Catching Up and Falling Behind: Lessons from 20th-Century Growth

Nicholas Crafts

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Angus Maddison’s Legacy

• Evaluating performance in economic growth requires long-run international and inter-temporal comparisons of productivity

• Angus transformed this discourse by allowing the notions of catching-up, falling behind, and forging ahead to be quantified

• The huge debt that we owe him will be obvious as this lecture proceeds … in the style of a fellow ‘chiffrephile’
Modern Economic Growth

• Post industrial revolution era

• Driven by technological progress that has substantial impact on productivity growth

• Need appropriate institutions and policies to take advantage of the opportunity

• Penalty for getting it wrong gets much bigger; income divergence is not new but increases dramatically
## Real GDP/Person ($1990GK)

<table>
<thead>
<tr>
<th>Region</th>
<th>1870</th>
<th>1913</th>
<th>1950</th>
<th>1973</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian Tigers</td>
<td>394</td>
<td>603</td>
<td>1010</td>
<td>3631</td>
<td>23313</td>
</tr>
<tr>
<td>China</td>
<td>530</td>
<td>552</td>
<td>448</td>
<td>838</td>
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</tr>
<tr>
<td>India</td>
<td>533</td>
<td>673</td>
<td>619</td>
<td>853</td>
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</tr>
<tr>
<td>Africa</td>
<td>648</td>
<td>908</td>
<td>889</td>
<td>1387</td>
<td>2034</td>
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<tr>
<td>W. Europe</td>
<td>2006</td>
<td>3488</td>
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<td>20889</td>
</tr>
<tr>
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<td>2445</td>
<td>5301</td>
<td>9561</td>
<td>16689</td>
<td>30491</td>
</tr>
</tbody>
</table>

*Source: The Maddison Project (2013)*
<table>
<thead>
<tr>
<th>Period</th>
<th>West</th>
<th>Rest</th>
<th>World</th>
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<tbody>
<tr>
<td>1500-1820</td>
<td>0.14</td>
<td>0.02</td>
<td>0.05</td>
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<tr>
<td>1820-1870</td>
<td>1.06</td>
<td>0.06</td>
<td>0.54</td>
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<td>1870-1913</td>
<td>1.54</td>
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<td>1.30</td>
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<tr>
<td>1913-1950</td>
<td>1.14</td>
<td>0.67</td>
<td>0.87</td>
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<tr>
<td>1950-1973</td>
<td>3.73</td>
<td>2.82</td>
<td>2.92</td>
</tr>
<tr>
<td>1973-2007</td>
<td>1.98</td>
<td>2.48</td>
<td>1.81</td>
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</table>

Source: Maddison (2010)
<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>India</th>
<th>Western Europe</th>
<th>USA</th>
</tr>
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<tbody>
<tr>
<td>1820</td>
<td>33</td>
<td>16</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>1870</td>
<td>17</td>
<td>12</td>
<td>33</td>
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<td>1913</td>
<td>9</td>
<td>8</td>
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<td>19</td>
</tr>
<tr>
<td>1950</td>
<td>5</td>
<td>4</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>1973</td>
<td>5</td>
<td>3</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>2010</td>
<td>16</td>
<td>6</td>
<td>19</td>
<td>23</td>
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<tr>
<td>2030</td>
<td>28</td>
<td>11</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>2050</td>
<td>29</td>
<td>16</td>
<td>10</td>
<td>17</td>
</tr>
</tbody>
</table>

Sources: Maddison (2010) and OECD (2012)
Divergence Big Time

- 20th century growth unprecedented; GDP gap much greater than ever before
- Clearly not unconditional $\beta$-convergence so the pure neoclassical prediction does not work
- Conditional $\beta$-convergence may be a viable hypothesis – but what are the key conditions?
The Solow Model in a Globalized World

- \( \frac{Y}{L} = A(K/L)^a \)

- Diminishing returns to capital accumulation
- Technology universal
- Factors mobile, K/L equalized across countries
- Beta and sigma convergence
20th vs. 21\textsuperscript{st} Century

- "The restoration of inter-society income equality will be one of the major economic events of the century to come" (Lucas, 2000)

- So divergence will be superseded by convergence and normal (neoclassical) service will be resumed
Lucas’s Underlying Argument

• **Obstacles to growth removed** through imitation of good policies, institutions

• In a globalized world, capital mobility and financial liberalization relax the savings constraint

• **Speed of catch-up growth will increase** markedly and K/L and TFP gaps will be rapidly reduced
Why Might Lucas/Solow Be Wrong?

• **TFP is not the same** across all countries because either efficiency or technology is not universal

• Obstacles to factor mobility

• Geography, institutions or economic policies differ **persistently**

• Sustaining catch-up growth may need **continual reform; ‘too difficult’** so catch-up incomplete
The North/Acemoglu View

- **Institutions** which affect investment and innovation are the underlying determinants of economic performance

- Institutions are formal and informal constraints that structure behaviour

- **Property rights** are the key to high incomes today and thus to divergence over time

- Institutions are **persistent**
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<tbody>
<tr>
<td>Brazil</td>
<td>-0.33</td>
<td>-0.11</td>
<td>Netherlands</td>
<td>1.65</td>
<td>1.84</td>
</tr>
<tr>
<td>China</td>
<td>-0.43</td>
<td>-0.49</td>
<td>Nigeria</td>
<td>-1.26</td>
<td>-1.18</td>
</tr>
<tr>
<td>India</td>
<td>0.26</td>
<td>-0.10</td>
<td>Singapore</td>
<td>1.28</td>
<td>1.77</td>
</tr>
<tr>
<td>Russia</td>
<td>-0.87</td>
<td>-0.82</td>
<td>USA</td>
<td>1.45</td>
<td>1.60</td>
</tr>
</tbody>
</table>
Early vs. Later Stages of Development

• **Gerschenkron:** institutional design and role of government different in conditions of ‘backwardness’

• ‘**Substitutes for prerequisites**’ (‘developmental state’); initially, optimal boundaries of firm wider and coordination problems more serious

• Implies institutional diversity (cf. China)

• May imply difficult transition as development progresses
Institutions and Growth

- Important but surely not all that matters

- Institutional quality may not be well measured but growth regressions do not suggest it dominates recent differences in performance

- Policy plays a part and so too does geography
Divergence Big Time

• Persistent and widening income gaps characterize modern economic growth era

• Institutional/policy failures matter much more when growth opportunities increase BUT there is a strong spatial correlation of development outcomes

• Does this mean that geography undermines the mainstream assumption of a ‘level playing field’ for development?
New Economic Geography: Key Ideas

- Agglomeration Benefits
- Market Potential
- Trade Costs
- Globalization may imply divergence
Transport Costs and the Location of Economic Activity

• **Very High or Very Low**: everything dispersed

• **Intermediate**: centralization of industry based on location in larger market with increasing returns and external economies of scale

• So New Economic Geography says that, even with perfect institutions everywhere, integration of markets may lead to divergence
Globalization and the Inequality of Nations (Krugman & Venables, 1995)

- **Manufacturing** goods are subject to increasing returns and are used both as final and as intermediate goods.

- As trade costs fall, self-reinforcing advantage of larger market leads to country-specific external economies of scale and lower costs for manufacturing in core relative to periphery.

- Eventually, if trade costs fall enough and/or wages in the core rise enough, manufacturing returns to (parts of) the periphery. **NB**: unconditional convergence only in manufacturing (Rodrik, 2013)
Market Potential

- Market access matters for industrial location decisions; operationalized by ‘market potential’ which is distance (transport costs) -weighted GDP

\[ MP_i = \sum GDP_j d_{ij}^\gamma \]

- If data permit, can estimate \( \gamma \) using gravity model; traditionally assumed that \( \gamma = -1 \)
Late 20th Century Empirics  
(Redding & Venables, 2004)

• There is a high correlation between location and income so, following Acemoglu’s strategy, this also might explain divergence big time

• Market potential elasticity around 0.3

• Location effects largely robust to including institutional quality
Figure 4: GDP per capita and \( MA = DMA(3) + FMA \)

\[
\ln \text{GDP per capita (US dollars)} = \ln \text{MA} = \ln (DMA(3) + FMA)
\]
A Prediction

If Zimbabwe were re-located to Hungary, real GDP per person would rise by 80 per cent

Changes in 19th-Century Economic Geography

• **Industrialization and de-industrialization** in globalizing world

• Concentration of world manufacturing production and, even more so, exports

• Changes in location influenced by transport costs; **manufacturing cities proliferated in Europe and North America**; mass production and mass distribution
Real Cost of Ocean Shipping
(1910=100)

Source: Harley (1988)
## Shares of World Industrial Production (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>India</th>
<th>Western Europe</th>
<th>USA</th>
</tr>
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<tbody>
<tr>
<td>1750</td>
<td>33</td>
<td>24</td>
<td>23</td>
<td>0.1</td>
</tr>
<tr>
<td>1830</td>
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<td>1880</td>
<td>12</td>
<td>3</td>
<td>61</td>
<td>15</td>
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<tr>
<td>1913</td>
<td>4</td>
<td>1</td>
<td>57</td>
<td>32</td>
</tr>
<tr>
<td>1953</td>
<td>2</td>
<td>2</td>
<td>26</td>
<td>45</td>
</tr>
<tr>
<td>2010</td>
<td>15</td>
<td>2</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>

Sources: Bairoch (1982) and UNIDO (2012)
The explanations for 19th century continental divergence are as follows:

- Imperialist exploitation (Mandel, 1975)
- Institutions (Acemoglu et al., 2002)
- Dutch Disease (Williamson, 2011)
- Directed technical change (Allen, 2012)

But could NEG core-periphery have anything to do with it?
## Market Access Then and Now

(Reddington & Venables, 2002; Liu & Meissner, 2013)

<table>
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<tr>
<th>1910</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>100</td>
</tr>
<tr>
<td>UK</td>
<td>88</td>
</tr>
<tr>
<td>India</td>
<td>31</td>
</tr>
<tr>
<td>Indonesia</td>
<td>13</td>
</tr>
<tr>
<td>Argentina</td>
<td>7</td>
</tr>
</tbody>
</table>
Market Potential and GDP
100 Years Ago

• Has similar impact on real GDP/person to late 20th century with elasticity of about 0.3 in whole world countries sample (Liu & Meissner, 2013) or in European regions sample (Caruana-Galizia, 2013)

• Core Europe has much greater market potential than peripheral Asia (and Southern Europe) by the late 19th century

• Liu & Meissner’s estimates suggest the following quote may not be entirely accurate
“No deus ex machina translates endowments into political outcomes. If that were so, Argentina would be as rich as the United States”

North et al. (2000)
Location of Manufacturing

• The ‘manufacturing belt’ in the United States is locked into place by market potential which interacts with scale and linkage effects (Klein & Crafts, 2012)

• Catalonia industrializes to a much greater extent than the rest of Spain as a result of favourable market size (Roses, 2003)

• Lancashire dominated the world cotton textile industry based on second nature geography (Crafts and Wolf, 2014)
Incomplete Catch-Up

• Historical experience is that even quite successful catch-up may stall well short of complete convergence

• Type of growth changes at different stages of development

• Far-from-frontier and close-to-frontier countries need different institutions and policies (Aghion & Howitt, 2006)

• Continual reform required but this is difficult
Phases of West-European Growth

- **1950-1973**: rapid catch-up growth; gaps with USA in Y/P and Y/HW falling quickly

- **1973-1995**: catch-up in Y/P ceases but catch up in Y/HW continues

- **Post-1995**: Europe no longer catching up but falling behind; Y/HW grows faster in USA
Late 20th Century Europe

• Now ‘close-to-frontier’ not ‘far-from-frontier’

• Adverse implications of ‘post-war settlements’

• **Failed to make necessary reforms** after the end of the ‘golden-age’

• Struggled to exploit the ICT opportunity
Real GDP/person as % of USA level, 1960-2007

Source: The Maddison Project (2013)
UK Relative Economic Decline in the Golden Age

- The **UK growth failure in 1950-73** was about 0.75 pp per year; UK was overtaken by European rivals (Crafts & Toniolo, 2008)

- Supply-side policy was badly designed and undermined incentives to invest and to innovate

- Policy was seriously constrained by accepting the ‘trade union veto’ in seeking to maintain full employment

- Weak competition sustained bad management and low-effort bargains
Levels and Rates of Growth of Real GDP/Person 1950-1973
($1990GK and % per year)
## Real GDP/Person (UK = 100 in each year)

<table>
<thead>
<tr>
<th>Year</th>
<th>USA</th>
<th>West Germany</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>76.6</td>
<td></td>
<td>58.8</td>
</tr>
<tr>
<td>1913</td>
<td>107.8</td>
<td></td>
<td>70.8</td>
</tr>
<tr>
<td>1950</td>
<td>137.7</td>
<td>61.7</td>
<td>74.7</td>
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<tr>
<td>1964</td>
<td>133.5</td>
<td>101.3</td>
<td>92.2</td>
</tr>
<tr>
<td>1979</td>
<td>142.7</td>
<td>115.9</td>
<td>111.1</td>
</tr>
<tr>
<td>1997</td>
<td>133.7</td>
<td>100.9</td>
<td>95.4</td>
</tr>
<tr>
<td>2007</td>
<td>124.9</td>
<td>88.9</td>
<td>86.8</td>
</tr>
</tbody>
</table>

*Sources: The Conference Board (2014) and West Germany in 2007 calculated from Statistisches Bundesamt Deutschland.*
An Early Start Hypothesis

- The real penalties of Britain’s ‘early start’ were felt after World War II.
- The key transmission mechanism was the persistence of institutions together with the policy framework resulting from the severe interwar problems to which the early start exposed Britain.
- Retreat from competition interacted with corporate governance and industrial relations legacies to undermine productivity performance (Crafts, 2012).
- It took roughly 50 years to deal with this problem.
BRICs Hypothesis

- Goldman-Sachs (2003) highlighted change in world economic structure consequent on rapid growth of big developing economies
  - Brazil + Russia + India + China = BRICs

- Based on catch-up and convergence in these economies
- Does not confront need for continuing reform to prevent catch-up stalling
The BRICs Model

• Conventional and mechanistic

\[ Y = AK^{0.35}L^{0.65} \]

\[ \Delta A/A = 1.3 + 1.5[\log(Y/P_{US}) - \log(Y/P_{BRIC})] \]

• Capital stock growth keeps pace with effective labour supply growth and Y/L growth at about 1.5 times TFP growth: TFP growth slows down gradually as catch-up proceeds

• Takes membership (or not) of the catch-up growth club as a given
Back to 1974

• It would be nice to believe that this model worked well in the past

• **Starting in 1974**, its predictions of future shares of world GDP would have been way off:

  it would have assumed continuing Japanese and European catch-up of USA

  it would have had no way to predict the rise of China and India
OECD (2012) Projections

• **Chinese growth will slow down** as scope for catch-up diminishes and labour force falls

• Normal catch-up trajectory entails China = 55% American Y/P in 2050 and Chinese share of world GDP stable at about 28% post 2030

• This might be too optimistic on China if future reforms are problematic

<table>
<thead>
<tr>
<th></th>
<th>Real GDP Growth</th>
<th>Real Labour Productivity Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-7</td>
<td>10.2</td>
<td>9.2</td>
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<tr>
<td>2012-17</td>
<td>8.9</td>
<td>8.4</td>
</tr>
<tr>
<td>2018-30</td>
<td>5.5</td>
<td>5.9</td>
</tr>
<tr>
<td>2031-50</td>
<td>2.8</td>
<td>3.6</td>
</tr>
</tbody>
</table>
The Chinese ‘Economic Miracle’

• Fast growth imperative to legitimize CP rule
• Much improved incentive structures but context-specific and politically-contingent institutions; *Doing Business* points to weaknesses
• Wasted investment, weak service sector performance, rapid **TFP growth hard to sustain**
• Still a very inefficient economy  (Hsieh & Klenow, 2009)
The RDA Model of Growth
(Xu, 2011)

• China like M-form firm with internal labour market; central government gives strong incentives for local officials to promote growth

• Incentives high-powered with single-task, effective yardstick competition, and CP in power

• Faster (slower) growth substantially raises probability of promotion (termination) for officials

• Explains rapid growth despite ‘bad institutions’ but will need to be replaced
Africa’s Growth Tragedy

• For 25 years from the 1970s income levels in Africa stagnated

• Neither economic policy nor institutions were conducive to joining the catch-up growth club

• Africa has not been favoured by geography

• But stronger growth recently … means an African Tiger is unleashed?
## Growth of Real GDP/Person, 1960-2000 (% per year)

<table>
<thead>
<tr>
<th></th>
<th>Resource-Scarce &amp; Coastal</th>
<th>Resource-Scarce &amp; Landlocked</th>
<th>Resource-Rich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>0.50</td>
<td>-0.36</td>
<td>0.29</td>
</tr>
<tr>
<td>Other Developing</td>
<td>3.79 (88)</td>
<td>1.40 (1)</td>
<td>2.89 (11)</td>
</tr>
</tbody>
</table>

Source: Collier (2007); numbers in parentheses refer to percentages of population in each category.
African Tigers?

- The recent growth spurt is based on very strong demand growth for primary exports driven especially by Chinese demand.

- Whether this leads to sustained catch up growth is doubtful:

  Productivity growth still quite weak
  No industrialization surge
  Weak institutions, moderate CPIA scores, and geographic handicaps have not gone away.
Sub-Saharan Africa: Reality Check

• 1997-2012: Y/L growth = 2.1%, TFP growth = 0.8%

• Manufacturing = 10% GDP in 2010

• Market access relatively low; is globalization really Africa’s long-term friend?

• *Doing Business* and *Governance Matters* scores generally still quite low

• None of Acemoglu, Krugman or Rodrik would see this as highly promising
What Does OECD Project for Post-Crisis Europe?

• Crisis affects output levels but not trend growth rate

• Basically, it is pre-crisis ‘business as usual’

• Catch-up growth resumes and slow convergence towards ‘best-practice’ supply-side policy continues
## OECD Real GDP/Person Potential Growth Projections (% per year)

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Euro Area</td>
<td>1.1</td>
<td>0.5</td>
<td>1.5</td>
</tr>
<tr>
<td>France</td>
<td>1.1</td>
<td>0.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Germany</td>
<td>1.2</td>
<td>1.4</td>
<td>1.3</td>
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<tr>
<td>Netherlands</td>
<td>1.5</td>
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<td>1.8</td>
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<tr>
<td>UK</td>
<td>2.1</td>
<td>0.3</td>
<td>2.0</td>
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<tr>
<td>Greece</td>
<td>2.6</td>
<td>-1.2</td>
<td>2.1</td>
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<td>Ireland</td>
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<td>1.4</td>
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<td>0.7</td>
<td>-0.6</td>
<td>1.2</td>
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<tr>
<td>Portugal</td>
<td>1.2</td>
<td>0.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Spain</td>
<td>1.8</td>
<td>-0.2</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: OECD, Economic Outlook (2014)
A More Sceptical View

- Medium-term effect of the crisis is likely to be negative (Crafts, 2013)

- The aftermath of the 1930s crisis is not encouraging nor is the rise of populism; ‘desirable reforms’ less likely?

- High debt to GDP ratios and lower levels of European economic integration are an unfortunate legacy
Lessons

• Catch-up is nearly always incomplete; the BRICs and Europe will face big reform challenges to address this problem

• Geography matters and this remains a big problem for Africa

• It is still not a neoclassical world of beta and sigma convergence