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PS1-Q1 From poverty trap to growth miracle? 1.1 A) Briefly outline the three poverty traps discussed in [Sachs et. al \(2004\)](#) and see also the [Three Growth Models handout](#) Which these poverty traps involve direct violations of the MPK Inada conditions? What creates multiple equilibria in the other two cases? Describe in words what happens when an economy approaches or falls below threshold capital labor ratio k^T or steady state k^* or k^E . Normally in the Solow only k^E or k^* matters, but at least there are at least two levels k are potential steady states in a poverty trap model. What are they? *PhD students: write some Inada like limit conditions associate with each of these poverty traps, related to $s(y)$ or $n(y)$ for example.* (1.1B) Did Africa generally and Ethiopia in particular emerge from a low income (poverty trap?) Which poverty trap did Ethiopia's escape (perhaps?) Ethiopia even has a WB [Facebook video](#) (how far up did Ethiopia move in the global GDP ranking (see Figure SSA-2 below or check with more recent WB or [IMF WEO PPP data](#)—remind me to do this, it will help us identify Ethiopia's peers). What was key in Ethiopia (see the World Bank on [Ethiopia's great run](#) or the darker [Milliken Review account](#)? Discuss the role of public investment & foreign Aid in particular. Why is Ethiopian airlines and the new [Addis Ababa–Djibouti Railway](#) of particular importance? 1.1 C) What does then Africa Chief Economist Shanta Devarajan suggest broke Africa out of its poverty trap? Is this a “poverty trap” argument? (see [Africa Pulse Vol 10 Oct 2014](#) and [Shanta's blog](#) or [Devarajan & Fengler 2012](#)). (1.1D) Beyond Ethiopia, what about the “Africa miracle?” Discuss the 3-4 “independent” sources of data we have for Africa income growth (standard national accounts, DHS and national household surveys, and new [“lights” data from Satellite images](#)). Briefly discuss limitations of each data source Why is the contribution of [Poverty in a Rising Africa](#) (Beegle et al. 2015) and Young's (2012) [The African Growth Miracle](#) ...Who does the DHS surveys, why did Hans Rosling call it the “best data in the world?” 1.1E EC How did Nigeria suddenly become Africa's largest economy? Does this sound suspicious? How can we confirm this rapid (overnight?) growth? (PS1 1.1F) *PhD students only: see [Robelo's “Stone-Geary”](#) discussion of endogenous savings—why does savings depend on income levels assuming Stone-Geary preferences? What stylized facts or income effects is are Stone-Geary preferences consistent with? What does this imply about growth regressions that regress growth rates on past savings or investment of vice versa (we have some of these for China...).*

PS1 1.2 The Fundamental Laws of Capitalism: Use [Piketty, 2015](#) page 4 and the [Three Growth models handout](#) to map his [fundamental laws of capitalism](#) into the Harrod Domar and AK endogenous growth model as discussed in the handout. Basically this just involve redefining some greek letters... as discussed in class. a) Use numerical values from [Mankiw's \$r > g\$ comment](#) or from [Piketty, 2015](#) preview the endogenous growth model and the golden rule to show why r is likely to be greater than g . If the golden rule is just an efficiency condition, how can $r > g$ be a bad thing? (what does Piketty say about this?). Why does [David Weil, 2015](#) argues Piketty's $r > g$ problem is exaggerated, why? How does [Piketty respond to these criticisms](#)? B) *PhD students: Show how β and α can move together (Piketty notation) when the elasticity of substitution is greater than one (see page 9 of [Piketty, 2015](#) , [Solow, 2014](#) and page 68 of [Barro and Sala-i-Martin, 2004](#)). Piketty however says he prefers the explanation provided by [Piketty and Zucman](#) Briefly review their explanation of a rising capital share.*

PS 1.3 Institutions, integration and geography: In a series of papers starting with [Acemoglu, Johnson and Robinson or AJR \(2001\)*](#) reach a discouraging conclusion: the persistence of underdevelopment is likely due to long-lived dysfunction institutions, mainly extractive vs. inclusive states, institutions which were apparently in evidence 300 years when European settlers (armies) first entered Africa, Asia and Latin America. In fact, a significant fraction of per capita income variation among countries today can be explained by colonial settlement data (settler mortality for example. And since events of 300 years ago cannot be changed by anything we do today (unless we have a time machine) the direction of causality is clear. For a quick summary

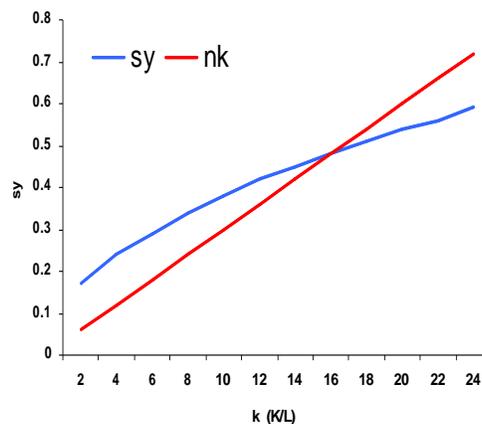
of this argument and its precedent in the finance and development literature, see Aghion and Howitt (2009) Chapter 11. Pp 237-44) and Acemoglu (2003) (a) North (1990) argues “Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction.” ... “In consequence they structure incentives in human exchange, whether political, social, or economic.” When AJR (2004) or AJR, 2006 argue institutions “cause” long term growth, what do they mean? What is the “reversal of fortune” and what caused it? For example they compare the growth of the U.S. vs. Mexico and of the Netherlands and the UK vs. France and Spain—what key institutions do they stress for the U.S vs. Mexico (see AJR, 2004 page 53 and A&R, 2012 Why Nations Fail Chapter 1)? (b) What is Sach’s (2003) objection to Institutions rule argument? In Second Best Institutions and “Growth strategies” Rodrik distinguishes between “stimulating” and “sustaining” growth. What policies “stimulate” growth in Chile and Uganda for example? Expand on this list of policies using the “levers for growth” article by Johnson, Ostroy and Sumbramanian or JOS (2006) If these “levers for growth” work in economies as diverse as China, Ethiopia and Chile, is it true that “institutions rule” as Rodrik, 2003 claims? (c) Looking at the performance of the “Showing Promise” countries listed at the end of JOS (2006), do institutions rule? In light of the AJR arguments is the recent resurgence of growth in Africa is surprising? But perhaps the AJR instruments for institutions explain at least the magnitude (ordering) of growth. Compare Figures 2.5 and 2.6 to Figure SSA-5 below, beyond Malawi do 19th century settler mortality rates predict the relative growth rates from 2000 to 2011 (the three letter ISO code for Malawi is MLI, Nigeria NGA, etc.—Nigeria should be in SSA-5, I know, but World bank and IMF report different growth rates for NGA, we will discuss this problem later).

PS1 Q1.4 Savings, growth and dynamic instability: Take the Harrod-Domar growth model in the Three Models Handout and set the ICOR is 4 so that $A = .25$ and the savings rate is 12%. (a) What is its Harrod-Domar or "warranted" growth rate? What happens to growth if s rises to 20%? What stylized fact or conventional wisdom regarding the causes of growth does this result imply? (b) Is there any tendency toward convergence, conditional or absolute, in the HD growth model? If savings and productivity rates are higher for rich countries, how will their growth rates compare to those of poor countries. (c) There is one "warranted" rate of savings (s) that makes $Y^S = Y^D$ in the HD model, given A . What happens to Y^S and Y^D if investment increases beyond the warranted rate? Use an example similar to that of the handout to illustrate this effect with or without contribution of investment to current output (that is, $Y=A(K+I)$ or $Y=AK$). How does this example to illustrate the "surprising" dynamic instability or "razor's edge" property of the Harrod-Domar mode?. What is the source of this dynamic instability? What are the policy implications of this instability?

PS1 Q1.5 Savings and growth in the Solow-Swan model: The diagram below plots the savings function $S=sy= sk^\alpha$ for $\alpha = .5$ and $s = .12$ over a range of values capital stock per worker, $k = K/L$.

(a) Why does the slope or MPK of this production or savings function decline as k increases, intuitively and mechanically. Relate this shape to the Inada conditions. How does this simple fact lead to what we call beta convergence: that poor countries grow faster than rich ones? Does this result depend on capital flows or trade between countries? How might trade between countries or capital flows affect the speed of convergence? (hint: the speed of convergence does depend on the domestic savings rate, s) (b) Suppose population growth is 3% (.03) what is the Solow model steady state capital stock (k^*) per person given $s=.12$ and $\alpha=.5$? How would an increase in s to .24 affect k^* and y^* ? Show this in both the Solow diagrams used in class. How does this increase in s affect short and long term growth in the Solow model? (c) PhD students only: Demonstrate steady-state consumption per capita $c^* = (1-s)y^*$ is maximized when $s = \alpha = .5$ (you know c for $s = .24$, compute c^* when $s = .4, .5$ and $.6$ or solve for s such that $\partial c^*/\partial s = 0$).

Solow Growth Model Example



Data for Solow model example (see spreadsheet) $s = 0.12$ savings propensity, capital share $\alpha = 0.5$ and $n = .03$ population growth rate

<u>k</u>	<u>y</u>	<u>sy</u>	<u>nk</u>	<u>sy-nk</u>
2	1.4	0.17	0.06	11%
4	2.0	0.24	0.12	12%
6	2.4	0.29	0.18	11%
8	2.8	0.34	0.24	10%
10	3.2	0.38	0.30	8%
12	3.5	0.42	0.36	6%
14	3.7	0.45	0.42	3%
16	4.0	0.48	0.48	0%
18	4.2	0.51	0.54	-3%
20	4.5	0.54	0.60	-6%
22	4.7	0.56	0.66	-10%
24	4.9	0.59	0.72	-13%

PS1 Q1.6 a) **Distinguish between absolute and conditional convergence.** Illustrate your answer using the growth rate diagrams in the [Three Models handout](#). b) Briefly review the evidence on absolute vs. conditional convergence (see Barro and Sala-i-Martin, [Chapter 1 page 44](#)). Taken together what does the evidence on conditional international convergence imply about the preconditions for convergence (Lucas has a view on this). c) *Discuss how selection bias and Galton's fallacy cast doubt on the empirical evidence regarding convergence. (see [Jones Chapter 3](#)) Do these same arguments apply to evidence on conditional convergence?* (d) Discuss the implications of the AK endogenous growth model for convergence. e) Are all endogenous growth models inconsistent with convergence? (with [Villanueva or Sobelo Model](#) See [BSIM, Chapter 1](#) page 66 or section 1.3.3) (f) *What is the essential assumption of endogenous growth models, that is the one that makes them endogenous rather than exogenous growth models? PhD. Students: how would you show this formally?*

1.7 [Levine and Renelt \(1992\)](#) use this basic equation to test the robustness of cross section growth estimates,

$$\hat{\gamma} = -.83 - .35*RGDP60 - .38*GPOP + 3.17*SEC + 17.5*INV \quad R^2 = .46$$

(.85)
(.14)
(.22)
(1.29)
(2.68)

in which the predicted per capita growth rate $\hat{\gamma}$ depends on per capital income in 1960 (RGDP0), population growth (GPOP), secondary enrollment (SEC) and investment share of GDP (INV). Compare these results with [Barro 1997](#) section 1. What are the major differences in their benchmark models? Which of these results are consistent with the prediction of the endogenous or exogenous growth models (including the augmented Solow or MRW model see Bosworth & Collins)?

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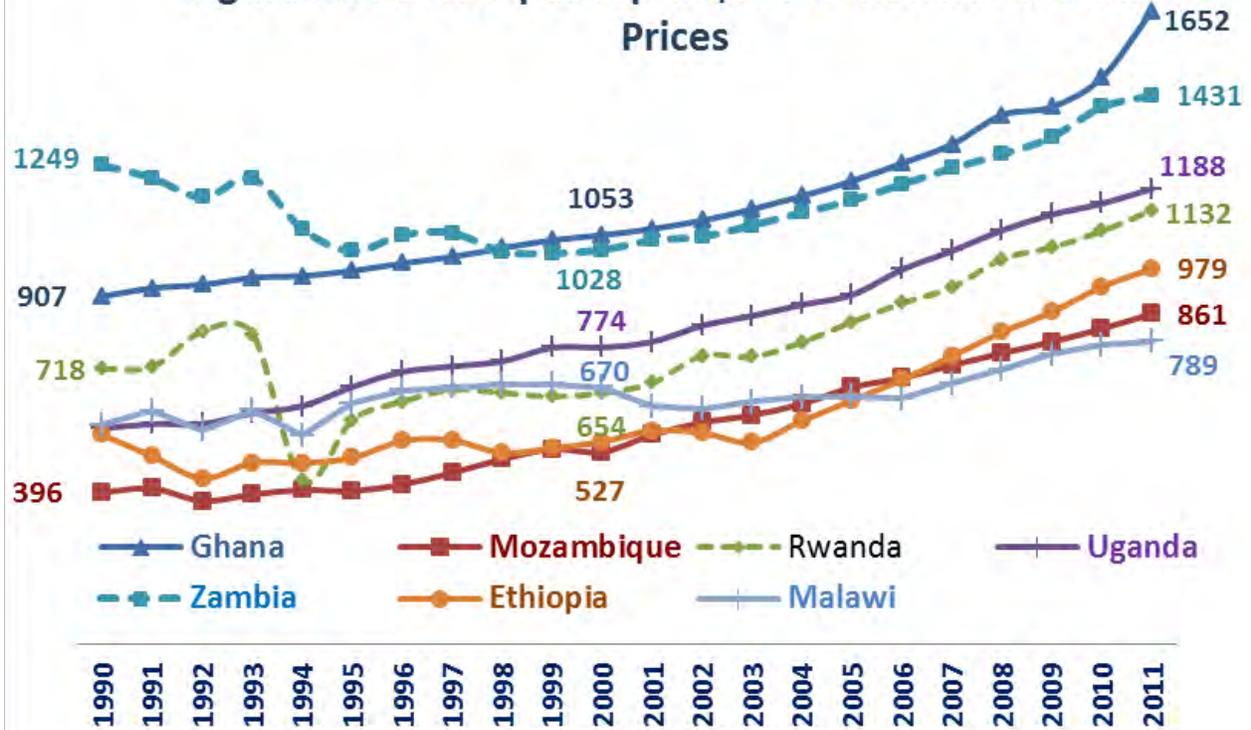
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<http://www.fordham.edu/economics/mcleod/JonesChapt3SpreadsheetHaiti&African&AsianCtys.xls>

Figure SSA-2 GDP per capita \$PPP constant 2005 U.S. Prices



Source: World Bank, WDI online data base, January 2012
databank.worldbank.org/ddp/home.do?Step=1&id=4

Figure SSA-5 Average per capita Growth Rate Selected SSA countries 2000 to 2011



Figure SSA-6 Growth estimates for Nigeria differ but all show Progress

