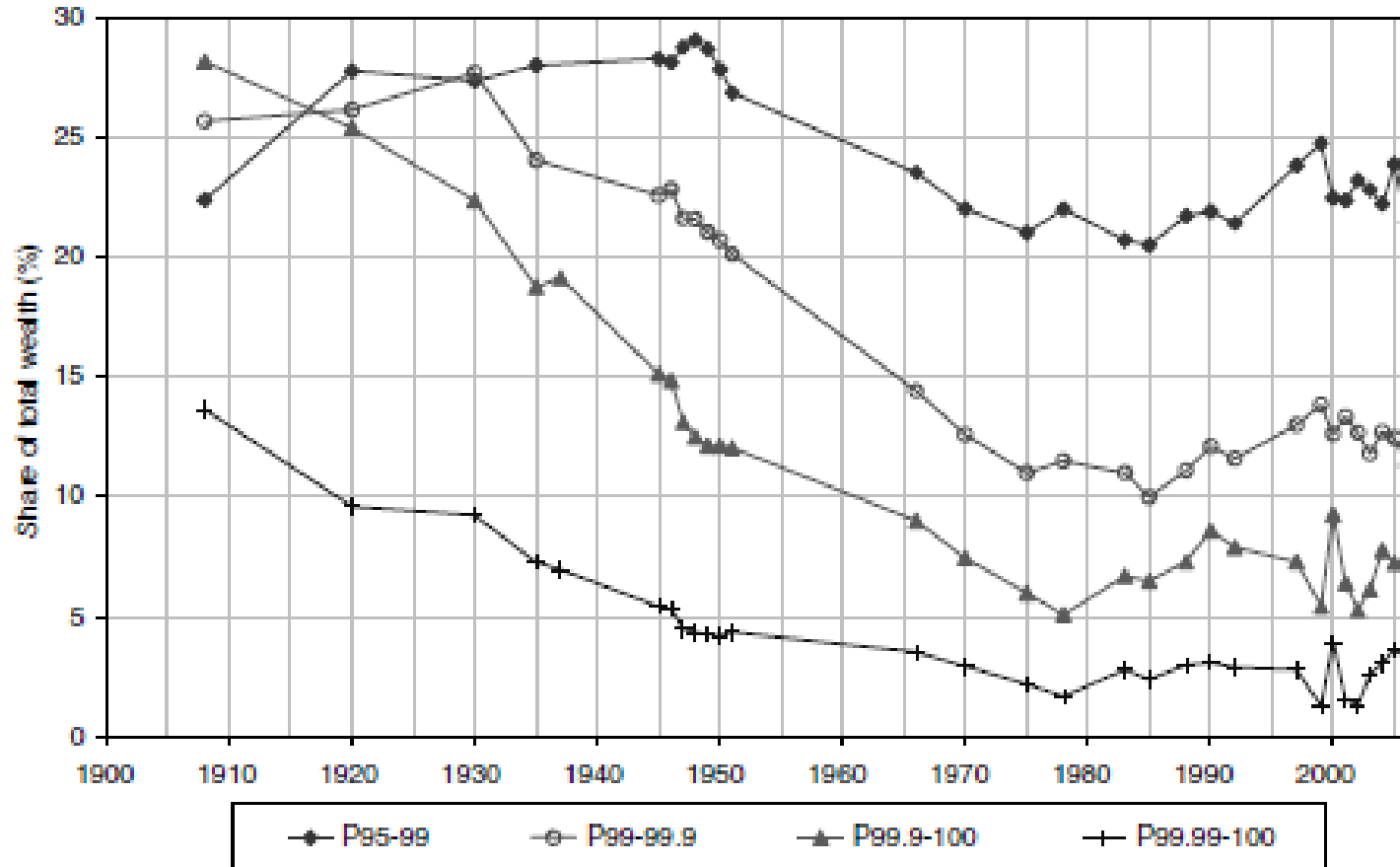
# Trends in wealth inequality

- 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 20<sup>th</sup> 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 \(2009\)](#)

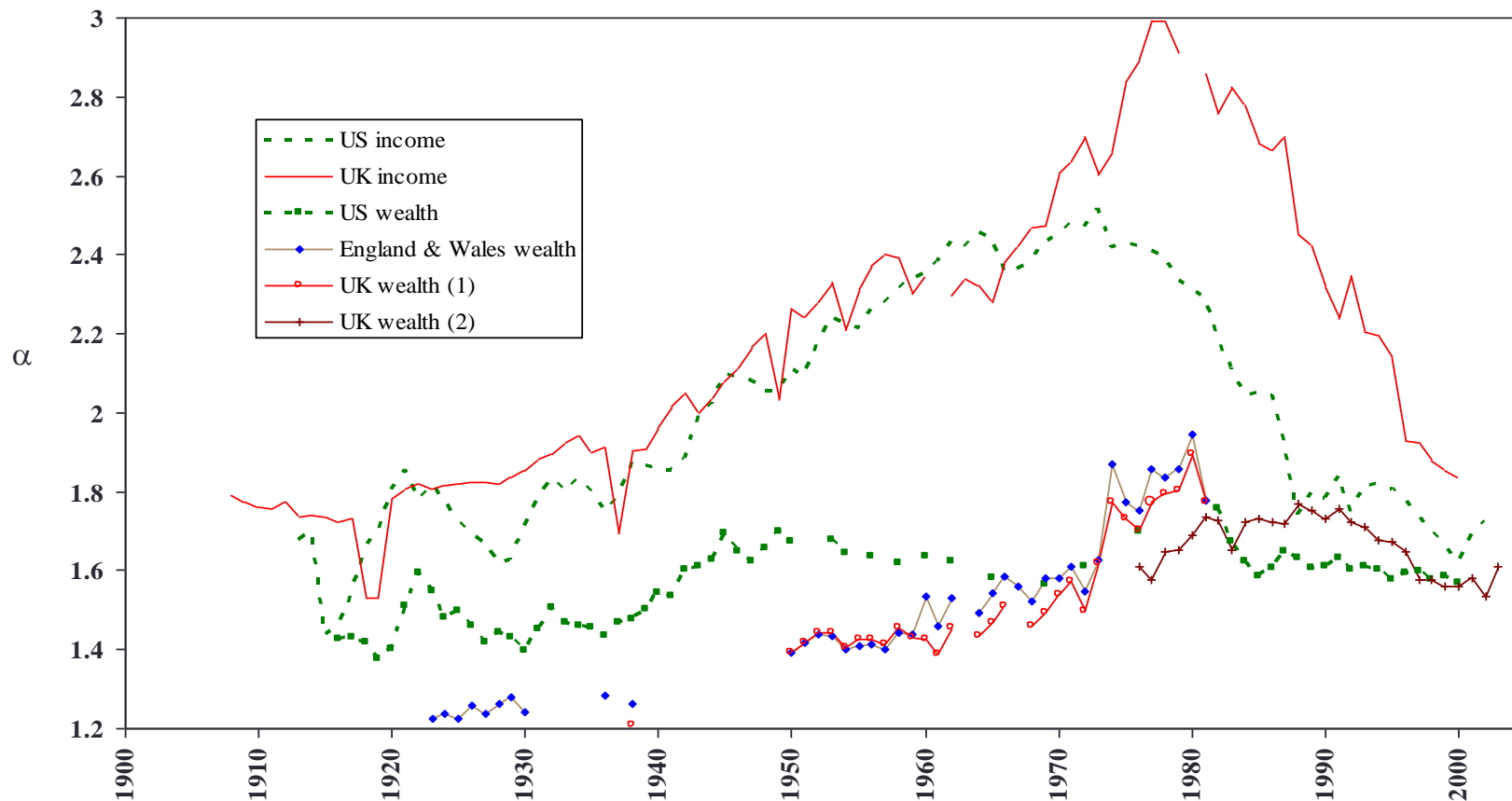
# Distribution of wealth US 1916-2000



# Sweden: top 5 percent



# Pareto's $\alpha$ : USA and UK



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

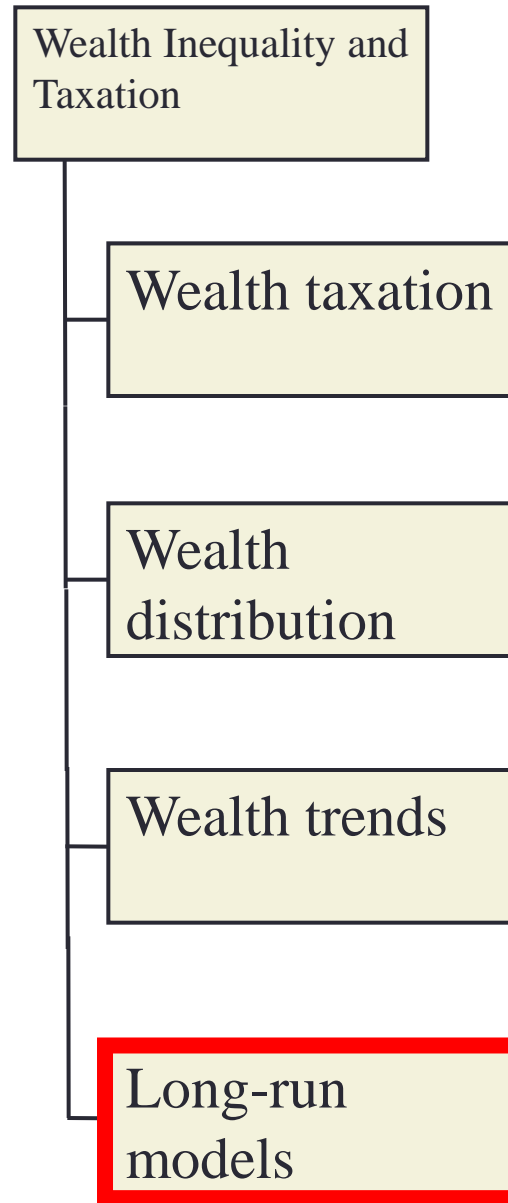
# Wealth trends

- UK Inequality falls in early 20<sup>th</sup> 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 20<sup>th</sup> century equalisation
  - From around 1980 trend reversed



# Overview...

*Fairy tales?*



# 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

# Outline of model (1)

- Common practice to combine in a neoclassical model
  - Characterise each generation as a fixed time unit
  - [Becker and Tomes \(1979\)](#)
- Preferences and behaviour
  - Cobb-Douglas preferences (simplified savings behaviour)
  - utility maximisation by parental generation
  - look one generation ahead
- Simplified family characteristics
  - exogenous attributes
  - no “marriage story”
  - no “fertility story”
- Resources and markets
  - “perfect” markets
  - exogenous (labour) earnings and initial endowments

# Illustrative model (1)

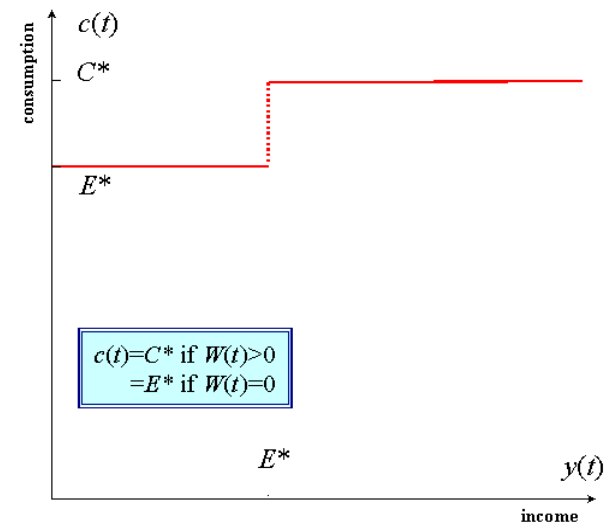
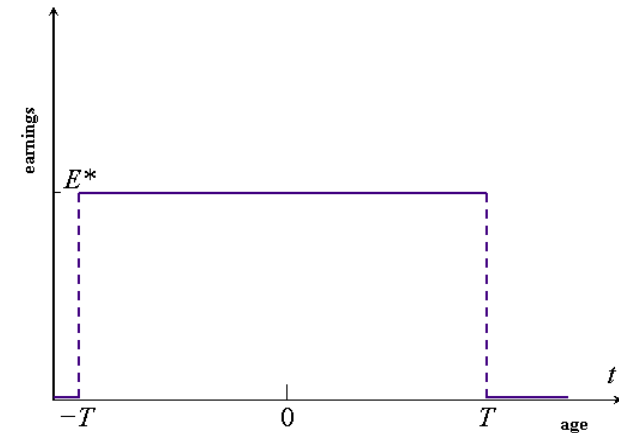
- Generational budget constraint
  - $C_n + B_n / [1 + r_n] \leq W_n$
- Wealth accumulation equation
  - $\frac{1}{2}k W_{n+1} = B_n$
- Prospective resources
  - $W_n + E_n / [1 + r_n]$
- Proportionate savings rate
  - $\frac{1}{2}k W_{n+1} = s[1 + r_n] W_n + sE_{n+1}$
- Equation for wealth accumulation
  - $W_{n+1} = \gamma [1 + r_n] W_n + \gamma E_{n+1}$
- Stochastic “earnings” will give a simple Markov chain.
  - given sensible parameter values get convergence (regression to mean)
  - Initial wealth inequalities will be damped away
- In the long run wealth inequality is determined by  $E$

# Simulation approach

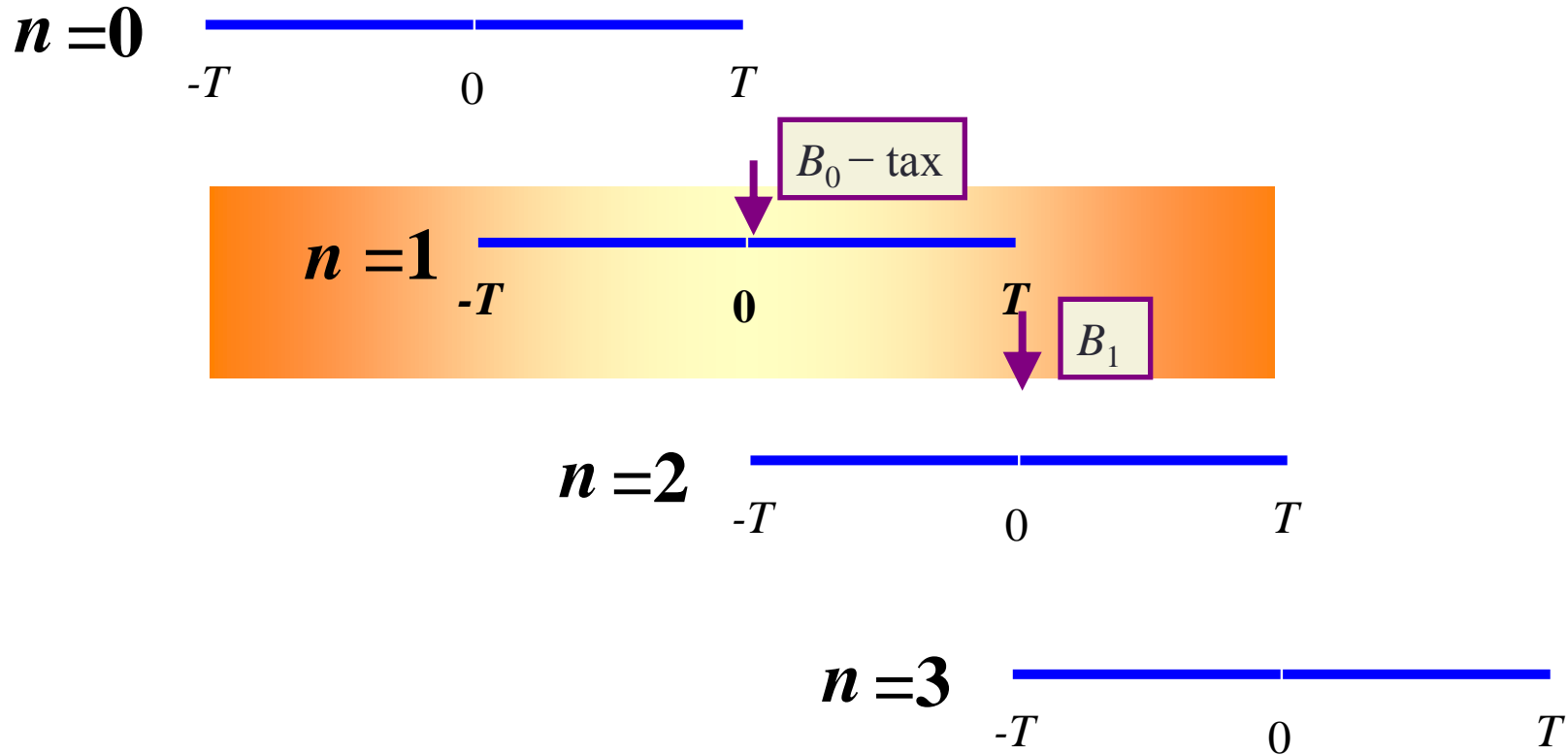
- Common to put a variant of this into a simulation model
- But is it based on optimisation – and of what sort?
  - Type of utility function crucial
  - [Gokhale et al. \(2001\)](#) strong conclusions based on “accidental bequests”
- What characteristics of the simulation model?
  - representative agent
  - size and length of the run
  - criteria for evaluation
- Type of solution?
  - convergence to equilibrium?
  - an equilibrium distribution?

# Illustrative model (2)

- Focus on the role of consumption
  - naïve savings behaviour
  - family features absent
  - ([Champernowne-Cowell 1998](#))
- A model of single person-dynasties
  - person inherits  $T$  years after attaining adulthood
  - dies  $T$  years after inheritance
  - leaves all his terminal wealth to one descendant
- Wealth left in excess of  $W^*$  taxed at rate  $\tau$
- During the earnings all get the same earnings,  $E^*$
- Individuals consume:
  - $C^*$  if they have positive wealth
  - otherwise  $E^*$



# Link between generations



# Wealth over the lifetime and bequests

- Given savings rule and inherited wealth  $W(0)$  we get

$$W(t) = \max \{ W(0) e^{rt} - \hat{B} [e^{rt} - 1], 0 \}, \quad \hat{B} := [C^* - E^*]/r$$

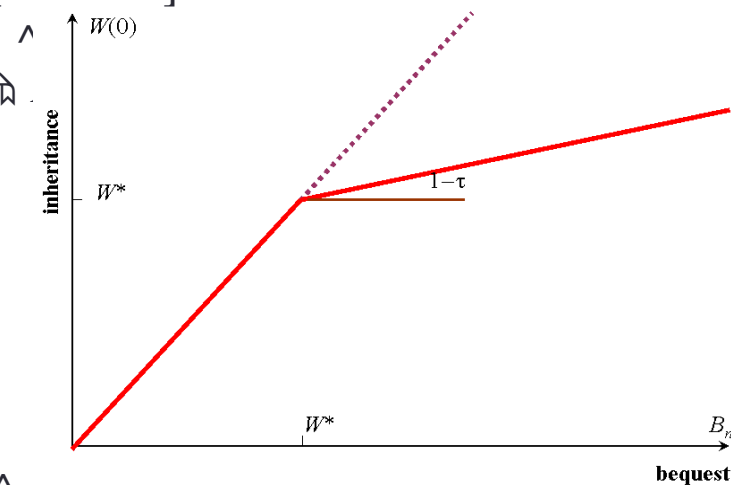
- Wealth rises/declines according as  $W(0) \lessgtr W^*$
- At end of life bequest is  $B_n = W(T)$
- But initial wealth for next generation is

$$W(0) = \min \{ B_n, [1-\tau]B_n + \tau W^* \}$$

- Evaluating at end of next generation:

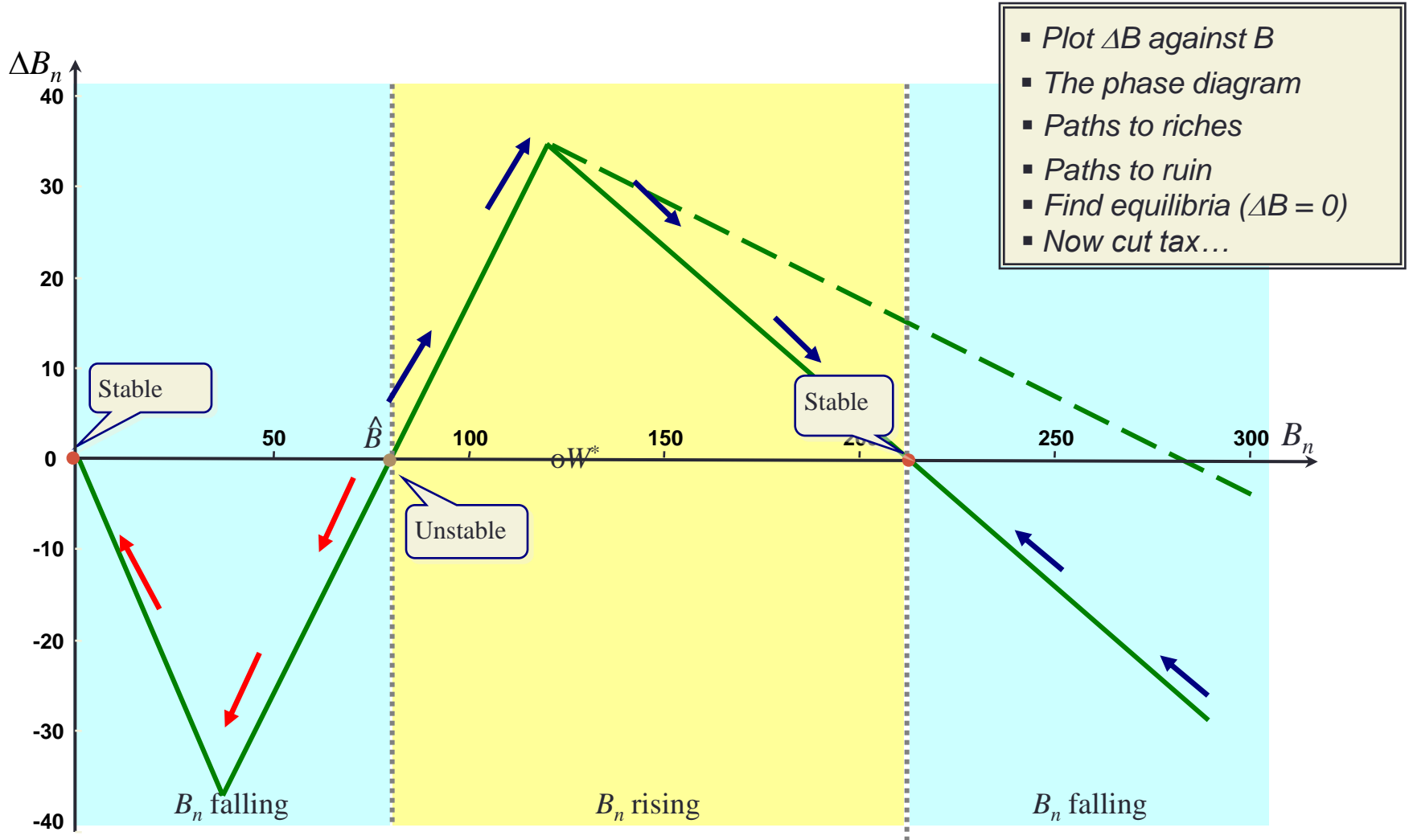
$$B_{n+1} = \max \{ \min \{ B_n, [1-\tau]B_n + \tau W^* \} e^{rT} - \hat{B} [e^{rT} - 1], 0 \}$$

- Change in bequest  $\Delta B_{n+1} = B_{n+1} - B_n$  as a function of  $B_n$
- Get three possible regimes
  - where  $W(t) = 0$
  - where  $W(t) > 0$  but  $B_n < W^*$
  - where  $B_n > W^*$

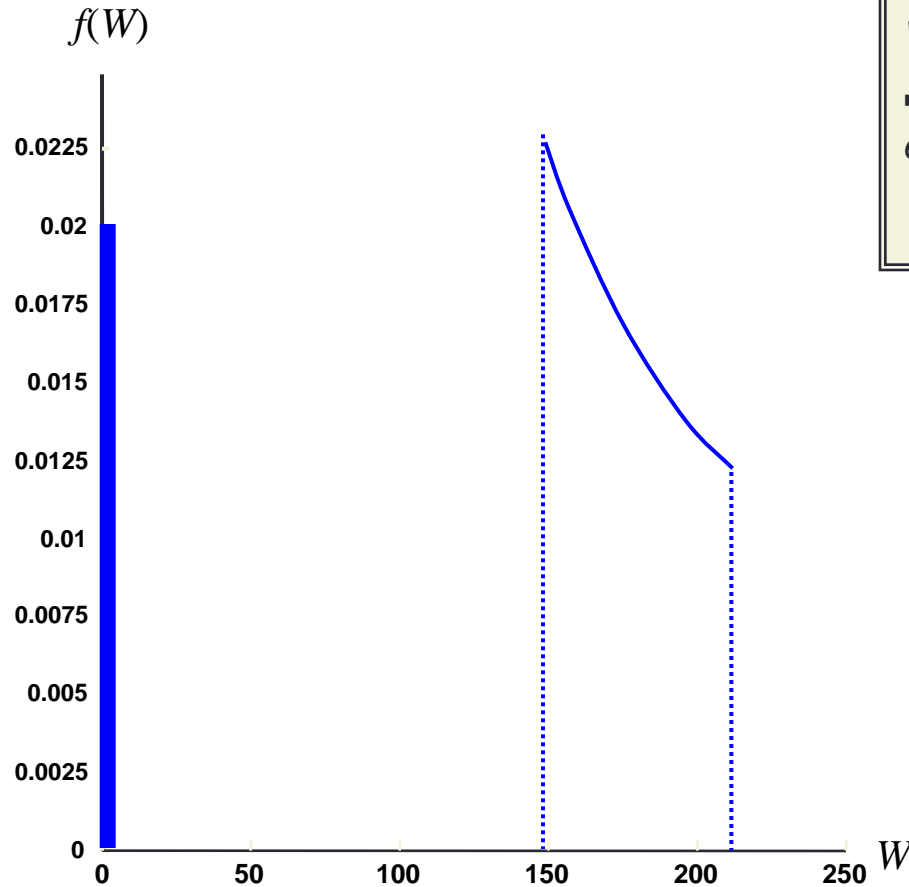




# Bequest Dynamics



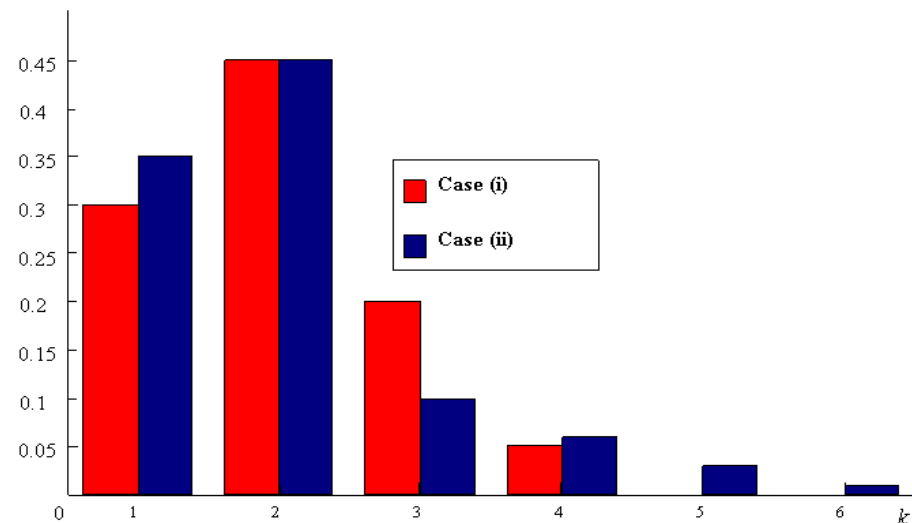
# Wealth distribution overall



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

# Illustrative model (3)

- 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

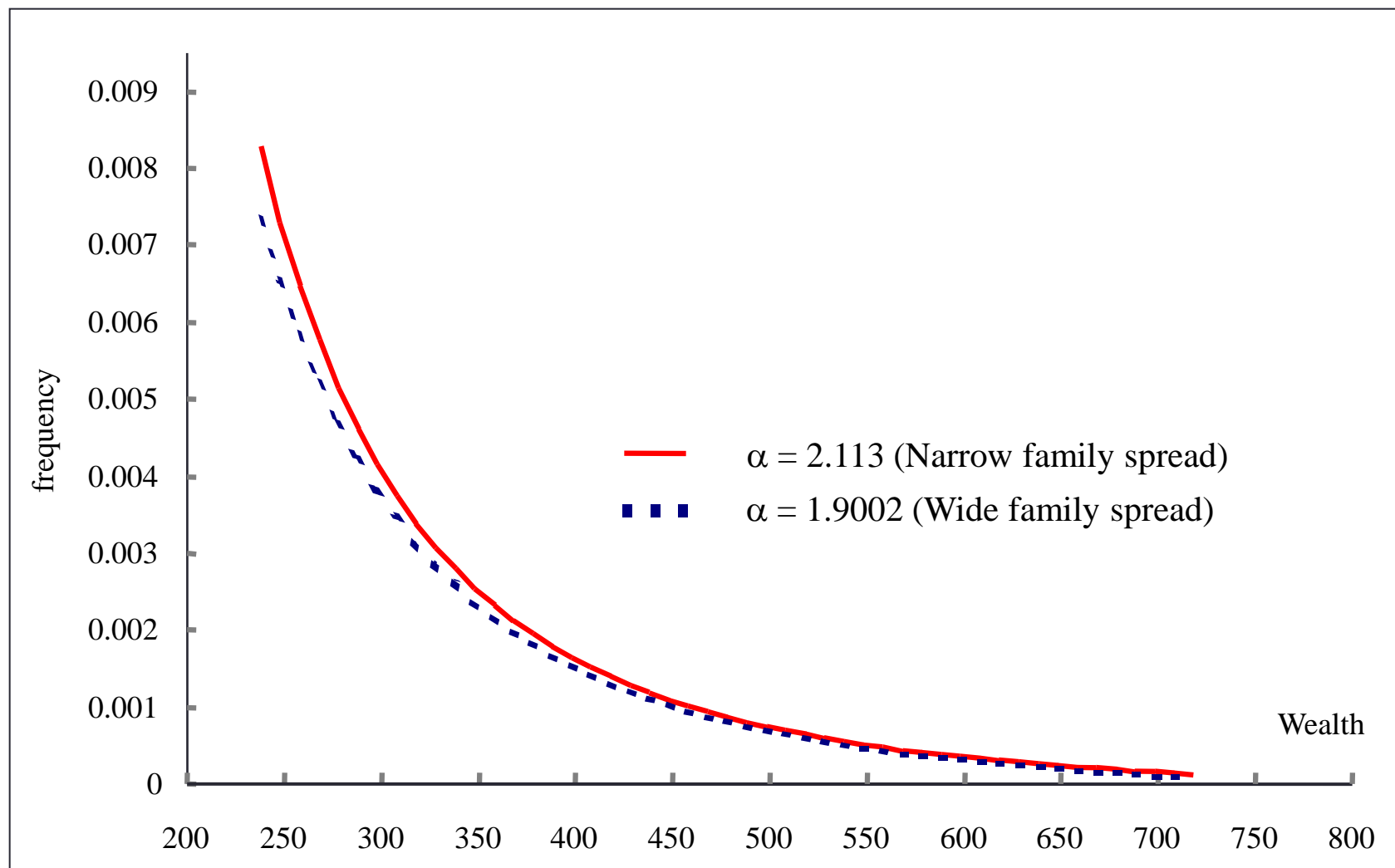
- Let  $F_n, F_{n+1}$  be the wealth distribution in generations  $n, n+1$ 
  - $F_n(W)$  is the proportion of the population in generation  $n$  with wealth  $\leq W$
  - We have equilibrium if  $F_n = F_{n+1} = F$
- Take a person with wealth  $W$  in a family where parents had  $k$  kids
  - if parental 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>	
	$\alpha$	<i>Gini</i>	$\alpha$	<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

# References (1)

- [Atkinson, A. B., Gordon, J. P. F. and Harrison, A. J. \(1989\)](#) “Trends in the shares of top wealth-holders in Britain 1923-1981,” *Oxford Bulletin of Economics and Statistics*, **51**, 315-332.
- [Becker, G. S. and Tomes, N. \(1979\)](#) “An equilibrium theory of the distribution of income and intergenerational mobility,” *Journal of Political Economy*, **87**, 1153-1189.
- [Cagetti, M. and DeNardi, M. \(2008\)](#) “Wealth Inequality: Data and Models,” *Macroeconomic Dynamics*, **12 S2**, 285–313.
- \*[Champernowne, D. G. and Cowell, F. A. \(1998\)](#) *Economic Inequality and Income Distribution*, Cambridge University Press, Cambridge, Chapter 10.
- Cowell, F.A. (2011) *Measuring Inequality*, Oxford University Press
- \* [Cowell, F.A. \(2012\)](#) “UK Wealth Inequality in International Context,” in J. Hills (ed.) *Wealth in the UK: Distribution and Policy*, Oxford University Press, Oxford , Chapter 4.
- \*[Cremer, H. and Pestieau, P. \(2003\)](#) “Wealth Transfer Taxation: A Survey,” CESifo Working Paper No. 106
- [DeNardi, M. \(2004\)](#) “Wealth Inequality and Intergenerational Links,” *Review of Economic Studies*, **71**, 743–768.



# References (2)

- [Edlund, L. and Kopczuk, W. \(2009\)](#) “Women, Wealth and Mobility,” *American Economic Review*, **99**, 146–178.
- [Gokhale, J. and Kotlikoff, L. J. and Sefton, J. and Weale, M. \(2001\)](#) “Simulating the Transmission of Wealth Inequality Via Bequests,” *Journal of Public Economics*, **79**, 93-128
- [Kaplow, L. \(2000\)](#) “A framework for assessing estate and gift taxation,” NBER Working Paper 7775
- [Kopczuk, W. \(2010\)](#) “Economics Of Estate Taxation: A Brief Review of Theory And Evidence,” National Bureau Of Economic Research,” Working Paper 15741
- \* [Kopczuk, W. and Saez, E. \(2004\)](#) “Top Wealth Shares in the United States, 1916-2000: Evidence from Estate Tax Returns,” *National Tax Journal*, **57**, 445-487
- [OECD \(2008\)](#) *Growing Unequal? Income Distribution And Poverty In OECD Countries*, Organisation For Economic Co-Operation And Development, Paris
- [Piketty, T. \(2000\)](#) “Theories of persistent inequalities,” in Atkinson, A. B. and Bourguignon, F. (eds) *Handbook of Income Distribution*, North Holland, Amsterdam, pp 429-476
- [Roine, J. and Waldenström, D. \(2009\)](#) “Wealth Concentration over the Path of Development: Sweden, 1873–2006,” *Scandinavian Journal of Economics*, **111**, 151–187.
- [Sierminska, E., Brandolini, A. and Smeeding, T. M. \(2006\)](#) “Comparing Wealth Distribution Across Rich Countries: First Results from the Luxembourg Wealth Study, Luxembourg Wealth Study Working Paper 1