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China in the Global Economy: Failure and Success

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Abstract

China's present economic performance is frequently attributed to market reforms that have opened up the economy to foreign trade and investments. In this article we suggest that a historical comparative approach may cast new light on China's present success. In imperial China the power of the mandarinate put limits on equality of opportunity and development of human capital, factors crucial for modern economic growth. Reforms and structural change in agriculture and expansion of primary and secondary education during the planning system paved the way for a subsequent market-led economic growth by providing the social capability for China's economic catch-up.

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I. China in the Global Economy: Failure and Success

Few had predicted that steel would be a leading sector in another phase of economic growth in the global economy, as was evident from the surge in steel prices from 2004 up to the turn-around in 2008. Historically, steel had a leading role in the period of industrialisation in the Western economies in the decades before 1914. Steel also had a leading role in the 'Golden Age' after 1945, when Japan caught up with the industrialised countries of the Western world. Conversely, steel also had a heavy weight in the structural crisis that hit the mature industrial countries after 1975. Demand seemed to fall off permanently due to substitution with new materials and a widely held view was that the world had entered a phase of de-industrialisation. Such projections were of course far off the mark in view of the contemporaneous rise of the Asian NICs in the 1980s, but the financial crisis of 1997/98 tended to justify the verdict that the East Asian mode of industrialisation had been little more than a delusion. Booming steel prices (and oil prices) in 2004 signalled, however, something that by then had become all but too obvious, namely that under globalisation (of goods, capital flows and knowledge) industrialisation is a worldwide phenomenon. In this process China's leading role is undisputable, which is indicated not only by the fact that China's economy has experienced unprecedented growth rates since the early 1990s but also by the great impact this process has had on the markets for steel and petroleum.

China is, thus, increasingly becoming a leading player in the global economy, in fact, even to the point that in some quarters fears have been raised that China's (and now also India's) industrialisation will have a dangerous impact on the global environment by directly contributing to global warming and climate change. However, our concern in this paper is a different one, namely the question of why it has taken China so long to become a significant actor and competitor in the global economy. A straightforward answer would be that the economic reforms after 1978 have created a market economy in China and opened for foreign investments. However, other former planned economies have surely not been as high performing as China over the last two decades, despite implementing far more radical market reforms. In addition, other

countries in the Third world are not as successful as China, despite often having more open economies. Furthermore, and for our purposes more interesting, the present era is not the first period of globalisation but the fact is that it is not until the present that China appears to have been able to take full advantage of the opportunities of globalisation and openness. Thus, market reforms and globalisation are not sufficient as explanations of the Chinese economic transformation.

China's relative economic debacle was documented long before the advent of communist rule, not least in light of Japan's contemporary successful industrialisation and rise to regional economic, political and military predominance. Whereas Japan had completed its industrial break-through by 1914 China failed to benefit from the globalisation of the late nineteenth century and was gradually becoming wide open to the devastating consequences of Western and, later, Japanese imperialism. Then, why did China fail in the first wave of globalisation in the nineteenth century, whereas she has apparently succeeded in the late twentieth century? We suggest that in order to reach a fuller understanding of the present we need to apply a historical perspective that reaches over several centuries. Such a perspective implies that explanations for China's present success may be tested against explanations offered in regards to its historical development failure. For example, if the emergence of the market economy is suggested as an explanation for the present success, how come that a similar extension and integration of market economy transactions did not give rise to an acceleration of economic growth in the eighteenth and nineteenth centuries? Or did it? Was China, in fact, on the threshold to industrialisation and modern economic growth at that time?

The question of why the first industrial revolution did not originate in China is a classical one. In fact, in light of China's previous advancements, why did it not occur long before it took place in Britain? More precisely, why did China not achieve an industrial revolution already in the thirteenth century? This is *the Needham Puzzle*. Joseph Needham and collaborators have demonstrated that Chinese technology was well ahead of Western technology in medieval times.

The conventional wisdom has been that China, despite such achievements, after the thirteenth century stagnated and around 1500 was behind the West in technology, institutional advancement and also in regard to living standards.[1] However, recently this view has been questioned by scholars suggesting that the divergence in living standards emerged only after 1750 or even 1800, that is, with the industrial revolution in Britain. The question of the timing of the divergence is relevant here, because if China was on the threshold of an industrial revolution in the Middle Ages and still in 1800 matched the living standards in Britain, the failure to industrialise becomes puzzling indeed. On the other hand, if divergence is of older date, say, since 1500, then the roots of China's demise during the nineteenth century globalisation ought to be sought for in the divergent growth trajectories in the centuries preceding the industrial revolution in Europe.

So far we have just raised a number of big questions, in fact too many for any scholar to encompass in a single research project. However, this is an essay of historical interpretation combining the research, assumptions and findings of others. By applying a long view perspective one may avoid fatal mistakes in the present and in the future. The long view of economic history contributes to the understanding of the present globalisation in which China has gained such an important role. The rest of the paper tries to wind up these questions. The next section is devoted to the origin of the divergence between China and Europe. Although the contributions of the 'revisionist' view have come to cast new and interesting light on the issue we still find strong arguments in favour of the 'traditional' view. Section three and four proceed with the Needham Puzzle and we suggest some new nuances to the argument that missing human capital delayed the emergence of modern economic growth from medieval times in China. Section five returns to the twentieth century and we reinterpret the failure and success in light of China's social capability for modern economic growth. Section six concludes.

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[1] Maddison, "When and why did the west get richer than the rest?"

II. When did the divergence in living standards arise?

When did China fall behind Europe? Maddison argues that China's GDP per capita remained stagnant between 1300 and 1820, while in the same period the per capita income of Europe doubled. By 1950 per capita income of Europe was ten times higher than that of China. However, a number of scholars[2] have asserted that productivity and living standards in Europe and the East were on equal levels until 1750 or 1800. The most influential of these revisionists is Pomeranz whose argument can be summarised in a sequence of propositions. First, the argument goes, around 1800 Chinese living standards were on par with Europe. China's population was not living on the margin of subsistence since birth rates were lower than in Europe due to the fact that families practiced fertility control. Second, China's markets for land and labour are said to have been at least as efficient as the European markets. Mobility of labour was freer and property rights were enforceable. Third, according to Pomeranz, China had higher agricultural yields and was more advanced in utilising labour-saving technologies. Fourth, although China was on level with Europe, neither Europe nor China was prepared for an industrial revolution by 1800. Both regions remained basically pre-industrial with production growing at a rate barely above the growth of population. Fifth, and as a conclusion, England industrialised not because its market institutions were more developed or because it had higher agricultural productivity, but because it had access to cheap coal resources and vast unused resources in the New World.

Much of the debate has circled around the first two propositions, i.e. that living standards in China were as high as in Europe and that market institutions and technology were equally well developed, both implying that China by 1800 was not technologically or institutionally backward in comparison even with the most developed parts of Europe. In this perspective there was nothing inherently more advanced in Europe or England compared to China that can be said o have induced the industrial revolution. Thus, the industrial revolution in England occurred basically due to exogenous factors and as an abrupt change.

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[2] Frank, *Reorient…;* Pomeranz, 'Standards of Living…'; Bin, 'The Role of the State…'; Goldstone, 'Feeding the People, Starving the State'; Li, 'Farm Labour Productivity…'

Comparisons of living standards face several difficulties and it could be seen as less relevant if one is searching for the origins of modern economic growth. However, the level of living has been taken as an indicator of economic productivity and certainly there is some sort of relation. Thus, let's have a look at the debate. For Europe there are reasonably good data on day wages for workers in the building trade since the Middle Ages onwards.[3] Taken as they are the day wages indicate a decline over the period 1500-1800. However, other evidence, such as probate inventories, indicates rising living standards over the early modern period.[4] Moreover, it is not unproblematic to convert day rates into annual estimates, due to changes in the length of the habitual working hours and unemployment. For example, following the Reformation some fifty feast days were dropped and other changes also led to a lengthening of the annual working hours. Broadberry and Gupta adjust for this but the consequences are still a most moderate increase in the living standards of London building workers, about 10 per cent from the late sixteenth to the late eighteenth century.[5]

The standard of measure until recently was the grain value of wages. We will first have a look at these, and then turn to more accurate measures. The figures, provided by Broadberry and Gupta, are compared with Pomeranz's estimate of the purchasing power of male agricultural day labourers in the Yangzi delta, calculated in a way that admittedly allows for a positive bias (in this exercise Pomeranz is looking for the earnings differential between a weaver and an unskilled worker, so in order not to overestimate this differential that proceeding is justifiable).[6] Unfortunately, Pomeranz presents no time series but only an estimate for the Late Ming (1573-1644) and another for Mid Qing (1736-1850), thus including half a century after 1800. Anyway, with the purchasing power of the wages measured in grain calories and set at 100 in rural Southern England, the Chinese grain wage turns out to have been 87 in the Late Ming period, and

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[3] van Zanden, 'Wages and the Standard of Living…'; Allen, 'The Great Divergence in European…'

[4] de Vries, 'Between Purchasing Power…', 'The Industrial Revolution…'

[5] Broadberry and Gupta, "The Early Modern Great Divergence…."

[6] Pomeranz, *The Great Divergence* pp. 319-20.

only 38 in the Mid Qing. Even if the positive bias seems to be in the Chinese estimate this comparison gives no clear cut evidence that West had a lead around 1600. For example, Paris mostly was below Southern England and when adjusting for the urban-rural wage differential Western France was probably below Yangzi. But it appears that the divergence had gained some momentum in 1800. Thus the truth should lie somewhere in between the traditional and the revisionist view.

However, there are other problems in the interpretation of these data. The comparison considers unskilled labour for which a subsistence wage has been seen as the rule well into industrialisation (not only Smith and Marx agreed on this but also a neoclassical economist like Jevons). Of greater relevance would be if one could compare income distribution, but of course such direct evidence is difficult to come by. Basing himself largely on Chang's early study of Chinese income distribution[7] and Lindert and Williamson's study of Europe[8], Pomeranz in a recent paper argues that China's income distribution was, if anything less skewed than England's.[9] In 1900 some 2 % of the population (the gentry) had an assembled income of 24% in China's national income. Pomeranz assumes that these figures had remained largely unchanged since 1800 and compares them with Lindert & Williamson's estimates for England and Wales according to which 2% of the population owned 22 % of the national income. Based on another, but as we saw from the comparison of grain wages rather dubious, assumption that incomes of the poorest equalled those of the poor in England and the fact that land ownership was more skewed in England, Pomeranz infers that the average living standard in China at least equalled that of England. Li goes even further to argue that since Chinese average yields per hectare were higher, land ownership more even and fewer people chose to leave agriculture, China's living standard was clearly on par with Europe's. [10]

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[7] Chang, *The Income of the Chinese Gentry.*

[8] Lindert and Williamson, ' Revising England's Social Tables'.

[9] Pomeranz, 'Standards of Living…'

[10] Li, 'Farm Labour Productivity…'

A problem with this conclusion is that it might underestimate the role of urbanisation and structural change. In England the employment outside agriculture was already by 1760 equal in numbers to those employed in agriculture, that is, about 50 per cent of total employment. Although rural living standards may not have been terribly lower in China, the share of the agricultural population was much larger than in England. This would indicate that a larger share of the lower incomes was retained in the agricultural sector, which in turn would be an indication of a smaller surplus capacity. Thus, in China a much larger share of the working population was required to feed the nation. In the terminology of Arthur Lewis this means that China's economy was less developed than England's. [11] In addition, the revisionists seem to assume that he fact that people stuck to their land is an indication that they had no reason to find alternative means of livelihood because they were reasonably well-off already. This is a conclusion, which is surprisingly ignorant of what we know of the behaviour of present day peasantries in the Third world. In fact, it is often the lower segments of the peasantry, those with very small plots of land that stick to their land simply because this is the only means of security available. Thus, staying in agriculture may just as well be a risk minimising strategy under conditions of economic stress as a sign of relative well-being.

An alternative approach to measuring living standards is shown by Broadberry and Gupta, who do not envisage the amount of grain a wage could buy as an adequate measure of the general living standard. For example, within Europe during the sixteenth to the eighteenth centuries the wages of both skilled and unskilled workers in Poland could buy the greatest amount of grain. So measured Southern England was the most destitute area in Europe in the seventeenth century, from Krakow and Vienna in the east, Florence and Valencia in the south. If, instead, the purchasing power is measured with a basket of consumption goods, the map is turned with the

[11] Lewis, 'The State of Development Theory'

living standards rising towards the Northwest of Europe, with Antwerp, Amsterdam and London in the top and pulling ahead over the centuries after 1500. [12]

A similar pattern is derived when wages are measured according to their silver content. Silver wages in Europe did not rise the most in Spain or Portugal, the major ports for the inflow of American bullion, but in the more developed countries in Northwestern Europe. This reflects the higher level of productivity that can also be seen in the real wage as measured with the basket of consumption goods. Missing a comparable basket of consumption goods for China, Broadberry and Gupta suggest that the silver wage can be used for the same purpose.[13] This involves the assumption that the real and nominal exchange rates of silver are equal. Since we deal with the very long term this is not too brave an assumption, as is also argued in some detail by the authors. So measured, and if the London silver wage is set at 100 in both periods, the Yangzi agricultural wage was 39 in Late Ming and had decreased to 15 in Mid Qing. These differences are significantly greater than those that existed within Western Europe. On the basis of this evidence Broadberry and Gupta suggest that China, as also India, in the Early Modern period was more on level with Eastern and Southern Europe over the centuries up to the Industrial Revolution just as these regions lagged further behind Northwestern Europe.

The conclusion of Broadberry and Gupta is largely corroborated by Allen *et al.* (2007) who extend the comparison both with more comprehensive wage data, including major Chinese cities and industrial centers such as Beijing, Canton, Suzhou and Shanghai, as well as typical baskets of consumption goods. Considering the internal differences in China these authors play down the leadership of the much focussed Yangzi Delta, finding that Beijing and Canton had almost the same level. However, even if the Chinese real wages in the eighteenth century were comparable with the bottom level in Europe, said to be held by Italy, they were far below Northwestern Europe. Taking account of the cost of living, Pomeranz' textile was not able to

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[12] Allen, 'The Great Divergence in European…'; Broadberry and Gupta, 'The Early Modern great Divergence…'

[13] Broadberry and Gupta, 'The Early Modern great Divergence…', 'Monetary and Real Aspects…'

sustain a family. If both spouses worked, however, "a family could survive on that, so long as nothing went wrong, but the standard of living was far behind that in London or Amsterdam where the labourers earned four times the cost of a bare bones standard of living in the middle of the eighteenth century."[14]

III. Causes of China's failure

A number of explanations have been offered to account for the divergent paths of China and Europe since medieval times. It is interesting to note that to some extent many of these explanations appear in modern disguise but are now used to explain the current growth experience. Let us briefly look at some of them.

One explanation, one which is popular among laymen and economists alike, focuses on cultural factors. This follows from the Weberian tradition that holds that economic life is conditioned by cultural factors, either by hegemonic systems of belief that constrain individuals and groups in their behaviour or by political, legal and institutional frameworks that determine the playground for economic actors. By focusing on the role of belief systems Landes and Lal,[15] among many others, maintain that European culture fostered individualism and rational thinking since the beginning of the last millennium, whereas Chinese culture nurtured authoritarianism and irrational and arbitrary rule. Differences in religious beliefs, family life and political systems produced the divergent paths of economic growth. Landes claims without hesitation that for the last thousand years Europe has been the prime mover of development and modernity. While this view has not escaped devastating criticism it has appeared, albeit in a different shape, in current explanations for China's economic metamorphosis. The other side of Confucianism, i.e. dexterity and loyalty (to the nation, the employer etc) is frequently brought forward as factors particularly conducive to modern economic growth, notably in combination with the gradual emergence of western capitalist institutions but sometimes also in alliance with the notable stability offered by

[14] Allen *et al.*, 'Wages, Prices and Living Standrards in China, 1738-1925...'

[15] Landes, *The Wealth and Poverty;* Lal, *Unintended Consequences…*

the political system. Since this approach can be used to account for either failure or success depending on the historical circumstances at hand it is utterly ad hoc and devoid of explanatory value unless we are more specific about what is meant by institutions.

A second, and related explanation, focuses on state-market relations. The commonly held view (from Marx to Wittfogel) was that Imperial China's centralised political and economic system was a brake on the division of labour and the rise of market forces. In early modern Europe the emergence of private property rights and the rise of an independent landowning class fostered rivalry to the reigns of power within nations and the rise of nation states promote competition between nations. It is emphasised that in China, on the other hand, development remained constrained by a centralist imperial power managed by an all-embracing bureaucracy. Private property rights allegedly were non-existent (as in Marx's Asiatic mode of production) or poorly protected. Similar views are not unheard of today, when China's rise to industrial hegemony is explained in terms of decentralisation and dismantling of the state planning system on the one hand and a booming private sector on the other.

In its historical version this view is clearly at odds with the facts. For several centuries the imperial bureaucracy appears to have been quite efficient in promoting agricultural development in the sense that a growing population could be provided for, although yields per capita may not have risen. Perdue argues that under Qing the state helped agriculture by investing in water conservancy, encouraging land clearance and by keeping order so that traders and peasants could do their work without fear. Perdue calls this the ideology of 'agrarian developmentalism'. [16] In the same vein the view that European states were less predatory appears equally dubious. In fact, measured in terms of the frequency of rebellions and uprisings there appear to have been few differences between China and Europe between 1750 and 1850. In many parts of Europe property rights of the peasantry remained poorly protected as well, at least before the 18th century.

[16] Perdue, 'China's Environment…'

The control system in China may have been a brake on market integration and trade-led, so-called Smithian growth. However, the real demise of China's agriculture coincides with the period when the bureaucratic control system begins to loosen up due to the rapid population growth and the growing power of a new landowning class, i.e. from 1750 onwards. This was also a time of growing market integration. In regards to this period Li and Goldstone argue that China went though an agrarian revolution.[17] Labour productivity and output per family rose which fuelled a boom in population, consumption, manufacturing and trade. As the argument goes it was institutional and technological improvements that instigated the dramatic population growth that followed. While Li appears to regard this as a dynamic force that kept China moving towards modernisation Goldstone appears to se the expansion as 'a one-time burst in labor productivity'. According to Goldstone, 'as demographic momentum led to further population increases, Chinese peasants could not readily boost output per capita by further intensification. Rather, from the late 1700s and early 1800s, declines in output per capita would have begun and then continued, leading to the poverty evident by the early 20th century after a period of comparative riches in the 18th.'[18] Thus, in this perspective China's decline was already underway by 1800 in spite of its relative prosperity vis à vis Europe and its previous technological and institutional improvements.

A third and closely related view stresses the role of openness to international trade. Whereas Europe developed into an integrated economic system, which was to include the Americas, China remained an inward looking empire held together by administrative rule. Wallerstein argues that it was the European path that led the development of the global capitalist system.[19] A major weakness in this argument is that it defines the capitalist economy merely in terms of a system of trade relations. In doing so the theory has to fall back on the assumption that Chinese foreign trade had been minimal ever since medieval times. Later historical research has seriously questioned this assumption and shown that Asian intra-regional trade was extensive

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[17] Li, 'Farm Labour Productivity…'; Goldstone, 'Feeding the People, Starving the State…'

[18] Goldstone, 'Feeding the People…' p. 7.

[19] Wallerstein, *Modern World System.*

already in pre-industrial times.[20] So, in case there are differences between the European world economy and the Asian (Chinese) world economy it surely has to be determined by factors other than simply the extent of international trade. Today openness is taken to be a fundamental trait of the reform period. Indeed, China's export growth record is amazing and since the 1990s it has become customary to describe China's economic development in terms of export-led growth. However, historically, openness to foreign trade was never a panacea for growth in China and in case trade is the engine of current growth the factors that have made China benefit from foreign trade and globalisation, possibly for the very first time, need to be explained.

The last important explanation for China's historical failure to develop concerns the question of why China remained technologically backward while Europe developed a science-based technology that was put to use in the emerging mechanised industry. This is the so-called *Needham Puzzle* mentioned above. The issue of China's technological backwardness is, in fact, a core question around which all other explanations are revolving. The issue is also closely connected to the question of productivity and surplus capacity in the China's agrarian economy. Elvin characterizes China as being caught in 'the high-level equilibrium trap'.[21] Due to a rich supply of labour, agriculture was labour intensive but with high land productivity. It thus managed to feed the huge population but the surplus was not enough for increasing the capital intensity or for pushing labour out of agriculture into industrial production. Hence, large numbers of people could be fed, but at the same time this required large inputs of labour.

A similar argument is forwarded by Huang who maintains that the rice producing economy of the Yangzi Delta was locked into 'involutionary growth'.[22] In fact, Huang argues that it was not until the 1980s that a transformation began and substantial margins over subsistence could be produced, i.e. real productivity improvements did not occur before the advent of the market reforms. Grain production increased about fivefold between 1400 and 1820, which was

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[20] Arrighi, Hamashita and Selden, *The Resurgence…*; Frank, *Reorient…*

[21] Elvin, *The Pattern of the Chinese Past.*

[22] Huang, *The Peasant Family…*

just slightly ahead of the population growth. In addition, in this system the farmers were under great pressure to find ways of raising yields per hectare since there were few alternative sources of income. There were no available forest resources and no commons as in Europe. Furthermore, the rate of urbanisation was slow although Chinese cities were generally larger than the European towns in pre-industrial times.

One problem with this approach is that it builds on a Malthusian model in which population growth is the source of change and where only so called positive checks constrain population growth. Recent research has cast doubt on the exceptionalism of the Western European demographic pattern, the proposition that it was only in Europe that people in historical times deliberately used preventive checks to balance the size of the population.[23] Moreover, as pointed out by Justin Lin 'the high-level equilibrium trap' cannot match the historical record of technical change in Chinese agriculture with the great swings in population numbers. 'If the man-to-land ratio were the valid explanation for the burst of labor-saving innovations up to the twelfth century, then that rate should have been even higher in the fourteenth and fifteenth centuries and again in the mid-seventeenth century'. [24] Against Elvin's demand related model of technological change, Lin puts forward the supply of human capital as the crucial factor.

The Industrial Revolution marked a fundamental divide between, on the one hand, historical periods of temporary economic growth that were interrupted by backlash and diminishing population and, on the other hand, what Simon Kuznets called modern economic growth. In the words of Kuznets 'the significant characteristics of the rises associated with modern economic growth are the large and rapid shifts that occur in the structure of an economy – in the relative importance of various industries, regions, classes of economic units distinguished by form of organisation, economic classes, commodity groups in final output and so on'.[25] These

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[23] Lee and Wang, *One Quarter of Humanity…*

[24] Lin, 'The Needham Puzzle…' p.274.

[25] Kuznets, 'Economic Growth and the Contribution…', p. 104.

shifts are not only conditions of the process of economic growth, but also part of the very dynamics of the process, thus warranting its sustainability.

China's economic growth in historical times was superior to Europe's in the sense that production techniques were developed to provide for a very large and growing population. It proved far less efficient with respect to taking the step into modern economic growth, i.e. a sustained increase in output per capita. Modern economic growth is a cumulative process that is sustained over the very long-term, as demonstrated by the history of the past two centuries. Useful knowledge, improved by science, is a key to this on-going, cumulative process. Lin builds hereupon when he suggests that the industrialisation required an advance from experience-based to science-based knowledge. In a society with experience-based knowledge, a huge population is an advantage since the greater is the probability for technical improvements. This may explain China's historical wealth in pre-modern times. However, in order to achieve sustainable (modern) economic growth with increasing income per capita, the experience of the masses has to be superseded by experiments along scientific lines and with the mathematisation of knowledge.

Then, why did the pre-industrially advanced China not take this critical step? Joseph Needham's argument is that China stagnated due to its failure to develop modern science. Several authors have tried to explain this failure with arguments focussing on the institutional setting, such as imperial inward looking state power and the bureaucracy, or cultural factors that allegedly have suppressed science. Lin reminds us that European contemporaries like Copernicus and his followers were persecuted as well. Rather, according to Lin, it was the missing economic incentives for individuals to accumulate human capital that was decisive for the stagnation of science. He is thereby adding an aspect to Needham's argument that the mandarin bureaucracy was a dead end for the educational system. Although Lin does not clearly elucidate this aspect we suggest that the exclusiveness of knowledge in China, as the preserve of the mandarins, caused the insufficient supply of human capital and thereby the failure to develop modern technology. In Europe education opened up opportunities, at least for some of the talented, and science developed both in parallel and in opposition to theology. In China the old examination system

remained a formal institution until 1905. We suggest that this is an important amendment to Justin Lin's explanation of the Needham Puzzle. It was not missing economic incentives in the form of alternative careers to the state bureaucracy but the *exclusiveness* of the higher education that did not force the graduates to look for new opportunities. There was a missing dynamism in the scholarly world that is of interest to further discuss because it is of relevance also today. As pertinently expressed by Joseph Needham: 'The institution of the mandarinate had the effect of creaming off the best brains of the nation for more than 2000 years into the civil service.'[26]

However, Justin Lin is superficial in emphasising the missing economic incentives for alternative careers. The problem was not that scholars did not turn entrepreneurs but that they did not create modern science. We will come back to how modern science propagated modern economic growth. Here should be underlined that modern science would be unthinkable without *open science*. In the Chinese mandarinate science and technology developed to a remarkable extent in secrecy with a personal transmission of knowledge which inhibited its broader diffusion.

In combination with the exclusiveness of the educational system this points at a very important characteristic of historical China, namely a fundamental and deeply rooted social *inequality.* This inequality fundamentally contributed to the institutional structure of China in pre-modern times. It should be remembered that institutions cannot be defined only in terms of formal arrangements for protecting private property rights, securing transactions and monitoring contracts. Institutions enhance and constrain human interaction in all kinds of activities. The role of institutions in modern economic growth can, in the language of Kuznets, be understood largely in terms of egalitarianism, which is meant a denial of inborn differences among human beings and a distribution of rewards according to accomplishments rather than by social status. Egalitarianism can be expressed in the sum of the equality of rights and opportunities that accrue to individuals in a society. *Equality of opportunity* focuses on the possibilities of individuals to improve her life conditions and *equality of rights* concerns the formal institutional set-up. Equality of opportunity is thus closely related to individual *capabilities* (such as the possibility to

[26] Needham, *The Grand Titration…*, p. 39.

acquire knowledge and specific skills) but it also concerns access to, and distribution of, property and, not least, the possibility to derive an income from property. Equality of rights is related to the protection by law of individual civil rights.

Good institutions, that is, institutions conducive to modern economic growth, are those that not only can protect property rights but also provide relatively equal access to resources. Thus, good institutions enhance not only equality of rights (property rights) but also equality of opportunity (distribution of resources and capabilities). The distribution of resources is fundamental in the shaping of institutions. When a specific group is wealthy relative to others this will increase its political power and enable it to promote and protect institutions that are favourable to its own interests. Thus, in inegalitarian societies institutional change is likely to occur only due to exogenous shocks.

The point we want to make is that the institutional structure of pre-modern China was a reflection of huge inequalities at the same time as it served to perpetuate inequality. The institutional structure was particularly important with regard to land distribution and access to education. With regard to land distribution, inequalities rose dramatically from 1750 onwards. The capacity of the paternalistic state declined and the position of the landowning gentry was strengthened. At the same time the rapid population growth created a class of landless, or semi-landless people, who in want of rights and resources, instigated numerous rebellions and uprisings. It seems that political institutions from that time onwards served the interests of the gentry. The revisionist school has a point in directing attention to the fact that while income inequality in England was high and rising in the 18th century, China went through a process of equalisation of land distribution. But by the end of the 18th century large segments of China's rural population lacked resources and skills, i.e. they lacked the means necessary for achieving sustained productivity improvements. On the other hand, those who had the means, and for whom the educational system as reserved, the gentry, appears to have been less interested in paying attention to agricultural development than the imperial bureaucracy.[27] In England too the gentry

[27] Moore, *Social Origins…*

appears to have been a conservative force, but here it should again be remembered that the relative size of the urban sector was considerably larger than in China. So, while the Chinese gentry in an effort to protect its vested interest became elitist and gradually militarised a large portion of the rural population was marginalised and excluded from access to resources (land) and were denied equality of opportunity (education). Consequently, the institutional structure of China around 1800 appears not to have been particularly conducive to modern economic growth. When the country was exposed to a series of natural disasters (floods and droughts) in the early 19th century the state appears to have had limited resources and powers to intervene.

IV. Failure and success of modern economic growth

The consequences of the missing human capital for the Chinese failure to industrialise can perhaps be best understood through the European mirror. Actually there is no consensus about the importance of human capital and knowledge for the British Industrial Revolution, and several authors have argued that science became crucial first at a later stage of industrialisation with steel, electricity and the combustion engine. However, that may be due to a not particularly appropriate perception of knowledge, science, and technology, which is not even fully overcome in Justin Lin's division between popular experience-based and scientific experiment-based technology. In an analysis of the role of 'useful knowledge' in the British Industrial Revolution, Joel Mokyr distinguishes between 'prescriptive knowledge' and 'propositional knowledge.'[28]

There are similarities with Lin's division between experience-based and experiment-based knowledge, as well as with the conventional division between 'empirical knowledge' and 'scientific knowledge' but both these divisions are unclear about the functional difference. Prescriptive knowledge is about how to do things, such as techniques and rules of thumb. Propositional knowledge explains why things work in the way they do. A discovery is thus an addition to propositional knowledge, whereas an invention adds to prescriptive knowledge. For

[28] Mokyr, *The Gifts of Athena…*

technology to progress cumulatively, there must be a two-way positive feedback mechanism between prescriptive and propositional knowledge, otherwise prescriptive knowledge will eventually face sharply diminishing returns, and technical change and economic growth will come to an end. Under the European *ancient regime* institutions such as the guilds had posed a negative feedback that erased the accumulation of useful knowledge.

Economists and economic historians have often emphasised the importance, for modern economic growth, of patent legislation that enforced property rights to the intellectual domain. In general new prescriptive knowledge has remained exclusive, that is, not free for everyone but protected through secrecy and patents. However, had that been the whole picture modern economic growth would not have been sustained. During the early modern period there emerged learned societies, for example agricultural societies, even in peripheral parts of Europe that worked for the diffusion of prescriptive knowledge.[29] According to one estimate there existed some 2500 such societies in the period 1500 – 1850 in Europe.[30] To these we could add the emergence of learned journals following upon improvements in the printing technology, which became building blocks in an institutional framework that created a positive feedback mechanism between propositional and prescriptive knowledge.[31] The European scientific revolution of the seventeenth century had already brought propositional knowledge to the public domain. Provided the very feeble enrolment in higher education before the twentieth century, the extent to which propositional knowledge trickled down in the population was of course insignificant. But of importance was that propositional knowledge became the issue of open intellectual intercourse and that scientific method, scientific mentality and scientific culture diffused with the Enlightenment.[32] That is the historical appearance of Lin's experiment-based knowledge.

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[29] Ljungberg, 'Introduction…'

[30] David, ' From Keeping "Nature's Secrets"…'

[31] Israel, *Radical Enlightenment*, ch. 7.

[32] Jacob, *Scientific Culture…*; Headrick, *When Information Came of Age…*; Mokyr, *Gifts of Athena…*; Jacob and Stewart, *Practical Matter…*

It is important to add that it took a long time before these changes materialised into modern economic growth. Recent research has emphasised that the British Industrial Revolution was not a sudden take-off but a gradual process with slowly accelerating growth. This view has been difficult to reconcile with the pessimistic view on the development of European living standards 1500-1800, based on the grain wage story referred to above, since this view envisages a sudden break with a Malthusian economy. However, with van Zanden's and Broadberry and Gupta's reinterpretations of the real wages the pieces fall into place: the East-West divergence by 1500, the very slow pre-modern growth over centuries, and the modern economic growth after 1800. Neither in China, nor in Europe was coke processed iron, the printing press and mechanical weaving sufficient for modern economic growth. A further advance to sustained growth was due to the positive feedback between prescriptive and propositional knowledge and the creation of human capital that followed. In this light '[T]he true question of the Industrial Revolution is not why it took place at all but why it was sustained beyond, say, 1820'. [33]

V. Restoration of China's social capability

While Europe and North America industrialised in the footsteps of England in the course of the 19th century and the global economy was rapidly becoming more integrated Asia, and China in particular fell increasingly behind. Nineteenth century globalisation turned out utterly disastrous for China, even to the point that the decline is sometimes ascribed primarily to the effects of foreign imperialism. With few exceptions[34] there seems to be agreement that China's problems were fundamentally related to the country's agricultural stagnation throughout the 19th century up to 1949. Attempts towards industrialisation remained regionally limited and by the advent of communist rule it as still accurate to describe China as a backward agrarian economy.

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[33] Mokyr, *Gifts of Athena…* p. 31.

[34] Rawski, *Economic Growth in Pre-War China…*

Today, the situation is reversed. China's industrial sector is challenging the West for leadership and at least in more developed regions the agrarian economy is flourishing. What are the explanations for this reversal of misfortune? An instinctive, and as good as trivial, answer would be found in the economic reforms that after 1978 have laid the foundations of the market economy in China and opened up for foreign investments. Changing state-market relations have led to a downsizing of the government sector and dismantling of state-owned enterprises alongside the rise of private enterprise, foreign as well as domestic. In combination with an increasing degree of openness to foreign trade and capital markets, not least by China's entry into the WTO, China now appears to carry many traits of the ideal model of a market economy. In fact, although the role of the state remains considerable in terms of ownership and regulation of labour and capital markets it appears that China's economy is decisively more open than was the case in the Asian forerunners Japan, Korea and Taiwan during their industrial ascendancy. Thus, in this perspective it is understandable that concerns about China's prospects of future progress tend to revolve around issues of institution building, e.g. protection of private property rights and the setting up of a regulatory framework for the private sector.

However, there is more to the story. China's rise did not come as a bolt from the blue. We have argued that historically China had two fundamental characteristics: slow or non-existent growth of labour agricultural productivity and incapacity to develop or absorb modern technology. Today, we instead have to explain precisely the reverse, the sources of the dramatic productivity improvement in agriculture after 1978 and the fact that China is now extremely apt to take on and develop the most advanced technologies. The opportunities created by the market reforms are absolutely crucial but they are not sufficient as an explanation. According to neoclassical economics market economies should converge towards the same income level and rate of economic growth, even if they start from different levels. However, the historical record shows another pattern, both with many poor countries lagging behind and also with other countries that converge only during certain periods. In search for the conditions which make a poor country catch-up with richer countries and bring about convergence, Moses Abramovitz

used the concept *social capability*.[35] Social capability is composed by diverse elements or factors that make an economy capable to exploit the opportunities that are provided by the productivity differential to a leading economy. Basically, what is required for a catch-up is an ability to import and exploit a more advanced technology. The stock of human capital is clearly of fundamental importance for the social capability of an economy, but for a fuller understanding human capital must be perceived in a larger context. We have highlighted the lack of human capital in old China and its connection with a profound inequality concerning opportunities and rights. These were the roots of China's historical failure to develop modern economic growth, and it is a transformation in these respects that has opened up for the present success.

As we have seen the core of China's agrarian crisis were the unequal distribution of assets (land) and capabilities (skills) and the fact that the institutions for protection of property rights were reserved for the well-to-do and largely excluded the lower strata of the rural population. A huge and growing peasantry lived under increasingly intolerable conditions when growing numbers had to be fed on increasingly scarce resources. The CCP government put a drastic end to these inequalities, by eradicating the gentry. Egalitarianism by means of equal distribution of land was thereby achieved. However, the government adopted the Stalinist model of forced industrialisation and for that purpose the surplus potential of agriculture was insufficient and had to be raised. The regime in fact restored the early Qing strategy of agrarian developmentalism by promoting land clearance, water conservancy and new agricultural techniques. The strategy was, however, largely the same as the traditional one, to raise output by putting in more labour. It appears that between 1955 and 1978 grain output per capita rose only slightly, from 303 to 318 kgs per capita.[36] Still, in this period its was possible to finance a large scale industrialisation programme by squeezing the peasantry, which must have meant that rural

[35] Abramovitz, 'Rapid Growth…', 'The Elements…'

[36] Perdue, 'China's Environment…'

living standards remained appallingly low not only relative to urban workers but also in an absolute sense.

Two problems were distinctive for this period. First, although land distribution was egalitarian the peasantry was denied property rights. The farmers had no rights to the land they were tilling and they were not allowed to retain any part of the income derived from the land. In addition, the peasantry were tied to the villages and denied the right to leave. Secondly, the strategy was anti-trade oriented, not only vis a vis the external economy but also internally. The emphasis on self-sufficiency led to decisions concerning resource allocation that were far from optimal.

The agrarian reforms after 1978 entailed great changes of this system. In fact, it might be taken as the first period in China's economic history that the agrarian economy undergoes a transformation that is fundamentally based on a sustained increase in labour productivity. Farmers were given de facto property rights by being allowed to retain a large proportion of the available surplus for consumption, saving and investment. This may have rescued China's agriculture from falling back into the Malthusian trap in the same way as happened around 1800. Thus, the reforms were necessary for achieving private accumulation, productivity improvements as well as a release of labour to other sectors. China's economic miracle in the 1980s is largely the story of the so-called TVEs (Township-Village Enterprises), the expansion of which could not have been achieved without these reforms.[37] It may be questioned, however, if the same reforms would have had similar effects under different historical circumstances, e.g. in the 1920s or 1930s. Although inequality is said to be sky rocketing, it is probably not anywhere near the conditions in the period between 1800 and 1949 when large segments of the population were denied access to productive assets and in want of productive capabilities. Thus, the initial equalisation of land ownership may have been a necessary precondition for the success of the subsequent market reforms. Without the development during the preceding decades the effects of the reform policy should have been seriously constrained and marginalisation among the peasantry much more extensive.

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[37] For a discussion, see Pei, *The Institutional Root of China's Rural Industry...*

Table 1 Enrolment in primary and secondary education

	1960	1970	1978	1991
China:				
Primary	102	89	93	123
Secondary	n.a.	24	51	51
India:				
Primary	61	73	79	98
Secondary	20	26	28	44
Other low-income:				
Primary	46	55	74	79
Secondary	6	13	20	28
Middle income:				
Primary	79	93	95	104
Secondary	16	32	41	55
High income:				
	114	106	100	104
	68	73	89	93

Source: World Development Report 1981, 1994.

Note: 'High-income countries' in 1960 and 1978 comprise 13 industrial market economies, and in 1970 and 1991 23 economies.

The transformation of the agriculture contributes to the social capability of the Chinese economy through providing access to opportunities to a large part of the population. Another contribution to the social capability has been provided by the substantial efforts after 1950 to raise the level of human capital. Already, in 1960, the first year for which the UNDP World Development Report gives enrolment figures, China had, as the only low-income country, achieved universal primary schooling. Table 1 reports comparative figures on enrolment in primary and secondary education. Since the number of pupils in primary education is compared with the population at the age of 6-11, the enrolment may well be above 100 if primary education comprises more than six classes. Enrolment in secondary education shows the share in such schools of those aged 12 to 17. In the turbulent 1960s and 1970s the Chinese enrolment in primary schooling decreased slightly, but nevertheless secondary schooling advanced. There is no figure for 1960, but in 1970 enrolment in secondary education was already 24 per cent, when the figure for India was 26 per cent and only 13 per cent for other low-income countries. In 1978 China's enrolment rate had more than doubled to 51 per cent in secondary education, whereas there was only an insignificant increase in India and other low-income countries were clearly behind.

There can be little doubt that investments in the educational system have been imperative for boosting individual capabilities on large scale. The investment in secondary education is particularly impressive and probably a key to China's great capacity to import and adopt modern technology. This is indeed a remarkable change vis a vis pre CCP China when the educational system was exclusive and unavailable to a large share of the population. Surely, the effects of these investments have come into bud during the reform period, particularly in the period of globalisation of China's economy the 1990s. However, no one can seriously argue that the market reforms lay behind these investments in education, although of course the negative effects of the cultural revolution on higher education were remedied as a result of the new policy regime after 1978. However, for an economy such as China's in the 1960s, 1970s and 1980s investments in

primary and, especially, secondary education are crucial. Thus, it seems that those investments were to a large extent already in place on the eve of the reform process.

VI. Concluding remarks

Despite the use, already in the Middle Ages, of technologies that usually are seen as elements of industrialisation, China did not manage to achieve modern economic growth until rather recently. We have argued that, basically, it was a lack of human capital that halted a further development of technology during several centuries. Of course, China had an institutional setting that constrained the formation of human capital but the critical point is that more human capital would have pressed for institutional change. In Europe such a change took place in the wake of the scientific revolution in the sixteenth century. Gradually a positive feedback mechanism between science or propositional knowledge and production technologies, or prescriptive knowledge, was created and thereby economic growth became a sustainable process. Research during the last decades has rejected the view that the British Industrial Revolution was a sudden take-off, and emphasised that the change-over to modern economic growth was a long drawn-out process. A similar picture has evolved for other early industrialisers in Europe. This picture is further corroborated by a thorough assessment of real wages in northwestern Europe, showing a significant growth over the period 1500 to 1800, and by the growing urbanisation in these centuries.

According to some scholars the more developed regions in China, as well as India, and Europe were on equal productivity levels in 1800. However, in some respects China seems to have been mature for an Industrial Revolution already in the Middle Ages. It is difficult to reconcile the conception of a gradual growth in Britain and Europe with the view that the divergence between the East and the West began only from the nineteenth century. Then China would have been staying at that high level for centuries, or decreasing from an even higher level. Even if that was the case and the lack of human capital ultimately constrained a change to modern economic growth such a development seems less plausible.

Eventually China entered modern economic growth. The reform of 1978 was necessary for the ensuing high performance, but it was the transformation of agriculture and expansion of education during the preceding decades that lifted the historical constraints on development. Historically, it was the huge inequalities in the distribution of productive resources and access to education that were a brake on technological development. During the last 50 years a broadening of the access to opportunities has raised the level of human capital and created the social capability which made it possible for China to take full advantage of the present wave of globalisation.

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