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Highlights:

New editors for *EHDR*
Textbook on African developmen
The Economics of Apartheid
The Great Divergence

EDITORIAL

This is the second issue of the South African Economic History Annual. The purpose of the Annual is to build on the enthusiasm that was created in the South African economic history community by the hosting of the World Economic History Congress in 2012. This year the Society was involved in organizing, with Economic Research Southern Africa, two workshops, the first on The Economics of Apartheid, and the second on Migration in South African History. Reviews of both workshops are published in this Annual. The Biennial General Meeting of the Society was also held in December in Potchefstroom.

Stefan Schirmer's term as editor of the Society's journal – E*conomic History of Developing Regions* – ends in December 2013. Leigh Gardner of the London School of Economics and I have been elected as the new editorial team from 2014. We look forward to build the journal as the premier outlet for research on the economic histories of developing countries.

As per usual, we also publish two essays of young scholars. The first, by Jorrit Bakker, a Masters student on exchange at Stellenbosch University, is a theoretical investigation of the use and abuse of econometrics in history. The second, by Raphael Chaskalson, an Honours student at the University of Cape Town, investigates the Great Divergence.

Happy reading, and happy holidays.

Johan Fourie

ECONOMIC HISTORY SOCIETY OF SOUTHERN AFRICA

Cover photo by Jasper Vlok.

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EHDR gets new editorial team

Leigh Gardner of the London School of Economics and Johan Fourie of Stellenbosch University have been appointed the editors of *Economic History of Developing Regions* from the beginning of 2014.

Dr Gardner, who obtained her PhD in Economic and Social History from the University of Oxford in 2010, investigate the fiscal and monetary systems of the British Empire, primarily in Africa. Dr Fourie, who obtained his PhD in Economic and Social History from Utrecht University in 2012, specializes in the economic history of South Africa.

The EHDR has made remarkable progress since its shift in 2010 from the South African Journal of Economic History. Not only has the journal published papers by a range of international scholars, it has also managed to attract papers that investigate questions on a wide selection of geographic regions, including Latin America, India, Africa and China. The journal's readership has expanded along with its coverage; from less than 100 full text downloads per month in 2010, the journal's full text downloads on standard platforms was over 250 per month in 2012. Readers as well as authors come from an increasingly diverse selection of countries. South Africa, Algeria, India and China are amongst the top ten countries by downloads.

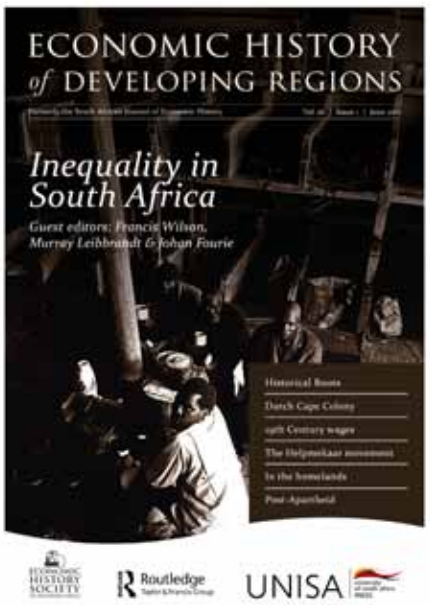
Key to this impressive growth has been the diligent work of the journal's editor, Stefan Schirmer. Partnering with Taylor & Francis has improved that quality standards of the print and online editions and, critically, opened the journal to a global audience. Important to the journal's success too, as the monthly download statistics prove, was the sponsorship and distribution of a special issue to all delegates of the World Economic History Congress in July 2012.

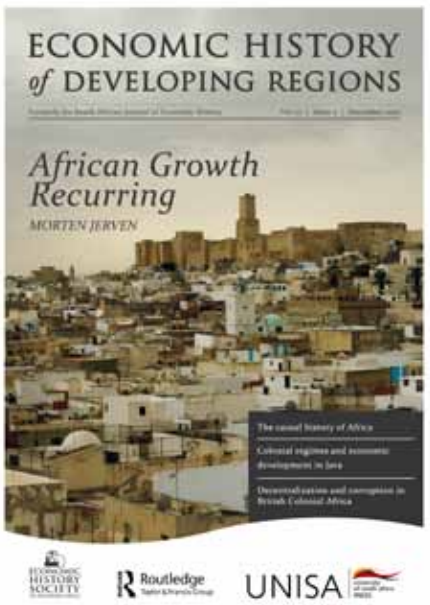
Drs Gardner and Fourie hope to build on this strong foundation. Their first edition in charge will be Issue 1 of Volume 30, to be published in June 2014. A special issue of the journal – The Economics of Apartheid – is scheduled for publicatioin in December 2014. They plan to add an electronic submission system soon in the new year.

With an international editorial board to support them, the editors believe the journal can become the premier outlet for high quality quantitative and qualitative research on the economic histories of developing regions.

'Poor Numbers' grabs attention

Bill Gates included Morten Jerven's 'Poor Numbers' as one of the seven best books to read this year. In his book, Jerven shows how official African development statistics substantially misstate the actual state of affairs. Some of these ideas first appeared in an article he published in Volume 25, Issue 2 of the *Economic History of Developing Regions* (see image below).





New textbook about history of African development

Ellen Hillbom, Lund University

In September 2013 the African Economic History Network (AEHN) launched a unique freely accessible online textbook - The History of African Development. The primary aim was to introduce African students and lecturers to a wide range of themes and concepts that are relevant for understanding the history of African development. Being initiated by economic historians, the intent is to build bridges between the study of economic, social and political history and long-term human development in Africa. The textbook is available for download at the AEHN website (www.aehnetwork.org/textbook).

The key premise of the book is that there are important 'general patterns' to discover in the economic, political and social structures of African societies and that these are rooted in the diverse history and varied ecology of the continent. A deeper understanding of these historical patterns will help a new generation of African students to engage with the major development issues of their generation in theory and practice.

Each chapter of the book introduces a specific topic and discusses both theoretical debates and empirical knowledge. Historical and contemporary events in Africa are analyzed using a comparative approach to show similarities and diversity within the region, as well as placing African developments in a global context.

The textbook project was initiated at the 15th World Economic History Congress at Stellenbosch University in July 2012. There, a group of economic historians discussed the benefits that would come out of producing a freely accessible 'open source' textbook written for teachers and students at African universities who do not always have the scholarly training to access existing academic literature, nor possess the financial means to buy expensive handbooks.

One year later eight chapters have been written and published. The authors are established scholars with an expertise in African socio-economic or political history and they come from various universities around the world. The common denominator is that they are committed to spreading their knowledge and communicate the results of their academic research to a wider public audience. The first batch of authors are, however, only the fore runners. Prominent scholars are lining up to contribute chapters to the textbook and we can predict that it will expand with several chapters each year in the future.

The textbook is not only aimed at catering for students, but also helping teachers and contributing with a pedagogical outreach. Each chapter is followed by study questions and suggested readings, and the editors are currently developing a teaching guide and several interactive teaching exercises. There are also plans to advertise the textbook at freely accessible distance learning web-platforms and to use it as a stepping stone to build a massive open online course (MOOCs) on the history of African development, including video-lectures and interactive examination tools.

The renaissance of African economic history

Johan Fourie, Stellenbosch University

Much like the continent's rapidly growing economies, the study of Africa's economic past is gaining momentum. But this was not always the case. After much interest during the 1960s and 1970s, African economic history had largely disappeared from the scholarly radar by the 1980s, aside from a few monumental contributions by people like Tony Hopkins and Gareth Austin. This was not entirely coincidental: the fortunes of many African countries were wavering on the back of large debts and several supply-side shocks. Just like the Cold War and colonisation created political factions that resulted in devastating civil wars on the continent, an intellectual war between liberals and Marxists was brewing, suffocating the lasts gasps of a dying scholarly field. When The Economist labeled Africa 'The Hopeless Continent' in 2000, it wouldn't have been unfair to ascribe a similar adjective to the study of African economic history.

Yet the high rates of economic growth achieved by many African countries in the 2000s have been mirrored by a revival in the quest to understand Africa's economic past. Rekindled by a new enthusiasm for the long-term impact of historical events, leading scholars began to explore the root causes of Africa's stagnation. These contributions, like Acemoglu, Johnson and Robinson's The Colonial Origins of Comparative Development (the 38th most cited paper in Economics) and Nathan Nunn's work on slavery, led a new generation of economic historians, using large datasets and the economist's standard tool set, to explore colonial records and, increasingly, long-neglected African archives. Several economic historians are busy constructing new series from these records, including African population numbers, prices, real wages and GDP statistics.

Morten Jerven, for example, recently wrote 'Poor Numbers: How We Are Misled by African Development Statistics and What to Do about It'. He shows how historical African statistics, because of incompetence, weak resources and political interference, rarely reflected reality, which have had serious implications for development policies. Ewout Frankema and Marlous van Waijenburg calculate real wages in nine British colonies to show that the populations of several African countries, notably in West Africa, attained real wages at the end of the nineteenth century higher than those of Asia. Ewout and Marlous' efforts were recently rewarded with the prestigious Arthur H. Cole Prize for the best article in The Journal of Economic History (June 2012- June 2013).

As African countries continue to grow, the interest in its economic past will grow too. This is why the African Economic History Network (funded generously by Sweden's Riksbank) has decided to put together a beginner's textbook that will invite future generations of economists and historians into the field: the textbook – The History of African Development – is available for free on their website.

It's not inevitable that all African countries will continue to prosper. But as we unearth more of the continent's rich economic histories, the belief that Africa is destined to be poor looks increasingly implausible. The more we look to the future, the more we will want to understand our past.

Interest in historical demography

From 21 July to 16 August 2013 Jeanne Cilliers, a PhD student in Economics at Stellenbosch University, joined a group of international students in attending the Longitudinal Analysis of Historical Demographic Data (LAHDD) workshop as part of the 50th Annual Interuniversity Consortium for Political and Social Research's Summer Program, hosted by the University of Michigan, Ann Arbor.

This was the fifth (and reportedly last) time this particular workshop was offered and consisted of tuition in three specialized tracks, namely: (i) Historical Demography (ii) Event History Analysis, and (iii) Database Management, instructed by a variety of leading scholars in the field of historical population studies, including George Alter, David Hacker and Ken Smith.

The four week program culminated in group research projects taking the form of posters that was on display in a session at this year's Social Science History Association Conference in Chicago, Illinois.

Says Cilliers: "It was an excellent opportunity to learn from the best. It also showed me that historical demography is an exciting, multi-displinary field."

Summer School encourages South-South cooperation

Two members of the Society, Johan Fourie and Nonso Obikili, attended the 4th Southern Hemisphere Summer School during December 2013. The Summer School, hosted by Luis Bertola of the Universidad de la Republica in Montevideo, Uruguay, aimed at bringing African and Latin American students together to discuss their research in a comparative framework.

Dr Fourie presented 'The Quantitative Cape: Notes from a new historiography of the Dutch Cape Colony', while Dr Obikili presented 'The trans-Atlantic slave trade and political fragmentation in Africa'.

Each student presented a paper for 20 minutes, and then received feedback from two students and one visiting faculty member. The discussions were extremely fruitful and a platform for future cooperation between African economic historians and Latin American economic historians has been laid.

While language barriers remain and transport costs are high, the benefits in terms of new research questions and ideas certainly outstrip the costs.

ERSA workshops continue to stimulate research

The ERSA Economic History group held two workshops in 2013. The first was held in Cape Town from 18 to 20 March on the topic 'The Economics of Apartheid'. 46 scholars attended the workshop. The EHDR has agreed to publish a special issue which will include some of the papers that were presented at the workshop. The special issue is scheduled for December 2014.

The second workshop of the year – and the tenth in total – was held in Potchefstroom from 4 to 5 December 2013.

The theme of the workshop was Migration in South African history. 20 scholars attended the workshop. Several fascinating papers were presented using large, historical datasets. The workshop also benefited from the contributions of historians working on family and ethnic histories, and their valuable methodological contributions in the study of migration.

The Economic History group plans to host two workshops in 2014. The first is scheduled for March in Cape Town. The theme will be The Environment and the Economy in South African history.

The Great Divergence: The Importance of Technology

Raphael Chaskalson, Department of History, University of Cape Town

Kenneth Pomeranz's The Great Divergence: China Europe and the Making of the Modern World Economy (2001) presents a strong to challenge to Eurocentric perspectives on the origins of the industrial revolution (IR). It argues that at least until 1800, very little distinguished the economies of China and Western Europe, which were only able to escape Malthusian constraints through fortuitous access to coal and colonies. By Pomeranz's own admission, the book's biggest weakness is its failure to account for Western Europe's sustained technological progress in the 18th and 19th centuries (Pomeranz 2011: 24). Recent research indicates that intellectuals in Qing China were less likely to learn and spread the knowledge necessary for technological progress than their Western European counterparts. Furthermore, informal transfers of knowledge – through discussions between artisans, intellectuals and entrepreneurs – made an equally important contribution to technological innovation in Western Europe, particularly during the Age of Enlightenment. Unfortunately, our understanding of the failings of Chinese technology is weakened by the absence of reciprocal comparisons of informal knowledge networks in Western Europe and Qing China in the existing literature. By highlighting this area of neglect in the 'Great Divergence' debate, this paper hopes to present an important future research agenda for global economic history.

Pomeranz argues that the economies of China and Western Europe were on broadly similar paths before the IR. Using a series of proxies, such as life expectancy and calorie consumption, he concludes that differences in standards of living in the two regions were negligible (Pomeranz 2001: 37-40). He also claims that economically advanced areas in the China and Western Europe had similar levels of agricultural productivity and luxury consumption (Pomeranz 2001). With rapidly growing populations and increasing demand for food and fuel, Pomeranz asserts that these regions faced massive ecological pressures from the late 18th century and through access to land-saving imports from American colonies, Western Europe was able to break free of these constraints. Britain, he argues, had the added advantage of large coal deposits near rivers, providing easier access to energy inputs necessary for the IR. Economic historians widely acknowledge The Great Divergence as a canonical work in global economic history (Coclanis 2011; Vries 2010). Recent scholarship, however, has asked serious questions of Pomeranz's methodology, use of evidence and areas of analysis.

Ricardo Duchesne asserts that Pomeranz's conclusions stem from a wilful misreading of the evidence at his disposal (Duchesne 2006). Marshalling a wide array of sources, he argues that the West had a significant lead in areas such as life expectancy, income and agricultural productivity on the eve of the IR. Duchesne's evidence illustrates, for example, that France's infant mortality rates decreased substantially between 1780 and 1840: from 280 per thousand births to 155. Pomeranz, however, counters Duchesne's claims on agricultural productivity with several pieces of contrasting research that support his thesis (Pomeranz 2011). Nevertheless, he acknowledges that in the light of evidence presented by Duchesne, Robert Allen and others, his claims of comparable levels of income parity in Western Europe and China 'still apply for 1700... but probably don't for 1800' (Pomeranz 2011: 24). This admission is evidence of a wider point to be drawn from Duchesne's criticism: even if the evidence available suggests an earlier timeframe for the 'Great Divergence', it still challenges claims of Europe having a decisive economic lead over China centuries before the IR. Attempts to undermine Pomeranz's use of data – which, as O'Brien notes, are currently being undertaken by several economic historians (O'Brien 2013) – are thus unlikely to add anything particularly significant to the 'Great Divergence' debate.

Pomeranz's findings are more likely to be questioned by the arguments of Peter Coclanis, Phillip Hoffman and others, which highlight the role of the state in Western Europe's eventual economic lead over China. Coclanis argues that Western Europe's competitive states established and exploited overseas colonies because of a desire for regional dominance, not simply because of a need for land saving imports (Coclanis 2011). Furthermore, Hoffman asserts that constant wars over trading routes between Western Europe's colonial powers stimulated heavy industry and enhanced the region's productive capacity (Hoffmann 2011: 17). Pomeranz responds by noting that these authors have largely failed to consider the ways in which constant warfare inhibits productive capacity and claims that any employment generated in these conflicts would most likely be in services, not manufacturing (Pomeranz 2011: 21). Even if we accept Coclanis and Hoffman's criticisms, there is a more general point to be made about their relevance to the 'Great Divergence' debate. The significance of the West's competitive states in exploiting the economic possibilities of colonies and, potentially, in the development of war-related industry, may serve to account for the economic growth that arose out of colonisation and warfare, but not industrialisation itself. Vries elaborates:

Economic growth, however, is not what set the West apart from the "Rest"... At the heart of industrialisation was set of unique technological breakthroughs... Those who think that something like a Western-state system caused the Western economic démarrage must take up the challenge of how exactly to connect political power to steam power, to put it in a catchy phrase (Vries 2002: 125-126).

Vries touches on an essential factor that set pre-industrial Western Europe apart from China counterparts – a sustained process of technological development and diffusion. There is debate as to when, exactly, these technological innovations became crucial to the IR. Allen asserts that technological improvements were essential to Britain's overall economic lead by 1800. He argues that productivity gains in the textile and porcelain industries from improved technology enabled Britain to push Indian and Chinese products out of the world market (Allen 2009, 2). Pomeranz questions how essential technology was to the first IR and points out that Qing China had advanced technology of its own, especially in the field of irrigation and waterworks (Pomeranz 2001). He acknowledges, however, that technological innovations, most notably the advent of steam power, became crucial to sustaining Western Europe's economic progress, and also caused revolutionary developments in transport and mining. A volume of recent scholarship on the West's technological progress – and China's relative weaknesses – confirms that economic historians are increasingly regarding technology as a crucial factor in the 'Great Divergence' (Wong 2011; Liu 2009; O'Brien 2009; O'Brien 2013; Huff 2010; Zumdorfer 2009, Mokyr 2005).

Pomeranz's explanation for the technological innovations of the IR is, by his own admission, a particularly weak aspect of his book (Pomeranz 2011: 24). He claims that luck incentivised British entrepreneurs to build on earlier inventions. With access to easily transportable coal, it became more economically viable to tinker with steam pumping techniques and many inventions, like Watt's steam engine, were made substantially more likely (Pomeranz 2011: 62). Whilst access to energy inputs may have been a necessary condition for these technological developments, they could not, in and of themselves, guarantee innovation. In response to this crucial weakness in Pomeranz's reasoning, economic historians have offered better nuanced economic arguments for Western Europe's technological successes. Allen argues that Britain's high wages incentivised firms to substitute labour for capital, which made the development of labour saving technology economically rational. Measured in terms of grams of silver per labourer, London's average wages for 1600 to 1800 were double that of Beijing's for 1700 (Allen 2009: 3-5). R. Bin Wong presents a more general argument for Western Europe, claiming that constant warfare encouraged entrepreneurs to locate their businesses and capital behind city walls, where labour was more expensive (Wong 2009). Similarly, Jan de Vries highlights differences in urbanisation rates in the two regions, arguing that urban areas had higher wages and greater rates of specialisation (De Vries 2011). Pomeranz does concede that, for a sector as key as Britain's textile industry, real wage gaps could have incentivised technological innovation (Pomeranz 2001: 53). He points out, however, that income levels in the Yangzi Delta – after we take into account in-kind payments and other tradable commodities such as cultivation rights – were probably comparable to Britain's and certainly to the rest of Europe's. He also provides convincing evidence that the Delta was much more urbanised than de Vries suggests (Pomeranz 2011, 22-23). Pomeranz's response poses serious questions of Wong and de Vries's arguments, but neglects a more significant point made by O'Brien, which bears repeating: we cannot assume that 18th century inventors were profit-maximising, rational actors when in reality, access to knowledge and cultural factors undoubtedly played a part in influencing their decisions (O'Brien 2010: 506).

As a suitable counterfactual, we must ask whether Chinese entrepreneurs would have invested in pioneering technology if their society had higher wages. As Vries notes, the Chinese elite promoted a culture of stability and order as opposed to risk-taking (Vries 2002: 747). Joel Mokyr argues that the knowledge inputs for technological development must be fostered by a suitable intellectual environment, and do not simply appear in response to economic incentives. His work shows that innovation is more probable if inventors understand how best practice techniques work, and are able to learn and adapt them. He asserts that lower access costs to this useful and reliable knowledge during the Age of Enlightenment lie at the heart of the West's technological successes (Mokyr 2005: 295). The remainder of this paper attempts to construct reciprocal comparisons of the intellectual environments of Qing China and Western Europe, with particular emphasis on cultural conceptions of useful knowledge, formal institutions and informal knowledge transfer.

Toby Huff asserts that Western Europe's culture of 'intellectual curiosity' gave it the decisive edge in the 'Great Divergence' (Huff 2010: 40-47). Although these sentiments may be somewhat overstated, a desire to understand the workings of the world, rooted in historical developments long before the IR, distinguished European intellectuals from their Chinese counterparts. Political shifts in the Church from the late Middle Ages fostered a growing culture of logical enquiry in the European intelligentsia. The effects of this cultural shift on knowledge production are exemplified by the unprecedented scientific discoveries of the 16th and 17th centuries. The link between Europe's 'Scientific Revolution' and its technological progress are keenly debated in the literature. Whether we posit a direct connection between scientific knowledge and technology or not, Newtownian sci-

ence was certainly key to some of the IR's most important inventions, such as Thomas Newcomen's steam engine (O'Brien 2010: 1-3; Pomeranz 2001: 59-60; Allen 2011: 25). Furthermore, Mokyr argues that even if scientific knowledge was largely 'peripheral' to the early inventions of the IR, the scientific method of enquiry was an important contribution to an intellectual environment that fostered innovation (Mokyr 2005: 292). By the Age of Enlightenment, a Baconian belief in the ability to attain material progress through the mastery of nature had become a feature of the Western European intellectual environment. Improvements in transport infrastructure sped up the dissemination of knowledge, as did the creation of hundreds of new scientific publications in vernacular languages, with increasingly standardised scientific methods and symbols. The importance of these developments is evidenced by the story of Newcomen, who was able to develop the steam engine by building on Papin's sketches in Philosophical Transactions between 1685 and 1700. This culture of rational enquiry and academic collaboration was conspicuously absent in Qing China.

Academic knowledge was well circulated during the Qing Dynasty, through an independent education system, public lectures and range of academic publications and encyclopaedias (Mokyr 2005: 313). Liu argues, however, that most of this work was focused on statecraft and medicine, not science or engineering (Liu 2009: 33-37). He explains this by noting that Chinese elites had a different cultural perception of useful knowledge to their European counterparts. Confucian ideology emphasised humankind's unity with nature, as opposed to the need to master it. Kent Deng argues that within this cultural milieu, it is not surprising that work on medicine and statecraft was regarded more useful or pragmatic than scientific knowledge: Chinese intellectuals demanded that academic work promote a particular set of values and morals, linked to the promotion of harmony and stability in society (Deng 2009: 61-62). He further claims that the ability of the Chinese state to maintain relative stability in a massive empire for centuries meant that there was less of a need to initiate any change of culture. We therefore cannot view Qing China's failure to match Europe's technological innovations and its apparent lack of interest to Western science as evidence of cultural conservatism, as David Landes seems to do (Landes 2006: 17-19). Clearly, the Chinese had a different cultural perception of useful and reliable knowledge to their European counterparts, which ultimately hindered the development of their technology.

Useful and reliable knowledge was made even more accessible in Europe with the development of formal institutions dedicated to improving existing knowledge in chemistry, medicine, botany and agriculture (Mokyr 2005: 316). Between 1600 and 1800, the number of scientific societies in Britain and Germany roughly doubled. Mokyr makes a strong argument linking these societies to the improvement of existing technologies and the development of new ones. In Britain's pottery industry, for instance, entrepreneur Josiah Wedgwood was able to use his knowledge of chemistry from interactions with Lavoisier in the Birmingham Lunar Society to develop a unique clay compound that vastly improved the quality of his products (Mokyr 2005: 306). Chinese technology, in contrast, was undoubtedly hindered by the absence of any regular scientific societies in the Ming and Qing eras (Liu 2009: 47). Pomeranz claims that the Qing elite engaged in 'scientific discussions' and alludes vaguely to a 'lively trade in vernacular medical texts', but does not indicate that any widespread, standardised approach to scientific enquiry developed (Pomeranz 2001: 48). For cultural reasons cited earlier, academic work unrelated to statecraft was held in low esteem and was ill funded. Botanist Song-Ying Xing's impressive study in 1637, The Exploitation of the Work of Nature, earned him no plaudits from China's intellectual elite and he eventually died a poor man (Liu 2009: 47). O'Brien points out that without a network of formal scientific institutions, improvements to existing technologies diffused more slowly across the vast stretches of land between China's urban areas (O'Brien 2010: 11). However, Pomeranz argues that with no antagonistic Church, Chinese scientists had less need to organise themselves in institutional settings and relatively advanced technology, like textile spinning in the north, could spread without them (Pomeranz 2001: 47). These developments question how important scientific institutions were to the diffusion of useful knowledge, but O'Brien and Liu's observations indicate that their absence slowed or hindered this process in comparison to Europe. O'Brien's recently established research initiative, which looks at the number, location and curricula of institutions of higher learning in Qing China, is an important new research agenda that is likely to support these conclusions (O'Brien 2012).

> *"Ultimately, a sustained stream of important technological innovations gave Western Europe the decisive edge."*

Existing debates on the 'Great Divergence' thus confirm that cultural perceptions of useful knowledge and formal institutions dedicated to scientific enquiry gave European innovators an edge over their Chinese counterparts. As Liu, O'Brien and Mokyr show, informal connections between Western Europe's scientists, entrepreneurs and artisans further aided the development and diffusion of pioneering technology (Liu 2009: 48; O'Brien 2010: 20). Mokyr argues that Birmingham Lunar Society provided 'routine contact between scientists such as

Priestley and Keir... and entrepreneurs such as Boulton and Wedgwood' (Mokyr 2005: 313). Coffee houses also became an important meeting place for intellectuals and engineers; in London, artisans and entrepreneurs could attend John Harris's open lectures on mathematics at the Marine Coffee House free of charge. In spite of this, Allen argues that the ideas of the Enlightenment reached few ordinary people outside elite circles (Allen 2011: 12-13). Mokyr does not appear to deny this, but claims that through a few thousand engineers and craftsmen gaining access to important scientific knowledge, 'the dynamics of competition are such that the few drag along the many' (Mokyr 2005: 301). Lissa Roberts supports this contention by showing that Dutch mining innovations in the 17th century can be credited to ordinary artisans, who were able to adapt Huygens' work on crystallisation to practical considerations (Roerts 2009: 107). Even Pomeranz acknowledges that collaboration between artisans and inventors contributed to improvements on Newcomen's steam engine (Pomeranz 2001: 66). Informal knowledge transfer was therefore another essential component of the West's technological progress before and during the IR.

Unfortunately, the existing literature does not contain a comprehensive study of informal knowledge transfer in Qing China. When we consider the importance of informal networking to the West's technological innovations, it is surprising that Liu and O'Brien neglect to explore the avenue further for China Liu 2009: 47; O'Brien 2010). The existence of relatively advanced textile technology in north China's spinning cellars, in spite of the absence of formal scientific institutions, indicates that useful knowledge was being transferred in some informal settings (Pomeranz 2001: 47). The extent of these networks for different industries may help us to determine more conclusively how existing technologies were transferred and adapted. It will also help determine whether cultural and institutional factors were, in fact, decisive obstacles.

Without written records, it is admittedly difficult to generate a useful historical account of informal networking, but there are avenues available that could provide important insights. As Liu points out, the profession and locality of China's 300 000 artisans were recorded by the Ming government in 1393 and similar record-keeping continued into the Qing era Liu 2009: 37). Like O'Brien's current project on formal academic institutions, there is clearly scope for a quantitative study of artisans by locality and their proximity to intellectual elites. Furthermore, future analyses of travel literature could include a focus on Jesuit encounters with engineers and artisans (if any such accounts exist). This will provide a more conclusive account of what Western science found its way into Chinese technology and which people adopted it. A study of informal networking may also necessitate the entry of material history into the 'Great Divergence' debate. Maxine Berg's analysis of British textiles illustrates that Indian spinning machines, observed by British travellers, provided some of the necessary knowledge inputs for crucial innovations in Britain's textile industry (Bert 2013: 122). If we cannot access travel literature that provides direct evidence of informal technological networks in Qing China, perhaps it is time for economic historians and archaeologists to excavate North China's former spinning cites for any remains of the machinery that was used, with the aim of assessing what information, if any, can be drawn from its material composition (Valeriani 2011: 44-47). Simona Valeriani's study of St Cecilia Cathedral in Trastevere shows that when material objects are studied in conjunction with written records, interesting conclusions can be drawn about the origins of the techniques that were used to construct them. These are admittedly speculative suggestions for a future research agenda, which may not yield any fruitful results if ultimately pursued. Nevertheless, the importance of informal knowledge transfer to West-

Time matters

Jorrit Bakker, Department of Economics, Stellenbosch University

The aim of this article is to engage economic historians more with economic growth models by identifying some of the time-dimension related complexities that stem from differences in long-term growth patterns. This builds on the recent discussion between scholars like Hopkins, Fenske, Jerven, Nunn and Austin concerning the theories and methods in economic history. The theoretical issues that these scholars identify have an echo in models and methods. Pritchett already has critiqued the methods used by economists to explain long-run growth based on the concept of time-persistence of growth correlates. I argue that his critique creates an opportunity for economic historians to engage with economic models based on their better understanding of historical processes.

We know a plethora of phenomena that are correlated to economic development. We know that factors like geography, factor endowments, demography, ethnic diversity, institutions, history, trade openness and the presence of natural resources are important. We do not know, however, is how the exact causal mechanisms between these growth correlates work.

A big part of the problem lies in the methods that are employed to research economic growth. The main tool for economic historians in explaining economic growth has been growth regressions, either in cross-country, panel or instrumental variable format. These techniques however, have limitations. This paper will argue that one of the most important, and often unrecognized, problems is that these techniques take insufficient account of the time-dimension of

ern Europe's technological progress suggests that this agenda will deepen our understanding of why 'Chinese technology... did not revolutionise its economy' (Pomeranz 2001: 48).

Kenneth Pomeranz's work has reshaped global economic history by showing that before the IR, the economies of China and Western Europe were moving along remarkably similar paths. Duchesne's critique of his use of evidence does not detract from this conclusion. Furthermore, an analysis of other critiques reveals that we cannot posit an internally generated advantage for Western Europe by virtue of its competitive state system. Ultimately, a sustained stream of important technological innovations gave Western Europe the decisive edge in the 'Great Divergence'. During the Age of Enlightenment, the Baconian ideology of European intellectuals and formal institutions dedicated to scientific enquiry enabled innovators to access useful knowledge at lower personal cost than their Chinese counterparts, who operated within a cultural milieu that inhibited similar enquiries. This paper has shown, however, that informal collaboration between artisans, engineers and entrepreneurs was an equally important contributor to the successes of the West's technology. Economic historians have not attempted a meaningful reciprocal comparison of Western Europe's and China's informal knowledge networks, which may shed light on why, in spite of cultural and institutional constraints, a limited amount of new technology managed to develop and spread during the Qing Dynasty. A research agenda that explores these issues will take the 'Great Divergence' debate forward and bring us closer to solving Needham's puzzle.

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growth processes. This is where economic historians can find new opportunities for research.

This paper will look at some of the recent debates and review papers on the role of history in economics. It disentangles three kinds of economic historical research and makes a plea for a fresh look at the methods used in them. If we want to reach a deeper more complex understanding of economic growth processes methods should take more account of the time dimension in which these processes operate. Based on the work of Pritchett, I will point to some flaws in the current methods and time complexities that can result in inconsistent results. Finally the paper identifies opportunities for economic historians to engage with and augment the models and methods of economics.

This section will explore some of the difficulties already noted in growth literature. Mainly based on the work of Pritchett, it identifies the problems growth regressions have with explaining growth in developing countries. The differences in growth experience between developed and developing countries cause complications for the methods employed.

Already in 1993, Easterly, Kremer, Pritchett and Summers noted that the most growth correlates, like institutions, show high persistence across decades, while growth rates are rather volatile. This implies that long-run determinants may not be the best indicators for growth when measured in the short-run. Year-to-year variation of growth is not so much determined by the level of institutions, but by shorter-run more volatile growth correlates like commodity prices.

Around the turn of the millennium Pritchett wrote a series of articles investigating this issue further (I primarily use Pritchett (2000) and Pritchett and Werker (2012), but also Pritchett (1997, 2001 and 2002)). He found that growth re-

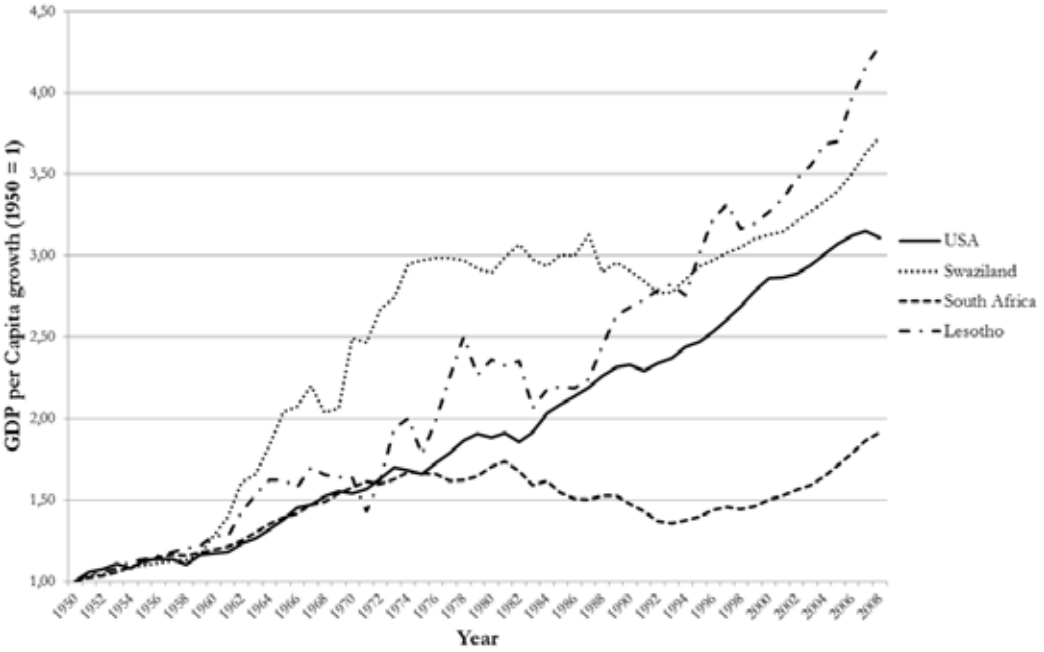
gressions, whether cross-country or panel, insufficiently captured the different growth experiences of developing countries. While the model was applicable to developed countries serious complications arise when applied to developing countries.

This problem stems from the fact that almost all developed countries today have had very stable growth experiences. High income in these countries is not the result of very fast growth, but of long-term, stable moderate growth. These countries have had growth figures around 2% to 3% for a very long time and never deviated strongly from this trend for any notable period (see table 1 in Pritchett and Werker, 2012).

The growth experience of most developing countries on the other hand has been very volatile. These countries have generally followed much more a boom-and-bust-pattern than developed countries. Periods of rapid expansion for several years are followed by years of sharp contraction. In the long-run this has led to lower average growth for these countries even though at time they outperform the developed countries.

An example might illustrate this and reveal the problems this results in for growth regressions. Graph 1 plots the relative growth experiences of the United States of America (USA), Swaziland, South Africa and Lesotho over the period 1950-2008. Compared to the other three countries the USA shows by far the most stable growth over the whole period. Swaziland shows fast growth up to 1973 after which it stagnates and even declines a bit until 1993. From 1993 onwards it grows at a pace that is roughly the same as the USA. South Africa shows a similar pattern, but with less explosive growth in the period 190-1973. Lesotho shows a slightly steeper incline than the USA, but with much larger booms and re-

GDP per capita development for USA, South Africa, Lesotho and Swaziland 1950-2008



versals. This is partly due to the lower absolute GDP per capita throughout the period.

This graph shows that sample period can seriously influence conclusions based on growth regressions. If we take the USA as a country with 'strong' institutions and Swaziland as a country with 'weak' institutions, conclusions on the effect of institutions varies between periods. Up to 1973 the weak institutions outperform the strong institutions; between 1973 and 1993 it is the other way around and after 1993 there seems little impact of institutions at all. This simple example shows that if countries go through different patterns of growth the results will depend heavily on the sample period.

Pritchett (2000) used a classification of six possible growth experiences that he observed during the period 1960-1992. Based on the presence of a structural break in the growth series he described the growth experiences of countries as geological formations: hills, steep hills, mountains, plateaus, plains and accelerators. See table 1 for the classification criteria.

When classifying the countries some interesting results emerged. All but five of the industrialized countries are found in the first two categories with the majority in the second. Only two African countries can be classified as such. Over two thirds of these are in the Mountain or Plain category.

So how can we explain the different growth formations between countries? In order to do that we need a better understanding on how growth correlates behave over time and a

Class	Growth rate before break	Growth rate after break	Industrialized countries	Sub-Saharan African countries
Steep Hills	g >3%	g > 3%	(4) Cyprus, Ireland, Japan, Malta	(1) Botswana
Hills	g >1,5%	g > 1,5%	(14) Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Portugal, Spain, Switzerland, United States	(1) Tanzania
Mountains	g >1,5%	g < 0%	(1) United Kingdom	(13) Cameroon, Congo, Côte d'Ivoire, Gabon, Liberia, Mozambique, Niger, Nigeria, Sierra Leone, South Africa, Togo, Zaire, Zambia
Plateaus	g >1,5%	0% < g < 1,5%	(4) Iceland, Netherlands, New Zealand, Sweden	(7) Ethiopia, Gambia, Guinea-Bissau, Kenya, Lesotho, Malawi, Swaziland
Plains	g <1,5%	g <1,5%		(14) Angola, Burundi, Benin, Central African Republic, Guinea, Burkina Faso, Madagascar, Mali, Mauritania, Rwanda, Senegal, Somalia, Uganda, Zimbabwe
Accelerators	g <1,5%	g >1,5%		(2) Ghana, Mauritius

more comprehensive theory on the relations among growth correlates depend on their time dimension. The 'tectonic' forces that shape the growth formations of countries move at different speeds, pushing against each other at different angles and over time creating varying landscapes. In Pritchett's analogy of geological formations, economic historians are the geologists uncovering how these landscapes were formed.

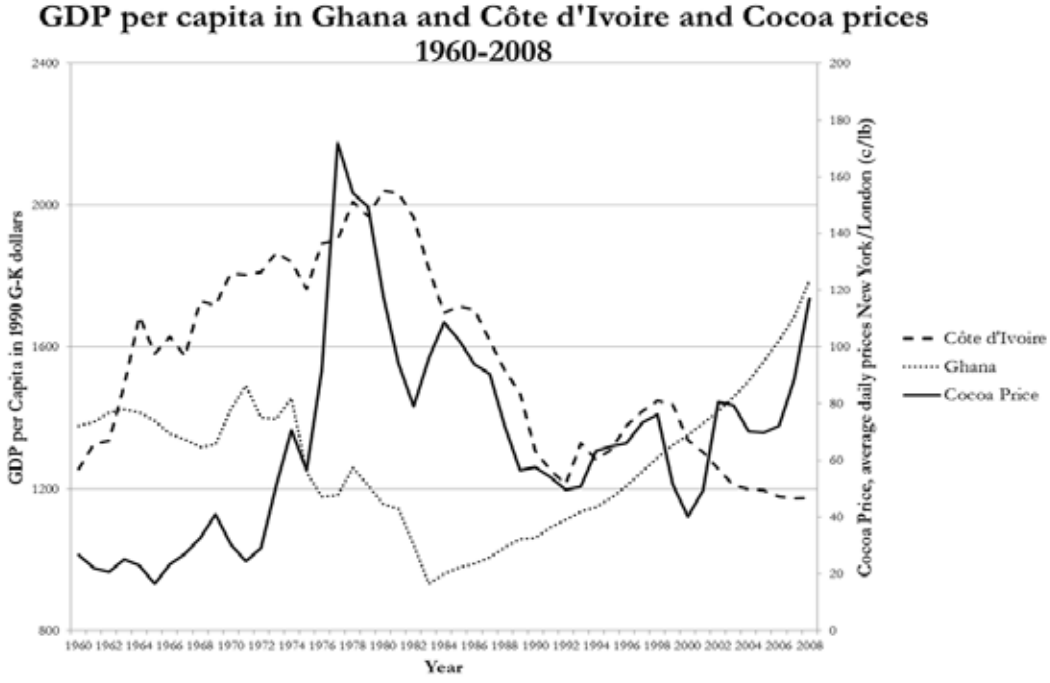
The broad implication of the previous section is that while long-run growth correlates stay fairly constant over time, not all countries experience stable growth patterns, while the assumption of stable growth holds true for the industrialized countries, most developing countries have different experiences.

The problem of sample period selection is driven by one of the features Pritchett (2000) noted in classifying growth correlates: time-persistence. The time-persistence of institutions makes them poor explanatory variables for the difference in year-to-year growth rates. However, over the long-run they do have effects on average growth figures. The question is how long is the long-run? We know very little on the persistence of growth correlates. We know that our indices of institutions change slower than commodity prices, but how long should our time series be in order to properly capture the effect of institutions on growth? Ten year? Fifty years? Five centuries? Without knowing the time scale involved comparing the relative importance of different growth correlates becomes problematic.

For instance, shorter-run growth correlates like commodity prices will explain much more of the growth experience of most African countries over the last decade than institutions will. However, if we look at the last five centuries of African development the relative importance of institutions will become larger. This means that comparing growth correlates with different degrees of time persistence is very tricky and need careful consideration before drawing policy implication from them.

A further implication of this is that the frequency of recording data matters. If we measure growth per month, commodity prices will be able to explain a far larger part of the variation than institutions will. However, if we measure growth per century the relative importance of institutions becomes larger. Research so far has almost exclusively used yearly measurements of GDP per capita or averages of these yearly observations for specific periods. This has the implication that the relative importance of growth correlates we have found so far could simply be driven by the fact that their dynamic over time is roughly correlated with that of our growth measurements. Research should control for alternative specifications of data frequency if it wants to come up with truly robust results. It might prove very difficult to compare the relative importance of two growth correlates with different levels of time persistence.

Lastly, the issue of sample periods and time persistence is further complicated by the interdependence of longer-run and shorter-run growth correlates. Pritchett and Werker (2012) hypothesized that the level of long-run growth correlates like institutions may have little influence on the level of growth, but it does seem to determine the volatility of growth figures. In the example of the USA and Swaziland we see that over the entire period average growth doesn't differ that much between the two countries, but the deviation from that average figure is much larger in Swaziland than in the USA.



This hypothesis is worth exploring further. If long-run growth correlates determine the volatility of growth, the most likely mechanism is that they influence the relation between shorter-run growth correlates and growth. A high level of institutions seems to dampen the amplitude of the boom-bust cycle, which most developing countries experience, into more stable moderate growth figures. The only way this can happen is when they change the timing and dynamic structure of the effects of shorter-run variables.

An example might clarify this point. A boom or bust in the world price

of cocoa affects cocoa-exporters differently based on the longer-run institutions that structure the economy. Graph 2 shows the comparison of GDP per capita development in Ghana and Côte d'Ivoire between 1960 and 2008 and how the price of cocoa, the major export product of both countries, developed over the same period. The relation between the price of cocoa is not only different in magnitude between the two countries, both react differently in timing of their reaction as well. The boom in cocoa prices in 1977 and bust in the years immediately after impacts Ghana faster than it does Côte d'Ivoire. The dynamics of the relationship are different due to differences in longer-run variables (some of which might be growth correlates, but some might not even have an effect on growth directly themselves).

Graph 2 also illustrates the relation between institutions and the volatility of the growth rate. The graph of Ghana shows quite well what an institutional reform can do for the stability of growth figures. After its Structural Adjustment Programme of the early 1980s Ghana grew at a very steady moderate growth rate. Côte d'Ivoire's growth on the other hand remained volatile and linked to the cocoa price. In Ghana the effect of booms and busts in the cocoa price on growth has been minimized.

The relationships and effects of this dynamic interdependence are virtually unknown within research. They do, however, have potentially major implications for policy advice. The effects of liberalization of trade policy for instance, can have very different (and possibly opposing) effect in countries with a different state of long-run determinants both in the timing as well as in the dynamic structure of the effect.

Pritchett (2000 p. 245-247) himself suggests several new approaches to growth analysis which have led interesting new research. His suggestion to take a closer look specifically at periods of sustained growth or of growth collapse have generated several empirical studies. Also the idea to look at the fundamentals of changes in growth rate has sparked new approaches. These take account of some of the problems identified in this paper, but not all.

The main aim of this paper is to urge economic historians not just to engage with the ideas and theories of economists, but also at the same time be critical of the methods employed to research these theories. Unfortunately, due to the scope of the paper, it has only been able to point out some of the difficulties that arise when the time dimension is more carefully considered. Development of new methods for identifying the optimal time scale, sample period and data frequency, as well as more intricate theories on dynamic interdependence remain for future work.

The issues raised in this article are relevant for all three classes of research being undertaken in the field of economic history. For trying to explain historical processes by economic models, these models should take into account the complexities that arise from dynamic interdependence. For testing economic models based on case studies found in history research should be careful in taking the sample period and data frequency into account. Too often these are driven by data availability, not theoretical foundations. For linking historical events and processes to current day outcomes careful consideration of the time persistence of growth correlates is needed. If we want to decompress history, as Austin proposes, to come to a more encompassing understanding of economic growth, methods should be developed that take more account of the time dimension of the growth process.

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