Income Distribution & Growth: Models and Empirical Evidence

ECGA 6470: Economic Growth Development

Lecture notes Spring 2014

Political Economy/inequality articles, ACG, 1999 JEL review

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Inequality and Economic Growth: The Perspective of the New Growth Theories

Philippe Aghion, Eve Caroli, *and* Cecilia García-Peñalosa.[1]

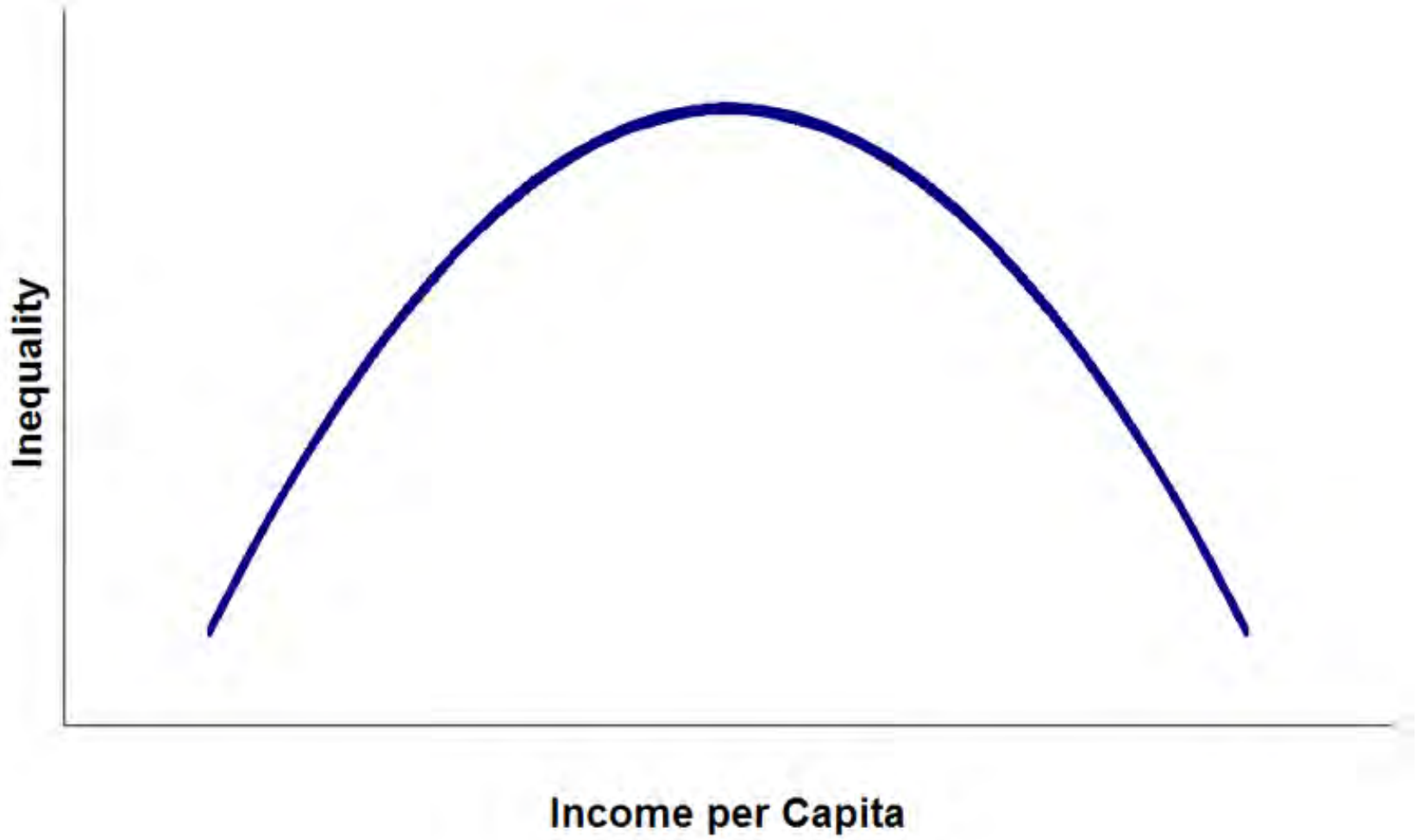
Inequality and Growth: Theory

- **Redistributive Political Economy:**
  - **Rent-Seeking** behavior-- corruption protection
  - **Fiscal channel-- redistribution** via taxes, government policy-- poor median voter for opts for high taxes & transfers reducing overall growth
- **Capital Market Imperfections: (Aghion) credit constraints imply more equal asset distribution leads to more investment in human capital**
- **Political & Social instability: segregation reduces investment in public goods (ghettos) as well as lead to crime & violence**
- **Savings Rates:** Keynes, Kaldor, Lewis & Pasinetti thought inequality raised average savings rates…

Classical – Kuznet's curve growth raises inequality early in the development process

- Growth begins unevenly, savings derive from profits (Arthur Lewis) and a large supply of unskilled labor discourages.
- The the economy reaches a "Lewis turning point" when real wages start to rise and inequality begins to decrease -- this is Kuznet's "U hypothesis"
- Inequality creates an incentive for investment in human and physical capital-- high profits associated with Inada conditions & low real wages… up until the Lewis turning point

Classical View– Kuznet's curve Inequality rises early falls later… (rural becomes urban



Barro, 2008 find's some evidence along these lines, but much stronger for low income economies

Figure 1: A Kuznets Curve: Effect of per capita GDP on Gini Coefficient

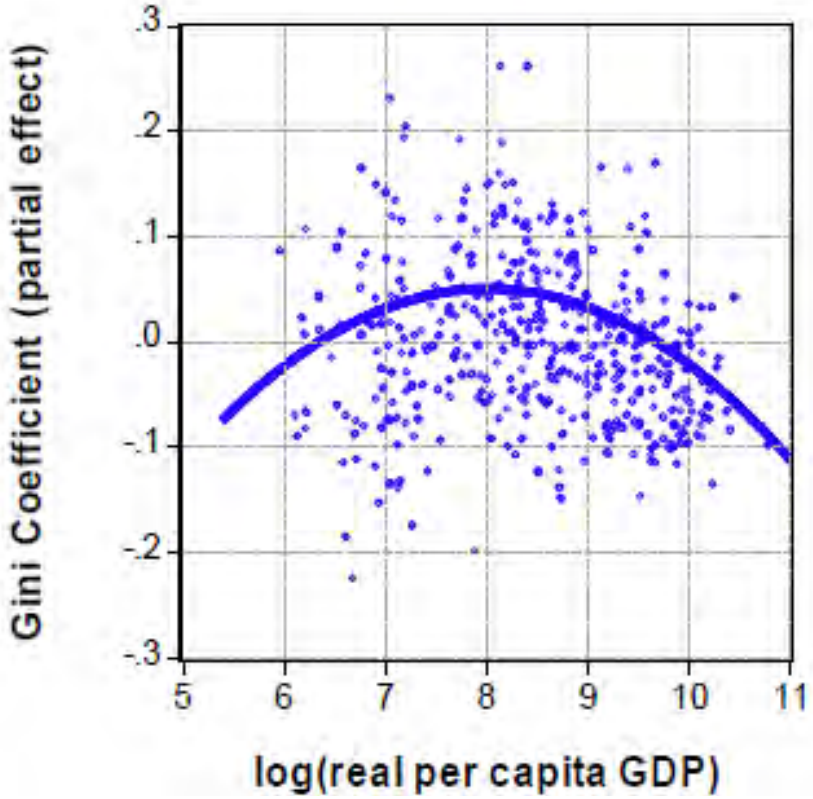


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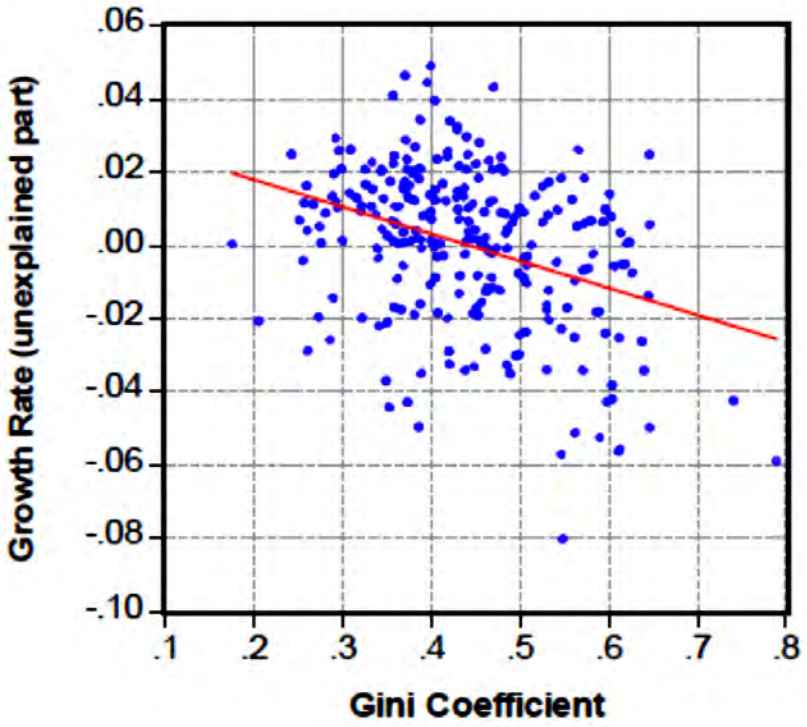
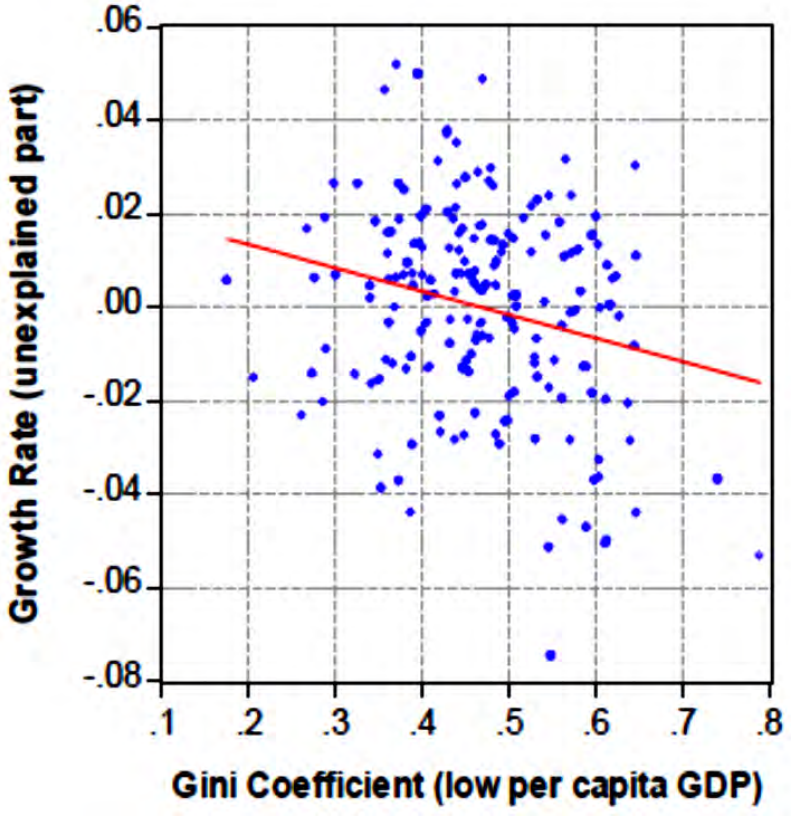
Figure 2: Effect of Income Inequality on Economic Growth

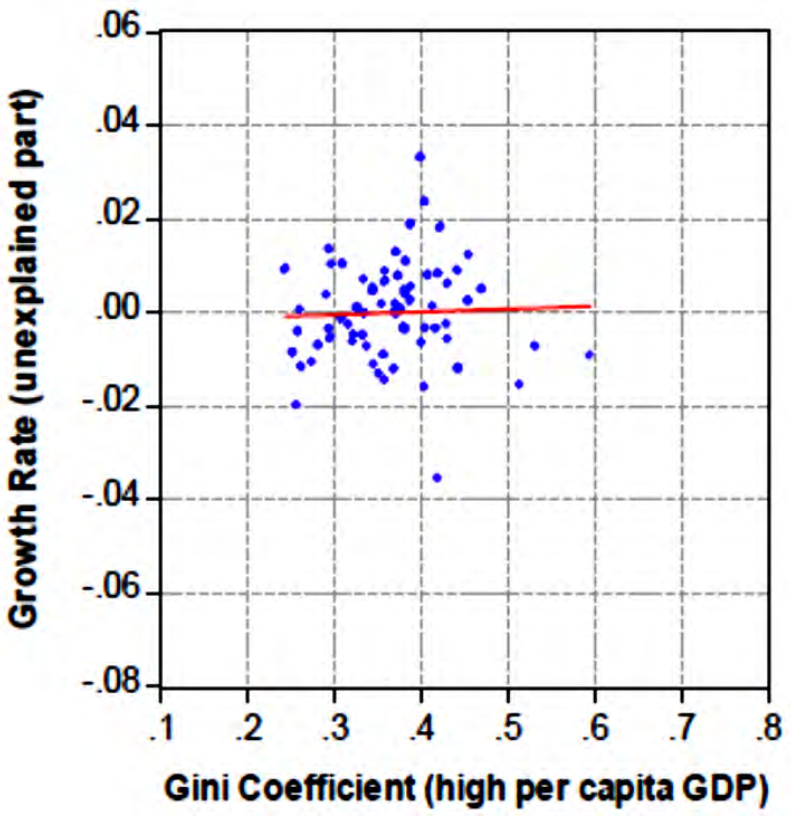


This graph corresponds to the regression system in Table 4, column 2. The curve shows the partial relation between the growth rate of per capita GDP and the Gini coefficient, holding fixed the estimated effects of the explanatory variables other than the Gini coefficient. (The variable on the vertical axis has been normalized to have a mean of zero.)

Barro, 2008 find's some evidence along these lines, but much stronger for low income economies

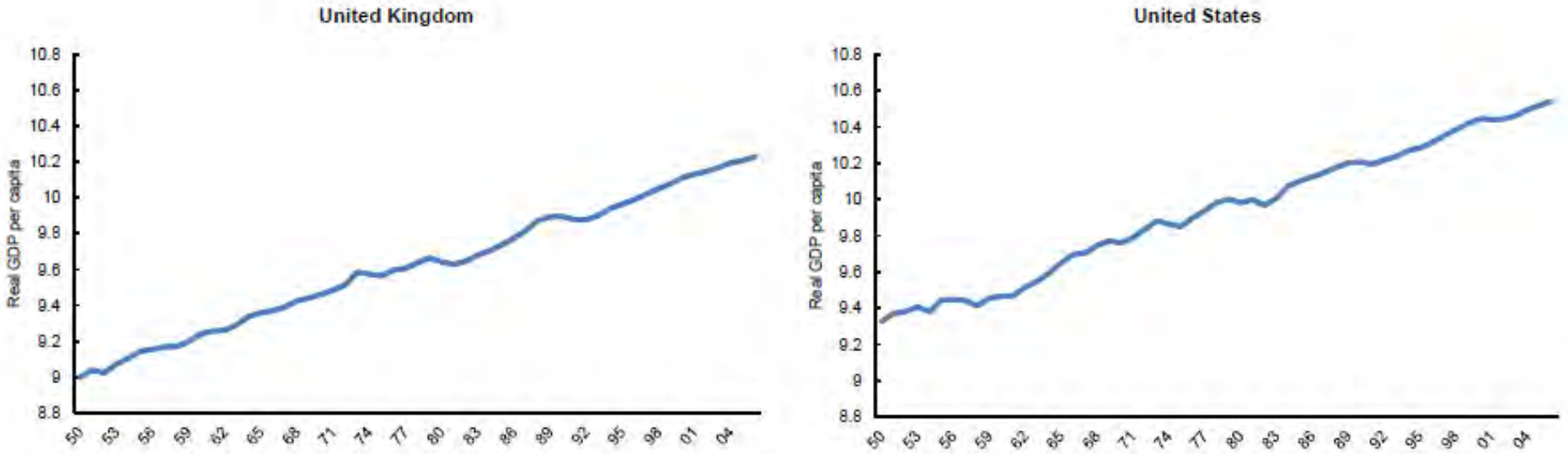
Figure 3: Effects of Income Inequality on Economic Growth: Two Ranges of per capita GDP





Newer views– Inequality slows growth… especially with imperfect credit markets

Figure 1a. The Hills of Growth
(Real GDP per capita)



Source: Penn World Tables Version 6.2
Note: Real GDP per capita is measured in logs, so a straight line implies a constant growth rate.

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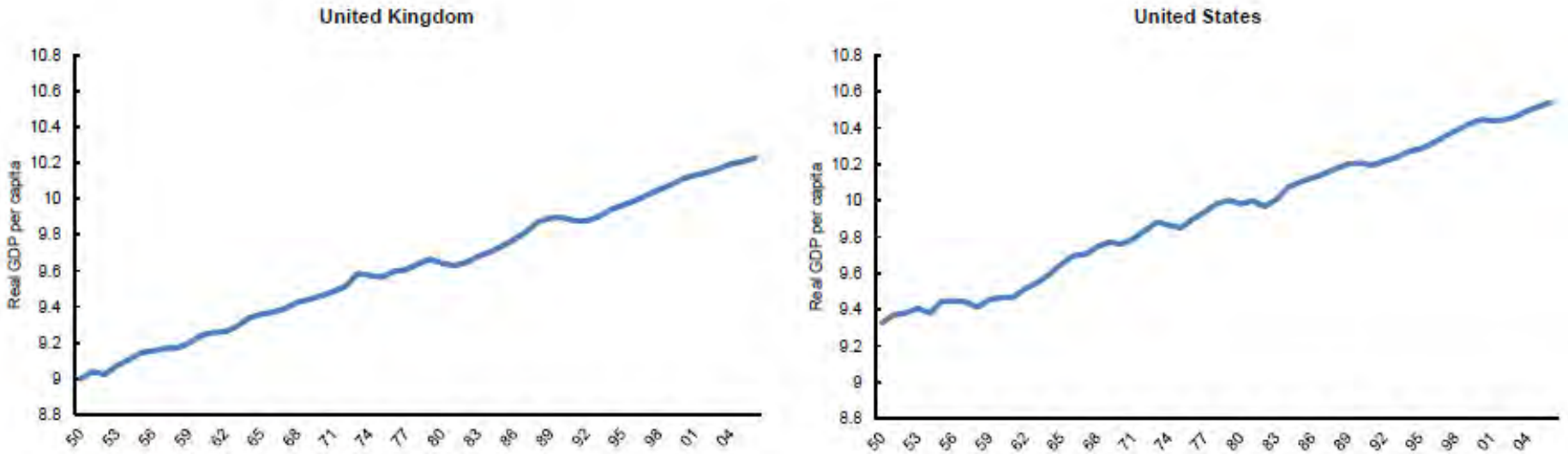
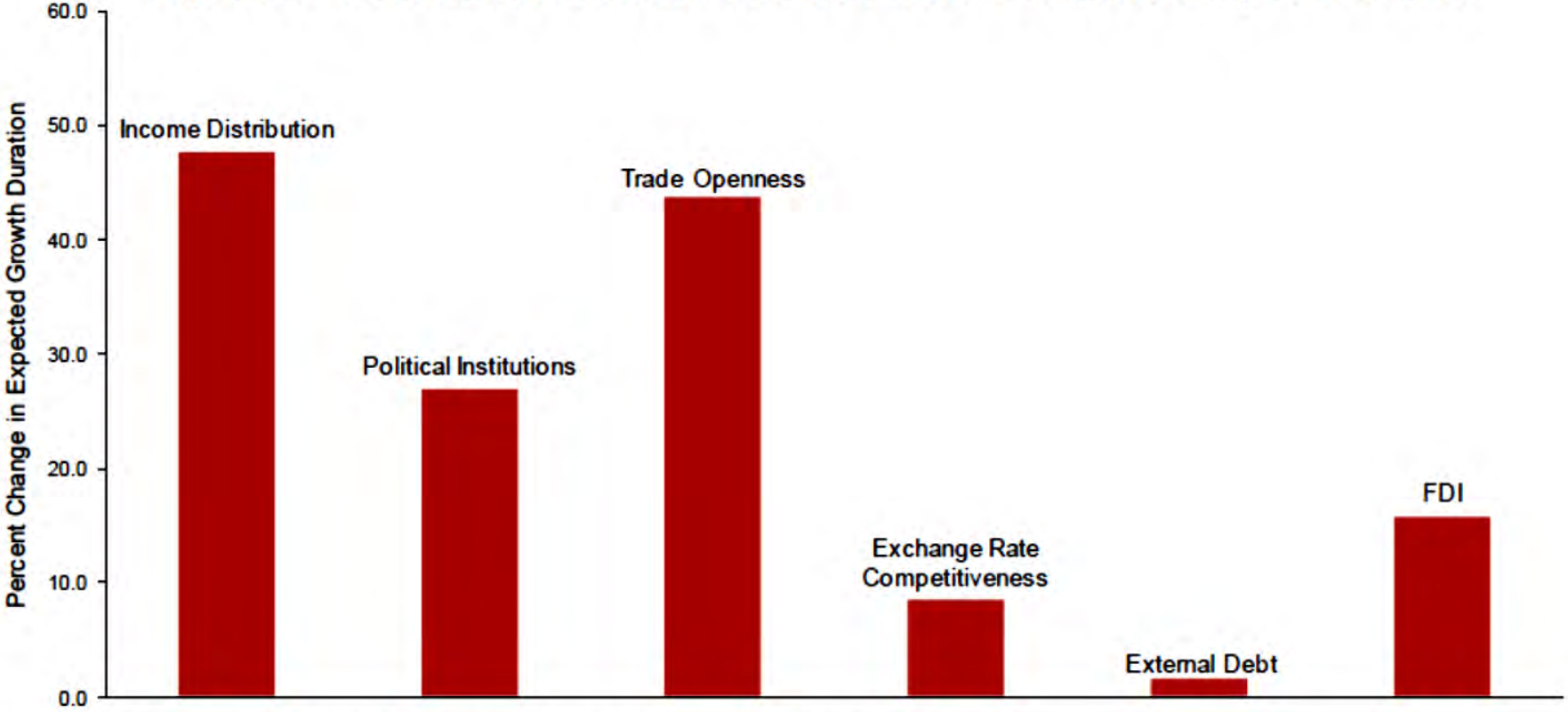


Source: Penn World Tables Version 6.2
Note: Real GDP per capita is measured in logs, so a straight line implies a constant growth rate.

Newer views– Inequality slows growth… especially with imperfect credit markets (Berg et al., 2011 and Berg et al. 2014 update)

Figure 3. Effect of Increase of Different Factors on Growth Spell Duration

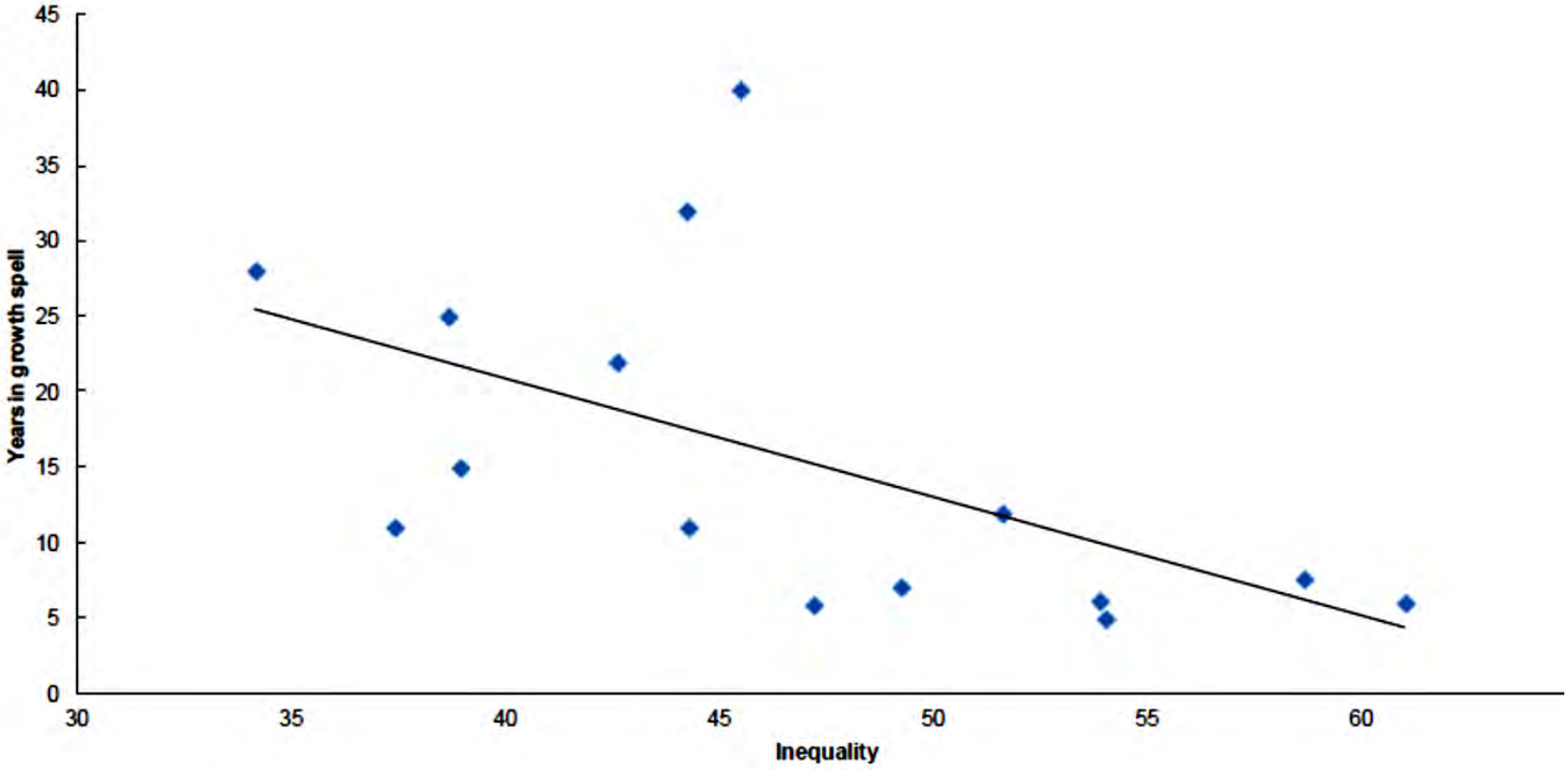


Sources: Berg, Ostry, and Zettelmeyer (2008) and authors' calculations.

Note: For each variable, the height of the figure shows the percentage increase in spell duration resulting from an increase in that variable from the 50th to the 60th percentile, with other variables at the 50th percentile. For trade, the figure shows the benefits of having an open instead of a closed regime, using the Wacziarg and Welch (2008) dichotomous variable. For autocracy, the figure shows the effects of a move from a rating of 1 (the 50th percentile) to 0 (the 73rd percentile.)

Newer views– Inequality slows growth… especially with imperfect credit markets (Berg & Ostry, 2011)

Figure 2. Duration of Growth Spells and Inequality



Source: Penn World Tables and Wider World Income Inequality Database.
Note: This figure includes spells that end in-sample (completed spells) only, because the length of incomplete spells is unknown. For this figure, minimum spell length is five years.

Newer views– Inequality slows growth… especially with imperfect credit markets (Berg & Ostry, 2011)

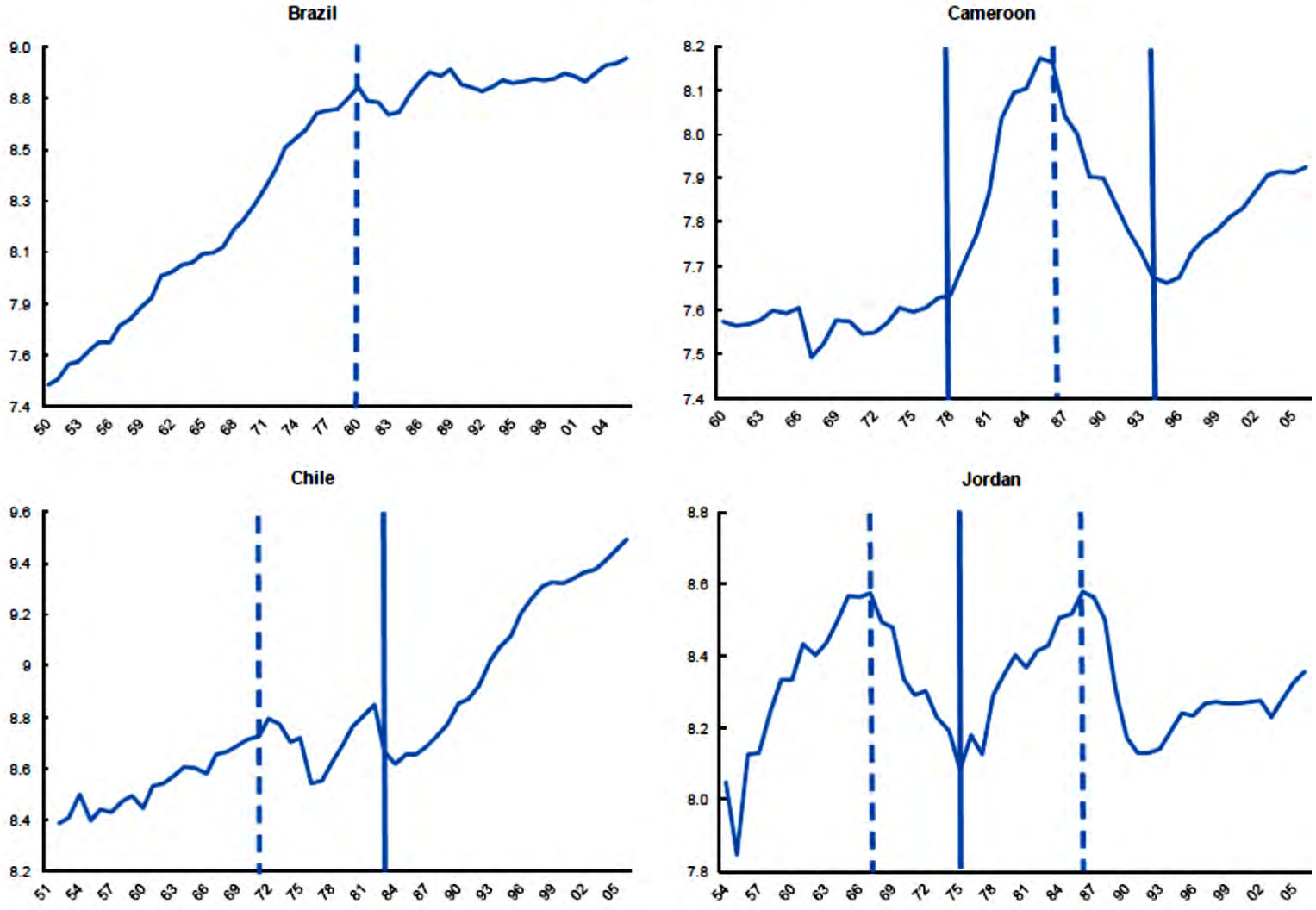
Table 2. Characteristics of Growth Spells

Region	Frequency and duration					Average growth before, during and After[1]			
	No. of countries	No. of spells	Mean duration (years)	% spells lasting at least		Average growth			3 y
				10 years	16 years	Before	During	After	Before
Complete spells									
Advanced countries[2]	37	2	13.0	100.0	0.0	3.3	6.0	1.2	2.6
Emerging Asia	22	3	18.0	33.3	33.3	-0.7	9.1	1.4	1.4
Latin America	18	5	14.4	60.0	40.0	1.1	4.8	0.2	1.3
Sub-Saharan Africa	43	3	8.3	0.0	0.0	-2.7	9.9	-4.0	-10.6
Other developing[3]	20	7	10.7	42.9	14.3	-1.6	5.0	-0.9	-1.4
Total (including incomplete spells)									
Advanced countries[2]	37	11	24.4	100.0	63.6	0.7	5.7	n.a.	-0.1
Emerging Asia	22	16	24.2	87.5	56.2	-0.3	5.8	n.a.	0.4
Latin America	18	7	15.7	71.4	42.9	0.4	4.4	n.a.	0.1
Sub-Saharan Africa	43	18	13.6	66.7	22.2	-4.0	6.3	n.a.	-7.7
Other developing[3]	20	12	13.5	66.7	33.3	-2.1	5.0	n.a.	-2.8

Source: Berg, Ostry, and Zettelmeyer (2008) and authors' calculations.
Note: A growth spell is a period between a growth upbreak and a growth downbreak, as long as per capita real growth 2 percent during the spell and falls to below 2 percent after the downbreak. Breaks are at least eight years apart.
[1]Real per capita GDP growth, in percentage points.
[2]Includes Hong Kong SAR, Japan, Korea, Singapore, and Taiwan Province of China.
[3]Caribbean countries, Cyprus, Middle East, North Africa, and Turkey.

Newer views– Inequality slows growth… especially with imperfect credit markets (Berg & Ostry, 2011)

Figure 1b. The Hills, Valleys, and Plateaus of Growth
(Real GDP per capita)



Sources: Penn World Tables Version 6.2, Berg, Ostry, and Zettelmeyer (2008), and authors' calculations.
Note: Vertical dashed lines represent statistically significant growth downbreaks; solid lines represent statistically significant upbreaks. Real GDP per capita is measured in logs, so a straight line implies a constant growth rate.

Fiscal Transfers key?

- Alesina and Rodrik (1994) public investment financed by taxation of capital income-- .
- Bertola (1991) revenues from taxation redistributed directly to the poor. Voting outcome depends on capital labor share-- higher the wealth/income of the median voter the higher the growth rate.
- Persson and Tabellini (1994) redistribution from rich to poor, higher taxation discourages investment in human capital-- poor the median voter relative to the average the higher the tax rate and the lower growth and investment.

Evidence on the Fiscal View

- Problematic asd higher transfers tend to be associated with higher growth-causality may be reversed as in the classic theory.
- But many studies find no relation, or a positive impact of transfers on growth… see Benabou Table in A&H on page 294.

Political Instability and Growth

- Assassinations, attempted coups,strikes have a negative effect on growth-- but what causes political instability-- a small middle class?, lack of education?, inequality?-- lack of democracy?
- Table 5 in Alesina and Perrotti (1994) : Political instability reduces investment, instability is caused by lack of middle class and level of GDP.
- Rodrik (1998) finds inequality and lack of democracy reduces government's ability to respond to negative external shocks (crises).

Asset Distribution & Growth

- Deininger & Olinto (2000) “Asset Distribution, inequality and growth?” World Bank, find initial asset distribution, as measured by land inequality, negatively affects subsequent growth.
- Education limited by inequality, if education increases overall economic less inequality increases economic growth Interaction between asset inequality and growth is negative and significant.
- D&O (2000) find income equality has a positive effect on growth… the opposite of Forbes…
- Asset inequality is hard to reverse– reform, privatizations…

Empirical Evidence: Bigger middle class enhances growth (median voters)

TABLE 1
THE IMPACT OF INCOME INEQUALITY ON GROWTH

	(1)	(2)	(3)
Dependent Variable	GR	GR	MTax
Constant	–0.18	0.004	0.164
	(–1.37)	(0.47)	(1.13)
GDP	–0.002	–0.004	–0.021
	(–1.77)	(–2.39)	(–1.50)
MSec	0.031	0.004	
	(4.05)	(0.38)	
FSec	–0.025	0.001	
	(–3.06)	(0.10)	
PPPI	–0.002	–0.0005	
	(–0.30)	(–0.07)	
MID	0.118		–0.096
	(2.84)		(–0.19)
MTax		0.090	
		(3.61)	
N.Obs.	67	49	49
R^2	0.30	0.22	0.30
Estimation	OLS	2SLS	2SLS

Source: Perotti (1996), Table 4, p. 160, and Table 8, p. 170.

Note: t-statistics in parentheses. The variables are GR: average rate of growth of per capita GDP 1960–85; GDP: per capita GDP 1960; MSec: average years of secondary schooling in the male population; FSec: average years of secondary schooling in the female population; PPPI: purchasing power parity value of the investment deflator relative to the US in 1960; MID: combined income share of the third and fourth quintile; MTax: average marginal tax rate over the period 1970–85.

Benabou model of inequality and growth, has everything, see Aghion & Williamson. 1999 for and excellent exposition and survey (Chapter 1)

The basic incentive argument carries over to the aggregate economy when agents are identical and/or capital markets are perfect, as shown by Rebelo (1991). In a Ramsey-Cass-Koopmans growth model with perfect capital markets, the rate of growth of individual consumption is given by

$$g = \frac{r - \rho}{\sigma},$$

where ρ is the intertemporal discount rate, r the *after-tax* interest rate and σ the intertemporal elasticity of substitution. If

If credit markets are imperfect, inequality reduces growth, if credit markets work, inequality is less of a problem (a reason to Bank the World?

The main conclusion we can draw from this section is that when we allow for heterogeneity among agents along with capital market imperfections, the traditional argument that inequality has a positive impact on growth is strongly challenged." page 32 of Philippe Aghion Jeffrey G. Williamson (1999) Growth, Inequality, and Globalization Theory, History, and Policy

Chapter 1. http://class.povertylectures.com/AghionWilliamson.pdf

Same Solow-Swan model but now we add up all individual agent to get total stock of knowledge, page 1622 of Aghion et al. 1999

More formally, suppose that when individual i invests an amount of physical or human capital $k_{i,t}$ at date t, production takes place according to the technology

$$y_{i,t} = A_t k_{i,t}^{\alpha},$$

where $0 < \alpha < 1$. A_t is the level of human capital or technical knowledge available in period t, and it is common to all individuals. The level of technology is endogenous, as the economy exhibits both learning-by-doing and knowledge spillovers. Learning-by-doing means that the more an agent produces one period, the more she learns, and hence the greater the level of knowledge available in the next period. The presence of spillovers implies that the learning done by one individual affects the level of technology

Inequality: entire stock of wealth is distributed randomly in each period

$w_{i,1} = a^* \varepsilon_{i,t}$

(see ACG page 1623

To see how investments are determined, consider an economy with only one good that serves both as capital and consumption good. There is a continuum of overlapping-generation families, indexed by $i \in [0,1]$. Each individual lives for two periods. The utility of an individual i born at date t is given by $U_t^i = \log c_{i,t} + \rho \cdot \log c_{i,t+1}$, where $c_{i,t}$ and $c_{i,t+1}$ denote current and future consumption respectively. Individuals differ in their initial endowments. In order to abstract from intergenerational transfers and bequest decisions, suppose that initial endowments are randomly determined at birth. Let the endowment of individual i upon birth at date t be given by

$$w_{i,t} = a \cdot \varepsilon_{i,t},$$

where a is a constant and $\varepsilon_{i,t}$ is an identically and independently distributed random variable, with mean $\frac{1}{a}$.

Learning by doing , and spillovers, so for each individual A_t is now the sum of all knowledge, that is, y_{t-1} (see ACG page 1623

$$A_t = \int y_{i,t-1} di = y_{t-1}.$$

That is, the accumulation of knowledge results from past aggregate production activities.

As a result of learning-by-doing, growth depends on individual investments. The rate of growth between period $t-1$ and period t is given by $g_t = \ln(y_t/y_{t-1})$, that is,

$$g_t = \ln \frac{\int A_t k_{i,t}^{\alpha} di}{A_t} = \ln \int k_{i,t}^{\alpha} di,$$

It can then be expressed simply as

$$g_t = \ln E_t[k_{i,t}^{\alpha}],$$

where $E_t[k_{i,t}^{\alpha}]$ is the mathematical expectation over the output generated by individual investment levels at date t.

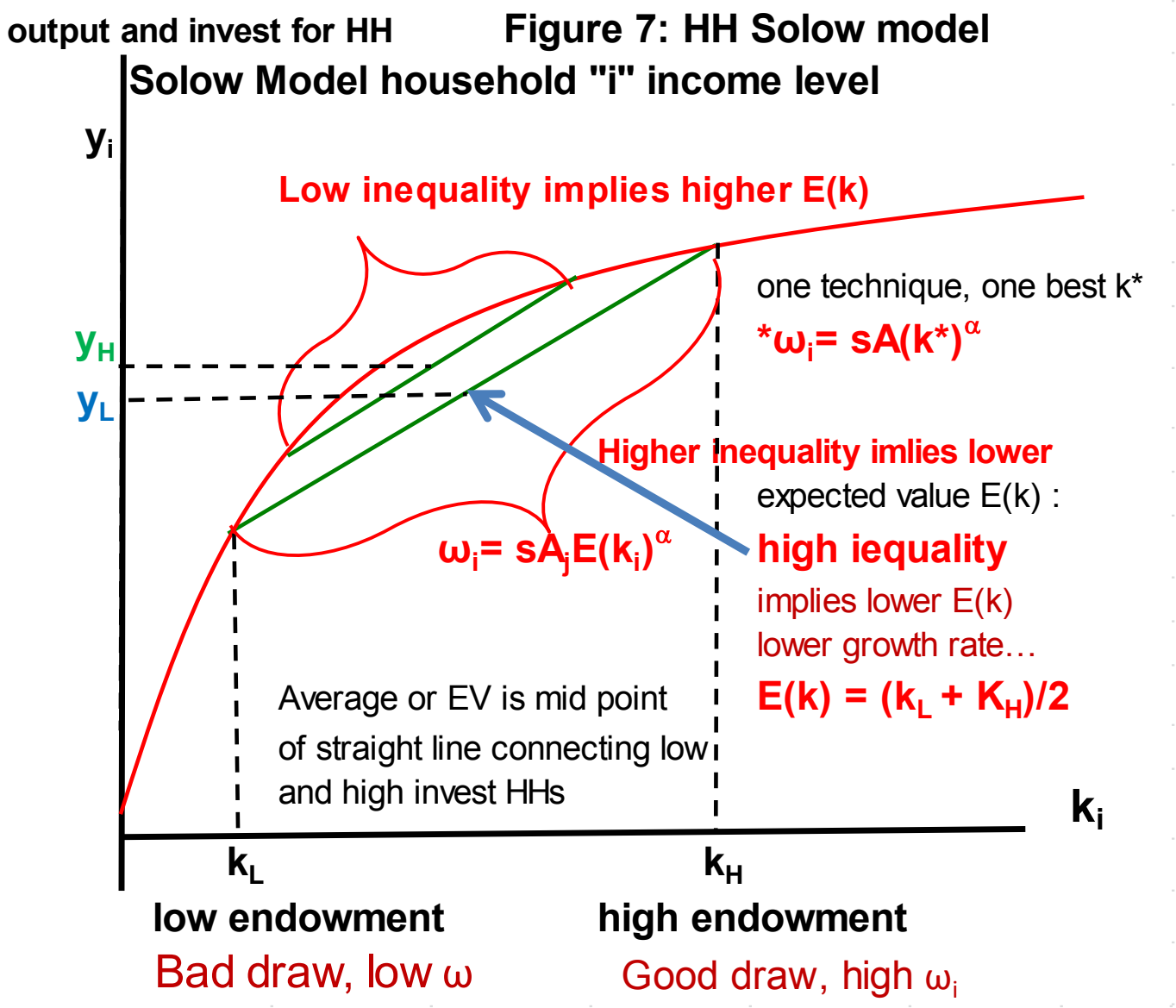
With credit market imperfection asset redistribution problem returns (see ACG page 1625

fections, based on Aghion and Bolton (1997). Specifically, we assume again the existence of a continuum of nonaltruistic, overlapping-generation families, indexed by $i \in [0,1]$. The utility of individual i in generation t is

$$U_t^i = c_{i,t} - h(e_{i,t}),$$

where $c_{i,t}$ denotes individual i's second-period consumption (for simplicity we assume that individuals consume only when old), $e_{i,t}$ is the nonmonetary effort incurred by individual i when young and $h(e_{i,t}) = A_t e_{i,t}^2/2$ denotes the nonmonetary cost of effort. The parameter A_t still measures productivity on the current technology. The endowment of individual i is taken to be an idiosyncratic proportion of average knowledge at date t, that is, $w_{i,t} = \varepsilon_{i,t} \cdot A_t$.

Why inequality reduces $E(k_i) = y$



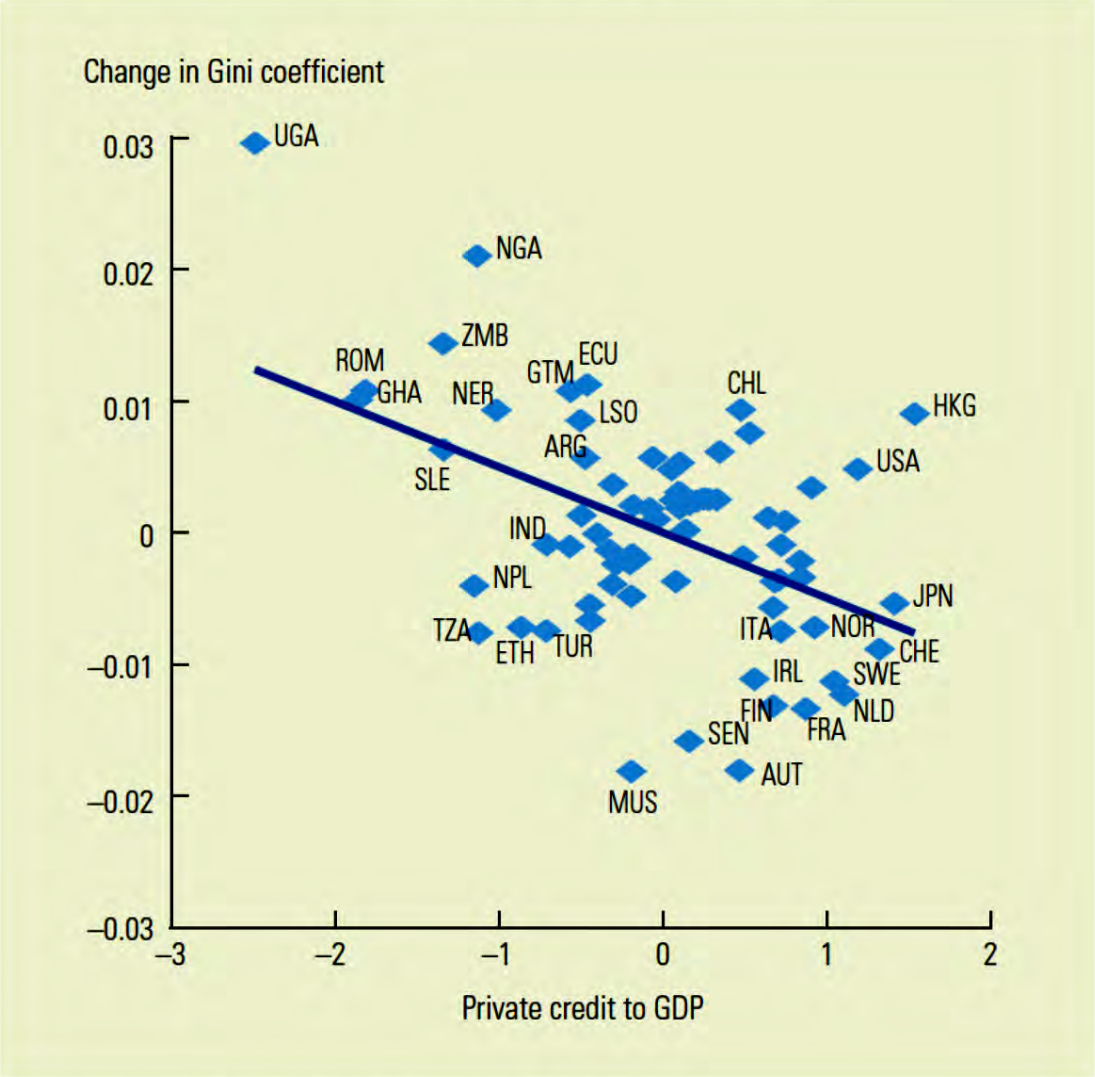
Why does lower output (due to inequality) imply lower future growth?

Answer: learning by doing such that $A_t = y_{t-1}$

This implies $y_t / y_{t-1} = E(k)^{\alpha}$

Empirical Evidence: financial access reduces inequality? Source: World Bank, re-thinking the role of the state in finance, 2013, page 20

FIGURE 1.1 Financial Depth and Income Inequality



Source: Update of Beck, Demirgüç-Kunt, and Levine 2007.
Note: The Gini coefficient is on a scale from 0 (total equality) to 1 (maximum inequality). The chart is a partial scatter plot, visually representing the regression of changes in the Gini coefficient between 1960 and 2005 on the private sector credit–to-GDP ratio (logarithm, 1960–2005 average), controlling for the initial (1960) Gini coefficient. Variables on both axes are residuals. The abbreviations next to some of the observations are the three-letter country codes as defined by the International Organization for Standardization.

Democracy, inequality and Growth:

Most evidence shows democracy has no strong growth impact (not harmful?)

but Rodrik (1997) argues democracy:

1. **leads to more "predictable" long run growth**
2. **more stable growth rates, less severe collapses**
3. **leads to better responses to bad luck (negative external shocks). Democracies pay higher wages?**

Barro (1997) Investment & Democracy

- **Barro (1997) Chapt. 2 (cites land reform as growth retarding..) positive coefficient on linear term, negative in squared term.. Low levels of democracy growth enhancing, higher levels reduce investment..**
- **Optimal democracy index is about .5 – about Mexico/Malaysia's level implies that Chile, South Korea and Taiwan who went from .2 to .3 in the 1970s and then to .7 or .8 then in the early 1980s got worse ? (check this)…**

Barro (1997) Lipset Hypothesis: causality runs from Income to democracy

- Democracy is more likely as income, education and life expectancy rises
- Regresses Gastil democracy index on these variables five years prior… finds significant predictive power in his panel of countries.
- But inequality does not seem to prevent democracy.. Does not have a significant impact on future democracy…

Barro (1999) Inequality & Growth

- Inequality reduces growth for values of GDP below $2070, and then becomes positive… a one Std. Dev. Increase in the Gini affects growth by .5% per year, negatively in poor countries, positively for rich countries. Rising per capita income relaxes credit constraints…

Barro (2007) Inequality & Growth revisited

- Inequality reduces growth developing countries, but has no effect on growth of OECD ctys. Explanation: rising per capita income relaxes credit constraints…
- Presentation

Political Economy of Growth Readings:

- Aghion, Philippe, and Jeffrey G. Williamson. 1998. *Growth, Inequality, and Globalization: Theory, History, and Policy*. Cambridge University Press.
- Alesina and Perotti (1994) "Political Economy of Growth" *World Bank Economic Review*
- Barro, R. J. (2008). Inequality and growth revisited (wp #11). Asian Development Bank.
- Benabou (1997) "Inequality and Growth" *NBER Macroeconomics Annual* (reader)
- Rodrik, Dani (1997) "Democracy and Economic Performance" (reader)
- Rodrik, Dani (1997) "Social Conflict and Growth Collapses" (reader)