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Higher education in East Asia and Singapore: rise of the Confucian Model

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Abstract The paper reviews Asia–Pacific higher education and university research, focusing principally on the "Confucian" education nations Japan, Korea, China, Hong Kong China, Taiwan, Singapore and Vietnam. Except for Vietnam, these systems exhibit a special developmental dynamism—still playing out everywhere except Japan—and have created a distinctive model of higher education more effective in some respects than systems in North America, the English-speaking world and Europe where the modern university was incubated. The Confucian Model rests on four interdependent elements: (1) strong nation-state shaping of structures, funding and priorities; (2) a tendency to universal tertiary participation, partly financed by growing levels of household funding of tuition, sustained by a private duty, grounded in Confucian values, to invest in education; (3) "one chance" national examinations that mediate social competition and university hierarchy and focus family commitments to education; (4) accelerated public investment in research and "world-class' universities. The Model has downsides for social equity in participation, and in the potential for state interference in executive autonomy and academic creativity. But together with economic growth amid low tax regimes, the Confucian Model enables these systems to move forward rapidly and simultaneously in relation to each and all of mass tertiary participation, university quality, and research quantity and quality.

Keywords Comparative education · Asia–Pacific · China · Confucian tradition · National systems · Role of government · Private funding · Research

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Introduction

On 1 February 2010 Yale President Levin (2010) spoke at the Royal Society in London on higher education in the Asia–Pacific. "At the beginning of the twentyfirst century, the East is rising", said Dr Levin. This "has altered the balance of power in the global economy and hence in geopolitics. The rising nations of the East all recognize the importance of an educated workforce as a means to economic growth and they understand the impact of research in driving innovation and competitiveness". Higher education systems in North America and Western Europe are watching the emerging Asian systems with a mix of excitement and apprehension (Times Higher 2010). "The East"—or "Asia" or "Asia–Pacific"—is seen both as the rival of "The West" for global primacy and a fecund source of options for collaboration. But in charting the new global landscape in higher education (Marginson and van der Wende 2009) it is necessary to differentiate the vast and varied terrain of the "East" and identify the drivers at work. Not all of "The East" is "rising" rapidly.

The paper follows common usage by centering "Asia–Pacific" on the sub-regions shaped historically by China and India: East Asia, Southeast Asia and South Asia; that is, littoral Asia facing the Pacific and Indian Oceans (see inclusions in Table 2). This region also abuts the Western Pacific including the British foundations in Australia and New Zealand. These are distinct from Asia in governmental, business and civil cultures but moving closer to Asia in economy and demography. The main purpose of the paper is to explain the dynamics of the "rising" or "risen" higher education systems of the "Confucian" education zone—East Asia in Japan, Korea, China, Hong Kong China and Taiwan, plus Singapore in Southeast Asia.

Asia–Pacific as a whole

Table 1 shows that between 1991 and 2007 there was massive growth of tertiary students in East Asia and South Asia, constituting the platform for the broad-based evolution of modern societies and knowledge economies in many countries. Taking East Asia, South Asia and West Asia together, the absolute number of tertiary students more than tripled (UNESCO 2010). In East Asia and the Pacific the rate of tertiary participation grew faster than in most other regions and has reached the world average (Varghese 2009, p. 8).

The growth of educational participation in Asia is especially significant because of its global scale. McKinseys estimates that in each of China (1.3 billion people) and India (1.1 billion) the middle class could reach 500 million by 2025, multiplying three or four times (Altbach 2009, p. 181). If the educated population in China and in India reach the average OECD level of tertiary participation—which is quite likely in the case of China—the pool of educated labour will be almost three and a half times the size of the pool from North America and Europe (Willekens 2008, p. 118). On top of this Southeast Asia has another 0.6 billion people.

In research the aggregate picture is again one of dynamic change. From 1995 to 2007 the number of internationally published science and technology[1] papers from Asia grew by 141.8%, from 76,922 to 1,67,389. Papers from the European Union increased by 25.5% to 2,45,852, and in the United States by 8.5% to 2,09,695. Asia's share of world science papers jumped from 13.6% in 1995 to 22.1% in 2007 (NSB 2010, A5–25). The annual Shanghai Jiao Tong University ranking measures comparative university performance in

[1] Includes social sciences.

Table 1 Tertiary students by world region, 1991 and 2007

	1991 Millions	2007 Millions
East Asia and the Pacific	14	47
South and West Asia	6	20
Central Asia	2	2
Arab States	2	7
Western Europe and North America	26	34
Central and Eastern Europe	10	21
Latin America and the Carribean	7	18
Sub-Saharan Africa	1	4
World	68	153

Source UNESCO Institute for Statistics

research and has become a key indicator of the knowledge economy (Hazelkorn 2008).[2] Between 2004 and 2009 the number of "Asia/Pacific" universities in the Shanghai Jiao Tong world top 500[3] grew from 89 to 106, an increase of 19.1% (SJTUGSE 2010). There were 208 such universities in Europe and 184 in North America in 2009. Compared to measures of the absolute number of papers, longitudinal rankings data tend to underestimate the growth of Asia–Pacific research. Rankings are zero-sum. New top 500 universities must displace existing ones, and changes in university hierarchies tend to be slow. There are time-lags between science outputs and their manifestation in rankings (see below). However, all measures suggest the world role of Asia–Pacific research is advancing at speed.

Differentiation

But generalizations about the "Asia–Pacific" have limited purchase. Table 2 demonstrates the immense variation within the littoral Asia–Pacific and Western Pacific in national size and wealth, education resources, tertiary participation, research outputs and global connectedness.

Many Asia–Pacific nations are impoverished and far from mass tertiary participation, and far from top 500 research university lists and other kinds of global ranking. GDP per head varies from $1120 in Nepal to over $40,000 in Macau, Hong Kong, Singapore and oil-rich Brunei. Public spending on education varies from under 3% in several nations to over 5% in Bhutan, Malaysia and the Maldives. Adult literacy rates vary from near 100% in the most modernized nations[4] to two-thirds or less in most of South Asia and also Papua New Guinea. The Gross Enrolment Ratio in tertiary education varies from 96% in Korea in 2007 and 87% in Taiwan in 2009, to just 5% in Cambodia, Pakistan and Bangladesh. Likewise there is great unevenness in levels of connectedness as measured by Internet use;

[2] The annual rankings by the *Times Higher Education* and QS marketing use composite indexes that cover a range of criteria, of which research is only one. Composite rankings can be criticized on grounds of validity; and these rankings are prone to sharp annual rises and falls that appear unrelated to institutional performance (Marginson 2010b).

[3] "Asia–Pacific" as defined in the Shanghai Jiao Tong ranking includes West Asia, and also Australia, New Zealand and the Pacific islands.

[4] The World Bank does not list literacy data for the most developed nations.

Table 2 The littoral Asia–Pacific: selected demographic, economic, communicative, education and research indicators

Nation and sub-region	Persons 2008 Millions	GDP PPP 2008 $US bill.	GNI per head PPP 2008 $US	Internet users per 100 persons 2007	Adult literacy (15 years & over) 2007 %	Public education spending as share of GDP 2008 %	Gross enrolment ratio tertiary education 2007 %	Number of international S&T papers 2007
East Asia								
China	1,325.6	14,204.3	6020	22	93.3	3.9	22	56,806
Hong Kong China	7.0	306.5	43,960	59***	…	4.5	34	…
Macau China	0.5	31.3	52,260	46	…	…	55	…
Taiwan China	22.9	717.7	###	…	…	1.7**	87****	12,742
South Korea	48.6	1,358.0	28,120	77***	…	3.1**	96	18,467
Japan	127.7	4,354.6	35,220	69	…	3.8**	58	52,896
South-East Asia								
Vietnam	86.2	240.1	2,700	21	90.3	…	…	283
Laos	6.2	13.2	2,040	2	73.4	…	12	12
Cambodia	14.7	28.0	1,820	0***	76.3	1.1	5	26
Thailand	67.4	519.0	5,990	20	94.1	4.0	…	1,728
Myanmar (Burma)	49.2	…	1,290	0	…	…	9	13
Philippines	90.3	317.1	3,900	6	93.4	2.5	28*	195
Malaysia	27.0	383.7	13,740	63	89.9	6.0	30*	808
Singapore	4.8	238.5	47,940	68	94.4	3.1**	…	3,792
Brunei	0.4	19.5	50,200	48	94.9	2.9**	15	16
Indonesia	228.2	907.3	3,830	11	91.4	…#	18	198
Timor-Leste	1.1	0.9	4,690	…	…	…	15***	…
South Asia								
India	1,140.0	3,388.5	2,960	7	66.0	3.0	13	18,194
Pakistan	166.0	439.0	2,700	11***	54.9	…	5	741
Bangladesh	160.0	213.5	1,440	0***	53.5	1.9	7	235

Table 2 continued

Nation and sub-region	Persons 2008 Millions	GDP PPP 2008 $US bill.	GNI per head PPP 2008 $US	Internet users per 100 persons 2007	Adult literacy (15 years & over) 2007 %	Public education spending as share of GDP 2008 %	Gross enrolment ratio tertiary education 2007 %	Number of international S&T papers 2007
Sri Lanka	20.2	91.9	4,460	6***	91.5	2.3	…	124
Nepal	28.6	31.8	1,120	1	56.5	3.3	…	72
Bhutan	0.7	3.3	4,880	6***	55.6	5.8**	5	3
Maldives	0.3	1.7	5,280	23	97.0	9.5	…	2
Pacific								
Australia	21.3	762.6	34,040	56***	…	…##	75	17,831
New Zealand	4.3	115.4	25,090	69	…	…#	79	3,173
Papua NG	6.4	14.2	2,000	2	57.8	4.5	…	21
Fiji	0.8	3.7	4,270	11	92.9	3.8		35
Solomon Islands	0.5	1.3	2,580	2	…	…	…	2

Sources data bases of World Bank (2010), Asian Development Bank (2010), UNESCO Institute of Statistics (2010), National Science Board of the United States (2010), CIA (2010) and HEEACT (2010) for Taiwan data only

Nations with less than 3,00,000 people not included; Democratic Republic of Korea (North Korea) not included due to lack of reliable data

Papua NG Papua New Guinea, *PPP* purchasing power parity, designed to represent dollar amounts in each country as equivalent in terms of local purchasing power, *GNI* gross national income

… = data not available

* data for 2006; ** data for 2007; *** data for 2008; **** data for 2009

In 2004 public spending in Indonesia was 0.8% of GDP, in New Zealand 5.1% of GDP

In 2005 public spending in Australia was 4.8% of GDP

In 2008 Taiwan's GDP per head (*not* GNI per head) was $32,100 in PPP terms

though the quality of Internet use can vary and these data are only a broad guide. The standouts are Korea, Japan and Singapore. Korea also has exceptional broadband penetration, the highest in the OECD countries. At the other end of the scale Internet connectedness falls below 1% in Myanmar, Cambodia and Bangladesh (Table 2).

In research the number of international scientific papers published per year exceeds 50,000 in China and Japan; and 15,000 in India, Korea and Australia; but is less than 300 in many nations including some large countries such as Indonesia and Bangladesh.

There are Jiao Tong top 500 research universities in just nine systems: Japan (31), China (18), Australia (17), South Korea (9), Taiwan (7), New Zealand and China Hong Kong (each 5), and Singapore and India (each 2). Five Asia–Pacific systems—Japan (9), Australia (6) and Singapore, South Korea and Taiwan (each 1)—have top 200 universities (SJTUGSE 2010).

In summary, Asia–Pacific nations fall into four groupings, according to the degree of global knowledge economy capacity. Note that nearly all of Confucian-shaped Asian education is in groups 1 and 2. The exceptions are isolated North Korea, and Vietnam (which is discussed below). Southeast and South Asia are spread across groups 2, 3 and 4.

In the *highly developed knowledge economies* the East has "risen": Japan, South Korea, Hong Kong China, Taiwan, Macau, Singapore, Australia and New Zealand. All have per capita incomes of $25,000 plus per year. Internet use and tertiary education enrolment reach half the population or soon will. They have stable education policies and all except Macau—too small to sustain a full higher education system—maintain a layer of research universities.

In group 2, the *middle emerging knowledge economies* "the East is Rising". These are China, Thailand, Malaysia and India. Unlike the systems in group 1, there are marked internal variations in economic and social development and tertiary participation. Cities with Western European style CBD's sit within peasant hinterlands. China is heading for group one. India has more knowledge economy potential than performance. There are a small number of strong higher education institutions. The Indian Institutes of Technology (IITs) benefit from a highly selective student intake. The public universities tend to be unreformed and many are small in size and scope (Agarwal 2009). After a long stagnation research outputs are now growing more rapidly. But there is a lacuna in national coordination and investment. The private sector cannot fill all gaps and there are many quality problems. The fit between the growing social use of higher education, and the demand for graduates in the labour market, is weaker in India than in the Confucian zone. In East Asia student enrolments seem to grow more or less lock-step with modernisation, the transition from agriculture to manufacturing to services, and people movement from country to city. In India graduate unemployment is high and endemic (Agarwal 2009, p. 194). Higher education is not high on official agendas in Thailand but research is growing rapidly (Table 4 below). Malaysia's education spending is higher than Thailand's. The top end of the private sector is impressive and the nation is an education exporter. But a potentially effective state machine is retarded by the racialized polity. Much is spent on student scholarships and loans for students from *Bumiputra* families who would participate regardless. Despite the talk about research, spending and outputs are weak. Funding is overly focused on applied research. Domestic PhD training capacity is limited.

In group 3, the *less developed emerging economies,* the "rising" of the East is slow and uncertain. This group includes Vietnam (which might be heading for the "medium emerging" group), Philippines, Indonesia, Pakistan, Sri Lanka, the Maldives and Fiji. Though the problems are tough all systems could reach group 2 under the right circumstances; but national factors vary and trajectories will probably diverge. All have

modernized zones in the cities and some universities with global connections. But except in the Philippines, participation is low and severely uneven by region. Research infrastructure is found only in small pockets. In some nations funding is very poor: In Indonesia in 2007 public investment in tertiary education constituted only 0.3% of GDP (OECD 2010, p. 220). The result is low participation rates and tiny research outputs: Vietnam published 283 research papers in 2007, Indonesia 198 and the Philippines 195 (NSB 2010. In Malaysia there were 808 papers). A common factor in group 3 is that government is not up to the task. Professionals in the state service and public universities cannot live on their salaries alone and typically resort to second jobs or corruption.

Group 4 consists of countries with a *high incidence of pre-modern undevelopment*, including Myanmar, Laos and Cambodia, Nepal, Bangladesh and some of the island Pacific. Here "the East" is not "rising". Illiteracy is a serious retarding factor. Research and global connectedness are minor. Policy attention is focused on basic education, not tertiary education. Cambodia published 26 science papers in 2007, Laos 12 (NSB 2010).

Self-differentiation

The potential of higher education systems and individual institutions in the global knowledge economy is determined by both objective and subjective factors. In other words, the outcome is shaped by the hand of cards that systems have been dealt (the objective factors), and how well that they play those cards (the subjective factors). The hand of cards they have been dealt includes their geographies, histories, cultures and languages; economic structure and resources; the inherited skills of their populations; and the traditions, capacity and readiness of their universities. This hand of cards cannot be changed in the short run. But systems of higher education and individual institutions *can* subjectively control the way they play those cards, through strategy, focus and coherence, energy and hard work. Systems can also improve their future hand of cards by investing in capacity, though the benefits take time to emerge.

The subjective factors are located in the executive leadership of government and the research-intensive universities. Material constraints set limits but over time systems, and institutions, can move beyond the objective positions they have inherited. All of the Confucian systems discussed in the next section of the paper moved forward in a generation or less from disadvantaged positions, through their own imaginations and efforts. Consider the respective cases of China and Singapore. They were dealt totally different hands of cards: 1,325 million people versus 5 million people, a long cultural history versus little history at all, differing levels of poverty and varied resource configurations. Both have played their cards with considerable skill, decisively lifting their long-term global position by rapidly expanding and improving their systems of higher education and research. It is above all the capacity of the machinery of state that distinguishes China and the group 1 systems from the rest of Table 2.

The Confucian Model of higher education

The paper now looks more closely at the Confucian-influenced higher education systems. Starting with Japan in the 1970s, with the others following in the 1990s, East Asia and Singapore have devised a distinct model of system here titled the "Confucian Model". This does not mean that all these nations and institutions are "Confucian" or Sinophile in all respects. The nations in this group have different languages, national traditions and

political systems. But there *is* a distinctive common approach to organizing education. These nations have more in common in their educational traditions and (for the most part) their associated system of writing, than in most other areas. The influence of Confucianism in social practices in education spread beyond China and its immediate outriders and offshoots in Hong Kong, Macau, Taiwan and Singapore. It entered Japan via Korea in the third century AD, not long before Buddhism made the same journey.[5] It reached Vietnam during the long period of Chinese colonization of Annam, situated in the Red River valley in which Ha Noi is now located, and the coastal areas, from the second century BCE to the tenth century CE (Gernet 1982).

The dynamics of the Confucian Model differ in key respects from those of higher education in Western Europe, the UK and the United States where the modern research university was incubated. The Confucian Model has different laws of motion to those of the private Ivy League university and public flagship university in the USA, the state managed and primarily state funded autonomous British university, the state administered and funded Humboldtian institutions in Germany and the Nordic countries, and the open and politicized Bonapartist mega-universities of Latin Europe and Latin America (Ordorika 2003).

Confucian systems have four interrelated features. First, strong nation-state policy drivers and relatively close supervision and control, with more detailed shaping of executive agendas, educational priorities and research creativity from above than in the English-speaking systems and most of Western Europe. Second, the rapid growth of tertiary participation beyond 50% and towards universal levels; simultaneous with a continuing increase in the proportion of tuition costs that are funded by households rather than the state. Third, "one chance" national examination systems at the end of schooling, which differentiate entry into tertiary education on the basis of status of institution, with the national research universities on top and low cost private (and often commercial) vocational colleges at the bottom. The examination mediates social competition in education and focuses the investment by families, while legitimating the university hierarchy and harmonising educational/social outcomes on behalf of the state. Fourth, a high and growing public investment in research science—using the fiscal resources freed up by the part private funding of tertiary tuition costs—plus rapid growth in and improvement of research activity and the formation of layer of leading research universities.

The Confucian Model systems are characterized by accelerated development in *both* educational participation and research quantity at the same time, while also improving the quality of the leading institutions and research. In contrast with some European systems such as those in the Nordic countries (though not the USA) uniformly high quality institutions are not achieved. A standard feature of Confucian systems is the long "tail" of lesser quality private institutions. But remarkably, Confucian Model systems manage the accelerated development of both participation and research within the bounds of low tax fiscal regimes, freeing up resources for capitalist growth. The knowledge economy, finance and industry move forward together. Central government spending is under 15% of GDP in Taiwan, Hong Kong China, Singapore and Japan, and under 21% in China and South Korea.[6] Yet high and growing tertiary enrolments and rapid research growth are expensive when funded simultaneously. How do these statist knowledge economies pay for all while maintaining a low tax regime, which is something no other system models has achieved?

[5] Neo-Confucianism, which entered Japan in the twelfth century AD, was deployed as part of official state ideology during the Edo/Tokugawa period of 1603–1867. See Marginson (2010a, b).

[6] In the case of China the figure includes provincial government (ADB 2010).

The key to fast-track all-round evolution in East Asia and Singapore is growing popular investment in tertiary education. This is sustained by desires for education stronger at the level of the whole population than elsewhere in the world. Here participation in tertiary education is bedded down more by Confucian values than by projections of lifetime earnings *a la* human capital theory, or by state subsidies for tuition. Confucian political economy has cultural roots. The state contributes to educational supply. China's investments in secondary and tertiary infrastructure are essential to its educational growth. In the early and middle stage of the Model, nation-states often foster pioneering participation by under-represented rural families. But the state has less work to do on the demand side than its Western counterparts.

Each of these elements—the nation-state, tuition, examinations and research—will be examined in turn.

Nation-state steering and control

Strong states able to direct resources on the basis of performance goals and capacity building objectives are the pivot around which the Confucian Model turns. As noted, the nation-state is not as effective in higher education policy in middle level non-Confucian systems such India and Malaysia. In East Asia and Singapore the state has translated the long-standing family commitment to education into modernizing educational systems. Crucially, in the present era these systems have radiated Confucian practices outwards from the upper echelons of society to the population as a whole. In the past most people, while committed to the Confucian educational values that permeate society, could not share in the practices. Economic growth and state-created mass education, partly adapted from Western models, have changed that.

For the most part Confucian states use the standard neo-liberal forms of modernization (Mok 2009). Systems of higher education are refashioned as quasi-markets and universities are remodelled as quasi-firms while central control is maintained. Thus the familiar new public management (NPM) reforms are rolling out in East Asia and Singapore, such as the corporatization of institutions—including devolution of financial responsibilities to institutions, and an emphasis on entrepreneurship (Huang 2006; Oba 2007)—a partial shift to Mode 2 conceptions of research (Gibbons et al. 1994); and the use of quality assurance, audit and accountability mechanisms to entrench performance cultures and steer activities in a more indirect fashion (for a case study at Peking University see Yang 2009b). Compared with the UK version of the NPM, Confucian states place less emphasis on university executive autonomy and the devolution of policy responsibility. Singapore seems to takes autonomy further than do the other systems. In some universities the capacity of institutional presidents to take strategic initiatives is surprisingly underdeveloped, for example in Japan (Oba 2007; Newby et al. 2009; Ohmri 2009). In some Japanese research universities presidents continue to be elected and lack executive training; while in China presidents are appointed by government rather than selected by university governing bodies, compromising their scope for initiative. Despite the use of indirect NPM steering, states often continue to exercise detailed controls over program contents, personnel management and research (Huang 2009; Newby et al. 2009; Oba 2007; Yamamoto 2007, p. 82)—though East Asia is not alone in that.

The continuing close relationship between Confucian educational government and the universities, very different to the critical distance maintained by American institutions, has longstanding roots. The notion of East Asia and Singapore without strong nation-states is

almost a contradiction in terms. 'The development of the political sphere in the Chinese world and its pre-eminence over all the other (military, religious, economic) is one of its most characteristic marks' (Gernet 1982, p. 28). Historically, when the state has not operated as a powerful centralizing and centripetal force, there has been fragmentation and chaos. The American state is also strong, but monopolizes activity in a smaller number of areas, with a larger reliance on patriotic consent. Higher education is folded into the inner workings of the state in East Asia and Singapore in a way without parallel in the USA. It is unsurprising to find that higher education and research are central to the global strategies of these nations. It was always thus. The first centralizing states emerged in the Warring States period in Wei and Ch'in in China from the 5th–3rd centuries BCE. They were marked by the separation of civil administration from military power, the formation of a caste of officials, and the codification of written language at the end of the third century which became central to the formation of the first all-inclusive Chinese nation, that of the Ch'in (Gernet 1982, p. 32 and 65). From then on scholarship, books and a caste of scholar-administrators—which was progressively expanded and later systematized on the basis of meritocratic examinations—were integral to the state.

Later, many European nations also defined scholar-teachers in universities as members of the public service and subject to state control. The Humboldtian model contained traces of the Confucian Model. In the Latin American Model the University functioned as a public sphere designed to provide an on-going critical reflexivity in relation to the nation-state (Ordorika 2003). But NPM reforms are now taking those European and Latin American systems closer to the Anglo-American model of an autonomous faculty. In the Confucian systems, the state is more deeply involved. The success of those systems will probably further entrench the role of the state. State-driven momentum provides much of the capacity of the Model, and also most of its inner constraints. (The potential downsides for research are discussed below, under 'Limits to the Model').

Tertiary participation and tuition

In 2007 the tertiary gross enrolment rate (GER) was 96% in South Korea and 58% in Japan. It reached 87% in Taiwan in 2009 (Table 2). China is on the same trajectory but at a lower point of the curve. Despite regional unevenness adult literacy reached 93% in 2008; and between 1990 and 2007 China's tertiary GER rose sharply from 4 to 23%. Meanwhile Project 985 created a layer of research-intensive universities. Participation is also growing rapidly in Hong Kong and Singapore, mostly in the private sector. Some commentators refer to "the rise of China-and-India" as if all are one, but South Asia is different. In 2008 adult literacy was 66% in India and 55% in Pakistan. In 2007 the tertiary GER was 13% in India, 5% in Pakistan and Bangladesh (Table 3). Participation is increasing in India but less rapidly than in the Confucian zone. There are endemic political and fiscal difficulties in financing education and science (Agarwal 2009).

While public tuition subsides vary, a feature in all Confucian systems is the willingness of middle class families—and in some systems, most families—to invest privately in secondary and tertiary education and tutoring to position their children for the one-off contest for university entry which determines their life chances. Some East Asian families spend as much on education as many Western families spend on housing. In 2006 the proportion of tertiary education funded by households in Japan in 2006 was 51% and in Korea 53%. This compared to 3% in Norway, 10% France, 15% in the Netherlands, 34% in the USA and 38% in Australia (OECD 2010, p. 235).

Table 3 Investment in R&D, Asia–Pacific and other principal nations, 2007

	General expenditure on R&D, all sectors	
	$s million PPP	% of GDP
USA	368.8	2.68
Germany	71.9	2.54
France	43.2	2.08
UK	38.9	1.79
Canada	23.8	1.82
Russian Federation	23.5	1.12
Italy	19.7	1.13
Spain	18.0	1.27
Sweden	12.1	3.60
Switzerland	10.9	1.70
Japan	147.8	3.44
China	102.3	1.49
South Korea	41.7	3.47
Taiwan China	18.3	2.63
Australia	14.9	2.01
Singapore	5.9	2.61
New Zealand	1.4	1.20
Other Asia–Pacific	55.7	–

PPP Purchasing Power Parity

Source NSB (2010, p. 4.34). R&D spending in India for 2006 has been estimated at 1.03% of GDP (Agarwal 2009, p. 252)

The share of funding carried by households in China was 35% in 2005 (Rong 2009), suggesting a convergence between China and the USA. But this appearance is misleading. In China the government share of funding is on a sharp downward trajectory. It fell from 96% in 1978, the year that Deng Xiaoping focused on the four modernizations (Zha 2009, p. 46), to 45% in 2005 (Rong 2009). Moreover, the roles of public and household funding of higher education in the USA differ from Confucian norms. Some US private funding is sourced from philanthropy not households, especially in the Ivy League. Government supports a large layer of lesser status public institutions in the USA (the community colleges) and Australia (Technical and Further Education) but many low status institutions in Confucian systems are privately maintained and funded. In addition the USA provides higher public subsidies to its private institutions and students than do Confucian nations (OECD 2009, p. 260). In Japan, the most mature Confucian system, 72% of students receive no state support in the form of grants, scholarships and loans. The corresponding figure in the USA is just 24% and in Australia 20% (OECD 2010, p. 256).

Korea and Japan have majority private sectors. This facilitates state policies that favour high private investment. In Hong Kong the expansion of participation is primarily not in state subsidized research universities but in two year colleges largely financed by private tuition (Kember 2009). Yet in China most students are in the public sector where they typically pay part of the cost; while many US private students are part subsidized by philanthropy and/or the state. The key to the Confucian Model is not private provision as such, but household funding. This is reinforced by the massive household investment in private tutoring outside the bounds of formal schooling, throughout the Confucian zone. Private tutoring, which is often provided by public sector teachers operating a second job in the marketplace, is focused on preparing students for successive examination and selection hurdles at the beginning of each stage of secondary and tertiary education.

The double pressure of schooling and tutoring intensifies the "examination hell" of many students, for whom Confucianism is less about the intrinsic value of self-cultivation and more about instrumental rewards. (Thus the universal mechanisms of modern social competition mobilize all other values and habits in their service). In Korea, with its near 100% participation in the contest for elite university places, national spending on private tutoring constitutes 1–2% of GDP (OECD 1998, 2001). The average OECD nation spends just 1.5% of GDP on all of tertiary education (OECD 2010, p. 218).

It is easy to see credentialism here. But what makes East Asia different is the bedrock Confucian respect for education. This long predates the Roman household tutor, the medieval clerical scholar, the early modern schooling systems in eighteenth century Prussia and Britain, and 1960s human capital theory. The life of Confucius has been dated as 551–479 BCE (Roberts 2006, p. 14). In the Confucian universe self-formation via learning is an act of filial piety, an aspect of the child's duty to his/her parents and the duty of parents to the ancestral lineage of the family. An educated child brings honour to the family and better protects continuity with the ancestors, thereby locating the family both in and beyond time. For most humans there is no greater aspiration, whether it is expressed in the code of honour or the code of career and wealth. This is what Confucian education offers. (Here we see that Confucianism, while closer to a moral code than a religion in the Western sense, and less pervasive and insistent than the evangelicals, goes just as deep as the religions of the book). At the same time Confucian education also connects the household to the larger social order supervised by the state, via examination competition.

In continuity with the long tradition of state-supervised preparation of the scholar-elite, the Mandarins, in Confucian systems government subsidies for tuition are disproportionately allocated to bright students in selective institutions (Yang 2009a, b), the universities earmarked for a "world-class" research role. For the last century graduates of the University of Tokyo in Japan and Peking University in Beijing have been headed to leading positions in the state apparatus. Of course non Confucian systems also subsidize an intellectual elite educated in leading universities and disproportionately drawn from socially advantaged families. The difference is that Confucian subsidies are more concentrated at the top end of the pyramid. Most OECD nations support lower status public institutions and target students from poor backgrounds. China provides some equity-based subsidies but the distribution of state support is more lop-sided than in OECD Europe and most English-speaking nations (see below). The role of household funding is maximized in the lower reaches of Confucian systems, the non-selective and vocational institutions, often commercial in character, although families using those institutions tend to be poorer than families using selective and academic institutions. Remarkably, this dependence on private funding in low status institutions does not seem to impair high participation overall, indicating the extent of popular compliance with the Model.

Relationship between household funding and growth of tertiary enrolments

A quantitative study by Yang (2010) considers the question of the respective roles of public and private funding in the expansion of participation. Yang used panel data models to analyse patterns for 1998–2006 for 98 countries worldwide and within that, 21 Asia–Pacific countries. She wanted to know whether public education financing promoted access to higher education, after controlling for economic development, levels of basic education and population characteristics. For the 98 countries in the world group there was a significant positive association between public expenditure per secondary student as a percentage of GDP per capita, and tertiary enrolment rates. However, public spending per

tertiary student as a percentage of GDP per capita was not a significant predictor of higher education enrolment, as private financing plays a greater role in tertiary than secondary education. Strikingly, Yang's findings change when she moves from the world (the 98 countries) to the Asia–Pacific (the 21 countries). In the Asia–Pacific—where Confucian systems constitute about half the tertiary enrolment—there was no statistically significant relationship between any kind of public spending and tertiary enrolment. This was true of public spending on secondary as well as tertiary education. Yang concludes that the growth of GDP per capita has driven the expansion of access not states. "Higher education expansion in the Asia–Pacific area can be almost 'solely' attributed to the portion of college costs covered by private resources, in particular, student families". In Confucian nations at least, more public investment is not essential to the expansion of access. But in many other nations, public investment *is* essential to access.

Nevertheless, the Confucian Model has social downsides that may breed trouble in future. It is difficult to lift quality in lower status private institutions that fall outside state funding and responsibility. The Confucian combination of steep university hierarchy, the concentration of poorer families in low status institutions, intensive selection and one-off examination hell generates automatic problems of social equity. Yang (2010) notes that: "The overdependence on student family contribution, coupled with the lack of effective government intervention, may result in great inequality among students in obtaining higher education opportunities". Inequalities are manifest on the basis of income, ethnic category and region. In Confucian systems there is less emphasis on compensatory financing than in Western Europe and the English-speaking world. Nor is there enough focus on the need for more diverse and second chance entry routes into the top universities, notwithstanding some discussion in Japan.

Student aid in China

The findings of a large-scale survey of student aid in China by Yang (2009a) are consistent with this picture of the Confucian Model. Yang notes there are three types of student aid in China: fellowships, grants and loans. Fellowships, received by 3% of undergraduates, are targeted to high achievers. Grants are received by 20% of undergraduates. There are four types of loans with a ceiling of 6000 RMB per annum. Repayment takes place 6–14 years after graduation and interest is subsidized. Grants and loans are meant to assist students irrespective of academic performance. But loan allocation tends to favour high achievers in high quality institutions. According to Yang: "To control default rate and improve loan repayment rate, China Development Bank and other commercial lenders prefer to give credit to students in high quality institutions who have a higher than expected future income and a lower probability of default". The needs principle is qualified by the merit principle.

The total level of aid was positively correlated to attending a selective institution, high academic performance, father with higher education, being from a poorer household, female gender, and membership of the Chinese Communist Party. The effect of party membership was double that of selective institution. Yang finds those benefiting most from student aid are low-SES students in selective institutions. They receive more than low SES students in less selective institutions. Because other selective students were assisted, 28% of students in very selective institutions received government aid, compared to 15% in less than four-year vocational colleges—and on average students in selective and very selective institutions received three times as much money as students in less selective and vocational institutions. Po Yang suggests that government should (1) target less selective four-year

and vocational institutions for more aid, and (2) "expand needs-based programs and control the growth of merit-based ones". But distributional patterns that are deep rooted in social tradition govern the notion of fairness, making the allocation difficult to change.

The examination

In the Confucian systems formal schooling is positioned in a social and institutional hierarchy mediated by examination competition. Confucian social harmony is based on universal acceptance of this hierarchy, moderated by the glimmer of hope that exceptional diligence at school will earn an honoured place on the upper rungs of the social ladder. The "one-chance" examination provides the state with a mechanism for social sorting which can be adjusted to permit variations in the extent of merit-based upward mobility, according to whether the regime needs to be reproduced or refreshed, and whether dominant groups can manipulate the system in their own interests. It is a powerful legitimating device for both the reproduction of elites and the maintenance of a hierarchy of tertiary institutions, led by the layer of "world-class" universities where popular aspirations are centred. Through the filter of Confucian values, coupled with the long struggle to succeed in these universalizing education systems, all families commit themselves to the examination mechanism. And in this way its outcomes, its acts of fate that decide social outcomes and set ultimate limits upon people's lives—for there are few second chances, few alternate ways into Seoul National, Tsinghua or the University of Tokyo—become internalized as the decisive consequence of individual effort and virtue.

These mechanism and values took shape in China in the first millennium CE. The first imperial academy and examination was created in 124 BCE to serve the need of the Han dynasty, that followed the Ch'in, for candidates for official posts who had been schooled in the Confucian classics. Thus Confucian education was put to the service of the state, though at first the academy numbered only 50 students (Roberts 2006, p. 30). The scholarly caste expanded, though for a long time examinations and tests played a fluctuating and secondary role. In the sixth century AD the Sui dynasty established three grades of credential. Examinations were conducted by the Board of Civil Office. "The most prestigious degree, the *xiucai,* or 'cultivated talent', assessed the candidate's broader learning" Roberts 2006, p. 48). However, it was China's one ruling Empress Wu Tse-t'ien (624–705 CE), who led the nation at the peak of the great Tang Dynasty, who fully systematized the role of the examination in the training, recruitment and promotion of the scholar civil service—in 669 CE, more than 400 hundred years before Oxford University was founded in England. Her reforms offered Wu Tse-t'ien a means of fashioning an instrument of rule under her control while undercutting the power of the noble families (Gernet 1982, p. 257). It is the same knowledge-power nexus, the same coupling of scholarship and the state, that is visible today in the building of "world-class" universities with global reach. The size of the civil service was much expanded under the Song dynasty that followed (Ebrey 2010). Though the examination system and the mandarinate varied in the centuries that followed, on the whole both grew in importance.

Japan imported both the Confucian commitment to social harmony and the notion of education as self-formation. Under the Edo regime after 1600, the state built educational participation so successfully that by the mid nineteenth century, prior to the forcible intervention in Japan by the USA and European powers, the level of participation was as high as anywhere in Europe. Initially Japan's commitment to upward social mobility via examinations was less strong. Scholars selected on merit were subordinated to hereditary

aristocrats. The universal exam system was finally consummated only when the samurai caste was disbanded after the Meiji restoration of 1868 (Marginson 2010a). But the same "examination hell" is now central to life in Japan as it is in all Confucian systems. All of this underlines the point that while modern universities in East Asia and Singapore were mostly founded in the twentieth century, their sustaining tradition is older than that of medieval Western European universities.

Research

The high and growing level of funding of tuition by households has freed governments in East Asia and Singapore to invest selectively in infrastructure, research and top universities so as to pursue global research capacity; and to continue the increases in research funding over time. Strong state support for research is a hallmark of Confucian systems. All except Japan, which has had a mature research system for 30 years, continue to drive funding upwards.

In 1998 the then President Jiang Zemin announced China's goal of building a group of world-class universities. The transformation of sites and growth of research in the next decade was extraordinary and China continued to increase funding during the global financial crisis of 2008–2009. American universities remain well ahead but few doubt that China will achieve its 1998 goals. In Hong Kong China leading research universities recruited vigorously during the financial crisis, enhancing their capacity to draw staff from American public institutions affected by spending cuts (Hvistendahl 2009). In South Korea, the Brain Korea 21 plan of 1998 concentrated research power in the traditional doctoral universities, underpinning basic research. The grants covered the sciences and technologies, social sciences and humanities, and professional graduate schools, over a seven-year cycle. In Taiwan the Development Plan for University Research Excellence concentrated support in areas where Taiwan could exercise world leadership (Salmi 2009). Singapore is now building global strength in bioscience alongside longer-term programs in engineering and technologies (Sidhu 2009).

Given their role in research funding it is unsurprising that the central governments at the head of the Confucian systems (see below) are shaping research priorities. Policy strongly favours the sciences and technologies over the humanities and the social sciences; and applied and commercial research are strongly favoured over academically-controlled 'basic' research. For example in 2007 Japan allocated only 13.8% of R&D money to basic research (Huang 2009). While many other nations evidence similar priorities, in the Confucian zone the skew is pronounced, with the partial exception of Korea. The proportion of R&D investment located in industry is high. In China only 10% of R&D is in the universities.

Accelerated research performance

The world has three primary zones of research and development (R&D), each accounting for roughly one-third of activity: North America ($393 billion in 2007), Europe ($313 billion) and Asia and the Pacific, including West Asia ($351 billion) which was 32.6% of the total, including 148 billion in Japan and $102 billion in China (NSB 2010, pp. 4.33–34). The shift in the global balance of power is signified by the spectacular growth of research in the Confucian zone. In 2007 national investment in R&D was 3.5% of GDP in Korea, and 2.6% in Taiwan and Singapore, comparing favourably with investments in

Table 4 Science and engineering papers in all fields [includes social sciences] all nations over 10,000 papers and Asia–Pacific nations over 1,000 papers (excluding West Asia), 1995 and 2007

	Number of science and engineering papers		
	1995	2007	Average annual change 1995–2007 (%)
United States	1,93,337	2,09,695	0.7
United Kingdom	45,498	47,121	0.3
Germany	37,645	44,408	1.4
France	28,847	30,740	0.5
Canada	23,740	27,799	1.3
Italy	17,880	26,554	3.3
Spain	11,316	20,981	5.3
Netherlands	12,089	14,210	1.4
Russia	18,603	13,953	−2.4
Brazil	3,436	11,885	10.9
China	9,061	56,806	16.5
Japan	47,068	52,896	1.0
South Korea	3,803	18,467	14.1
India	9,370	18,194	5.7
Australia	13,125	17,831	2.6
Taiwan China	4,759	12,742	8.6
Singapore	1,141	3,792	10.5
New Zealand	2,442	3,173	2.2
Thailand	340	1,728	14.5

Source NSB (2010)

Western Europe and the USA (2.7%) (See Table 3). In China investment in R&D climbed from 0.6 of GDP in 1997 to 1.5% in 2007, growing by 19% per annum in the first half of the 2000's.

Has the Confucian investment in research capacity translated into a growing presence in world science? Yes. The number of internationally published papers in science and technology has grown at about the same rate as R&D investment (Table 4).

According to the U.S. National Science Board, between 1995 and 2007 the number of papers produced each year in China grew by 16.5% a year, South Korea by 14.1%, Singapore 10.5% and Taiwan 8.6% (note also the growth of 14.5% in Thailand). Between 1995 and 2007 China's annual number of papers rose from 9061 to 56,806, moving past the UK and Germany. In 1995 the output of international science and technology papers in India and China was about equal. By 2007 output in China was three times that of India, while the number of papers from South Korea had moved past that of India—though India had more than twenty times the population of South Korea. These trends are unsurprising given South Korea has 3187 researchers per million people, China 708 and India 119 (Agarwal 2009).

Comparative research quality

At this stage Confucian universities are more impressive in research quantity than quality. The Leiden University rankings, which draw on both principal bibliometric systems, Thomson-ISI and Elsevier-Scopus, make this distinction. The ranking lists the world top

250 universities based on publications and citations for 2003–2007. Columns 3 and 5 of Table 5 focus on the absolute number of papers. Here eight Asia–Pacific universities were in the top 50: four from Japan and one from each of Korea, Singapore, Taiwan and China—all Confucian systems.

There were 19 Asia–Pacific universities in the top 125 (15%), mostly from Japan (8), Australia (4) and China (3). But once total papers for the top 250 universities are adjusted using citations per paper (column 6), the Asia–Pacific universities move downwards, aside from Hong Kong. To the extent that citation impact is a proxy for quality, this metric measures each university's 'firepower'—its quantity of high quality research work—in the knowledge system. Citations per paper in column 7 is a more pure measure of quality alone. Here Asia–Pacific universities look weaker than in column 6. Note that in column 7 the University of Hong Kong moves to first in Asia, Tokyo second and NUS Singapore third (CWTS 2010).

The US National Science Board compares research systems and regions in relation to their share of highly cited papers. Again the data show the Confucian systems are weaker in research quality as distinct from quantity. From 1998 to 2008 China's share of world science papers rose from 1.6 to 5.9%, underlining the rapid growth of research. China's share of the top 1% most highly cited papers in 2008 was 2.5%, compared with its publication share of 5.9%—though between 1998 and 2008 China's share of the top 1% of papers rose sharply, as happened in other Asian nations (NSB 2010; Table 6).

Between 1998 and 2008 the United States' share of world top 1% papers fell from 62.0 to 51.6% but remained dominant (NSB 2010). Why? In part because of system size, in part because American researchers tend to cite Americans and are less likely to read foreign papers than their counterparts in most other countries (Altbach 2005).[7] It also reflects two other factors. First, there are time-lags between investment in R&D and the output of papers, between the output of papers and citation performance, and between citations and the effects in rankings systems. It will be 15–20 years before today's new R&D investments show up fully in rankings performance, but eventually they will generate more top 100/200 research universities in China, Korea, Taiwan and Singapore. Second, the US research system, and research in Canada and much of Western Europe (though less so that of Australia) place a relatively high emphasis on peer-reviewed basic science, more so than the Confucian systems. Basic science is a stronger driver of publications than are applied and commercial science. Intellectual Property arrangements can slow publication. A possible third advantage enjoyed by the US is that its civic as well as university settings encourage open discussion, debate and criticism across all fields, and this might be more conducive to creativity (see next section).

Confucian research is uneven by discipline. It is strong in engineering and technologies. China has seven schools of engineering in the Shanghai Jiao Tong top 100 schools, Japan five, Taiwan four, Korea three and Singapore two. Japanese universities also stand out in the physical sciences, especially Tokyo and Kyoto. The Confucian systems are not as strong in medicine and life sciences—though recent investments may change this—and weaker in the social sciences where the USA has 70% of the top 100 schools (SJTUGSE 2010).

[7] The Carnegie survey of the academic profession found that whereas more than 90% of scholars from other nations believed that it was necessary to read foreign books and journals, only 62% of American scholars agreed (Altbach 2005, pp. 148–149). "American academics do not often cite works by scholars in other countries in their research. The American research system is remarkably insular, especially when compared to scientific communities in other countries… The American system accepts scholars and scientists from abroad, but only if they conform to American academic and scientific norms" (Altbach 2005, p. 149).

Table 5 Asia–Pacific universities in the Leiden ranking listed in first half of the world top 250 for publications, publication and citation data for 2003–2007

University	System	Total publications 2003–2007*	Citations per publication (unadjusted for field)	World ranking in total publications	World ranking in total publications in terms of citations per publication normalized for field	World ranking in citations per publication normalized for field
U Tokyo	Japan	35,622	4.78	2	10	160
Kyoto U	Japan	25,905	4.51	8	27	180
Osaka U	Japan	22,049	4.65	17	36	171
Tohoku U	Japan	21,260	3.51	21	45	202
Seoul National U	Korea	19,590	3.34	27	57	203
National U of Singapore	Singapore	16,494	3.40	43	63	164
Tsinghua U	China	16,300	1.83	44	136	239
National Taiwan U	Taiwan	15,567	2.72	50	110	227
U Sydney	Australia	15,419	4.05	52	72	175
U Melbourne	Australia	14,757	4.54	58	70	154
Kyushu U	Japan	14,384	3.49	63	120	225
Hokkaido U	Japan	14,232	3.00	65	146	232
Nagoya U	Japan	13,707	3.77	70	119	216
U Queensland	Australia	13,268	4.17	73	88	159
Peking U	China	13,177	2.98	75	145	228
Tokyo Institute of Tech.	Japan	12,256	3.21	89	128	200
U New South Wales	Australia	11,164	3.90	107	125	163
Shanghai Jiao Tong U	China	10,996	1.49	110	202	234
U of Hong Kong	Hong Kong	10,616	4.39	116	114	117

Note Columns 6 and 7 rank the universities listed in column 5, i.e. the world 250 (first half only are listed here) on the basis of the highest number of science and technology papers

* The leading university in the world in publication volume is Harvard which is well ahead of the field with 57,124 papers over the 5 year period. Harvard's average citations per publication was 10.46

Source CWTS (2010)

Table 6 Comparative performance of selected countries and regions in relation to share of publication volume and share of highly cited articles, all fields, 1998 and 2008

	Share of all articles		Share of 1% most cited articles		Index of highly cited articles*	
	1998 %	2008 %	1998 %	2008 %	1998	2008
United States	34.0	28.9	62.0	51.6	1.83	1.78
European Union	34.6	33.1	25.1	29.6	0.73	0.89
China	1.6	5.9	0.1	2.5	0.07	0.42
Japan	8.5	7.8	4.3	4.5	0.50	0.58
Asian-8**	3.6	3.6	0.3	2.2	0.08	0.32

* The index of highly cited articles is the share of the world's top 1% cited articles divided by the share of world articles. 1.00 = a share of the world's most highly cited articles that would be expected given the share of all articles. An index number of more than 1.00 constitutes relatively high quality performance

** Asia-8 = India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand

Source NSB (2010, Appendix Table 5.44)

A note on Vietnam

As noted above, in the first millennium CE occupied Vietnam was strongly influenced by Chinese culture and absorbed Confucian education ethics (Gernet 1982), which developed further in the independent nation that was established in the North and Centre of today's territory. In a prominent place in the Temple of Literature in Ha Noi, where a proto-university was created in 1076, there is an inscription urging respect for self-cultivation through education. The founder of the modern nation, Ho Chi Minh, always saw the Confucian tradition as an asset (Brocheux and Duiker 2007) and the post of teacher as an especially honoured one. The Confucian legacy seems to be as widespread in Vietnam as in any other Confucian heritage country. Vietnam uses universal examinations for educational and social selection. There is a strong normative commitment to schooling and respect for the teaching profession; a burgeoning private tutoring industry; and a broad commitment to household investment, expressed primarily through private tutoring and foreign tertiary institutions. Since 1986 fees have been charged in public education, though schools and universities are subsidized by the state. Those who invest in extra tuition enjoy advantages (London 2006, pp. 13–14).

However, of the four elements of the Confucian Model—strong state steering, growth of participation underpinned by growing household spending, universal examinations and accelerated research development, only the second and third are present in Vietnam. The essential cultural conditions are present but the political conditions are absent. Vietnam has half the per capita income of China and at this stage the state is unable or unwilling to commit to an accelerated development of tertiary participation, quality of provision, and research. There has been considerable growth in lower secondary participation but upper secondary participation rates were still only 37% in 2002 (London 2006, p. 11), slowing tertiary growth. In the universities, policy makers are as yet little focused on the global comparisons of performance that drive reform in the rest of East Asia and Singapore. Modernization reforms have just begun in many tertiary institutions. Research languishes. Many policy problems remain to be addressed (Harman et al. 2009). Nevertheless, the central Vietnamese state has shown a formidable military capacity in the recent past, its role in the nation seems to be as strong as ever, and economic growth at 5–10 per annum is

steadily transforming national capacity. It may be only a matter of time before Vietnam adopts the Confucian Model of knowledge economy.

Limits of the model?

One tension in the Confucian Model is the potential conflict in research between on one hand the priorities of governments; on the other hand the judgements of peer-based discipline groups, which at best work to the world literature, at worst are self-serving and isomorphistic. Second guessing by governments and the insistence that inquiry must have a visible utility and often a potential commercial application tend to inhibit the academically controlled research program which are the best potential source of long term innovations, whether curiosity-driven or use-driven as in research in 'Pasteur's Quadrant'. This suggests that the high percentages of research (a) not basic, and (b) located in industry not universities, may limit the Model.

Moreover, when shaping by government is accompanied by conservative academic cultures, a high level of social conformity and near closure to foreign talent as in Japan (Newby et al. 2009) there is a danger that the Confucian Model will insufficiently alive to both global intellectual currents and local potentials for creativity (Marginson 2010a). Closure to foreign talent is a limitation also in Korea. Perhaps Singapore, China and Hong Kong China evidence greater academic mobility and openness to new ideas, with feisty academic cultures in some institutions. But state political control remains the final authority in the background in Singapore and Hong Kong; so the imaginative capacity of the universities remains crucially dependent on continuing nation-state acumen and restraint; and state control is exercised up front in China, where the university president shares authority with the party secretary.

> Unlike the regulatory state in America that evolved against a liberal market economy context, the regulatory state in Asia has emerged from a context of a combined strong state and a free market economy, by which the state ideologically commits to an "authoritarian mode of liberalism" (Mok 2009).

An element common to higher education systems in both capitalist and socialist countries in the Confucian zone is that they have sprung from a centralizing states with a history of authoritarian rule. Nevertheless the democratization of Korea and more recently Taiwan—both places where civic culture can be more open than the universities—and also the evolution of single-party Singapore, where the state has shaped a regulated freedom and scope for criticism in many spheres including the universities and civil society (Sidhu 2009; Kong et al. 2006), all show that marked variations in governance are possible within the terms of strong nation-states and suggest that one possible variation is self-management in higher education. Perhaps the big question for the Confucian Model is about China. China is slowly liberalizing, and higher education is a principal medium of this liberalization. Higher education is forming a mass population in the capacity for public action and global awareness. Graduates from higher education in China will expect a growing transparency in the operations of government. In building a high participation higher education system the Communist Party government has deliberately fostered its own on-going modernization and created a reciprocal relation between the nation-state and the evolving public sphere enabled by the knowledge economy, a public sphere that extends well beyond the national border. It seems that the leading research universities exhibit academic freedoms in the sciences, and in most of the social sciences, similar to those

found in most of the world. There are feisty academic cultures in many places, with free constructive critcism of government policy. The barrier to university creativity in China is not so much the one party regime but the present limits on communicative freedom in the civic environment outside the universities, particularly in relation to social and policy issues, the humanities and the arts.

A strength of American creative cultures is the scope for criticism and innovation in civic, communicative and business forums which are often ahead of the universities. Arguably, edgy university ideas and off-the wall invention achieve their full potential only when discussion and debate can also flourish. Moreover stellar creators stimulate each other, across fields, and typically renaissance cultures are strong in the arts and humanities as well as sciences and business (Marginson et al. 2010; Murphy et al. 2010). And modern Confucian scholarship needs room to breathe, grow and reinvent if it is to sustain an evolving East Asian identity. Yet in all Confucian systems university strategy and research priorities are constrained by the all-pervasive state instrumentalism. It does not necessarily inhibit most science but it increases the dependence of economic innovation on top-down forms and it probably retards the broader economic, social and cultural contributions of higher education. This might constitute a decisive limit of the Confucian Model of higher education. Time will tell. The jury is still out. Many in the Confucian systems are aware of the dangers of over-determining states and the potential of political objectives and risk-aversion to cut across intellectual merit and the fostering of creative cultures. The capacity of the Model for reflexive self-improvement should not be underestimated.

Conclusions

Higher education and research are "rising" rapidly in some but not all Asia–Pacific countries. The main action is in systems most closely affected by Confucian values: Japan, Korea, China, Hong Kong China, Taiwan and Singapore. These exhibit or have exhibited a special developmental dynamism, one that continues to play out in all of them except Japan. They have created a distinctive model of higher education and university-based research that many emerging nations would like to imitate. Confucian higher education rests on a long tradition of respect for education and scholarship. It is also modern. Every Confucian nation wants to catch up with Western science and technology. Policy makers implement American system organisation, based on vertical diversity topped by high quality research universities. The neo-liberal forms of governance and new public management reforms pioneered in the UK and spread throughout the world are marching through East Asia and Singapore. But the Model is not a simple adaptation of the Western university in Greater East Asia. Nor is this the splicing of Confucian tradition with Western modernization. It is an organic hybrid of old and new, and East and West: a distinctive Confucian form of modernization in the knowledge economy.

The four aspects of the Model are interdependent. The core of the model is the role of the nation-sate, which frames the examination system, steers the patterns of public and household investment and funds and drives the accelerated program of research. Selected state investment provides infrastructure and subsidizes tuition so as to push forward the boundaries of participation. Confucian traditions in education provide the essential cultural conditions that support the roles of state, household and examinations; while Confucian scholarship is the foundation of the respect attached to scientific research. Private household funding frees state resources for infrastructure and research. Examinations lock

in the population, drive private household funding and legitimate the Model and the social competition that sustains it, on behalf of the state.

This Model is changing the global balance of power in higher education—because it works.[8] Together private funding of tuition, public funding of research, and economic growth, enable the Confucian systems to lift mass participation, university quality and R&D all at the same time and at unprecedented speed. No other developmental model of knowledge economy is associated with progress at this rate. Yet the conditions underpinning the Model, such as rapid economic modernization and capital surplus, are not available to all systems. And there is a danger that the phenomenal achievements of the Model will blind policy makers, media and academic communities—not to mention scholars of higher education—to its potential limitations and downsides: social inequities in tertiary participation, and authoritarian state constraints of university autonomy, executive leadership, academic creativity and the capacity for free global interactions beyond the borders of the nation-state Marginson (2010). Arguably these downsides are inherent in

[8] A further question arising from the present analysis is that of the scope for regional development in higher education and research in the Asia–Pacific, in the Confucian zone or on a broader basis. Is their potential for an Asian Bologna in higher education? There are four necessary conditions for successful regionalization in higher education and research. First, the parties must be at a threshold level of economic and educational development, or they make unattractive partners. The second condition is geographical proximity. The third is sufficient cultural commonality or coherence. The fourth and most important condition is the sustained political will to establish regional forms. These conditions are not present across the whole of South Asia, Southeast Asia, East Asia and the Western Pacific. There is already regional organization in Southeast Asia. But ASEAN is inhibited by under-development, weak states and lack of political will. It is marginal to national polities in Southeast Asia.

On the face of it the most promising potential for regionalization is in the Confucian zone. This is suggested by student mobility, driven by linguistic and cultural commonality between the Confucian nations that use Chinese script: China, Taiwan, Korea and Japan. In each country a major source of international students are other parts of East Asia, constituting "a certain de facto integration" (Kuroda 2009). In Japan in 2009, of 1,33,000 international students, 60% were from China, 15% from South Korea and 4% from Taiwan (JSSO 2010). Japan plans to more than double the international student intake to 3,00,000 per year. Taiwan has decided to accept international students from mainland China (Tien 2009; Roberts et al. 2010). Of the smaller number of internationals in Korea most are from China (Sugimura 2009, p. 13). Likewise the largest source countries for China are South Korea and Japan (Verbik and Lasanowski 2007). China plans to more than double international students to about 5,00,000 (Sharam 2010). Japan, China and Korea are discussing the potential for streamlined arrangements for mutual recognition and accreditation (Daily Yomiuri Online 2010) which hints at the potential for an East Asian Erasmus style scheme for student mobility.

Research is the most important domain of global collaboration in higher education. In 2008 two-thirds of all citations were international citations (NSB 2010). The National Science Board maps global patterns of collaboration. In these data a value greater than 1.00 indicates a rate of nation to nation collaboration higher than expected on an average basis, given the two nations' overall rate of collaboration. The NSB finds that researcher-scholars in China collaborate especially strongly with counterparts in Singapore and Taiwan, and above average with Japan and South Korea. Researchers from Taiwan collaborate strongly in Singapore and Japan and above average in South Korea. South Koreans have very strong links in Japan. Interestingly, researchers in India have intensive collaboration with researchers in South Korea and Taiwan (especially) and also in Singapore and Japan. Australians have intensive collaboration in Singapore and above average collaboration in China (NSB 2010). These data suggest a broad potential for regionalization in research, perhaps through formation of an Asian Research Area or Asia–Pacific Research Area to parallel the European Research Area.

However, the constraint on East Asian regionalization is the absence of nation-state political will. The legacies of the 1930s and 1940s have not been overcome. There is a formidable lack of trust between Japan and China and endemic rivalry over primacy in Northeast Asia (Wesley 2007). Neither country wants to discuss regionalization on an equal footing in neutral forums. If governments are unable to advance regionalization in higher education and research, leading research universities can move regionalization forward via personnel mobility and joint programs. This would test the scope for executive action and intellectual freedom in the Confucian systems.

the Model, given its high dependence on private funding of tuition, targeted investment in talent, and state direction. The current stagnation of the one mature Confucian higher education system, Japan, is of concern (Marginson 2010a). But these limitations are not inevitable, providing that correctives are factored into the Model.

On present trends the level of education and research infrastructure across the whole of East Asia and Singapore will reach that of Western Europe within a generation. This has already been achieved in Singapore and Hong Kong China and has long been the case in Japan. Whether the Confucian systems can match the fecundity of the USA, by far the most important zone of intellectual creativity in the last 150 years (Murphy 2010), remains to be seen. If a renovated and modernized hybrid Confucian intellectualism develops, alongside the Western tradition, anything is possible. Arguably, this will only happen if the Confucian systems develop research and scholarship in the humanities and social sciences as strong as their science and technology. And it will be augmented if these systems find a way to establish a zone of autonomous creativity, able to interact directly with both communicative civil society and industry without the relationship being articulated through the machinery of state. A Confucian model without the nation-state is inconceivable, just as it could not exist without family commitment. The task of the nation-states will be to ensure that their institutions of higher education and research can sustain the present exceptional dynamism of learning and knowledge production, while operating on the basis of growing autonomy and global links.

References

Agarwal, P. (2009). *Indian higher education: Envisioning the future*. New Delhi: Sage.

Altbach P. (2005). Academic challenges: The American professoriate in comparative perspective In A. Welch (Ed.), *The Professoriate: Portrait of a profession* (pp. 147–165). Dordrecht: Springer.

Altbach, P. (2009). The giants awake: The present and future of higher education systems in China and India. In OECD, *Higher education to 2030. Volume 2: Globalisation* (pp. 179–203).

Asian Development Bank, ADB. (2010). *Key indicators for Asia and the Pacific 2009*. Manila: ADB.

Brocheux, P., & Duiker, C. (2007). *Ho Chi Minh: A biography*. Cambridge: Cambridge University Press.

Central Intelligence Agency, CIA (2010). *The World factbook.* Data on Taiwan. Accessed July 14, 2010 from: https://www.cia.gov/library/publications/the-world-factbook/geos/tw.html.

Centre for Science and Technology Studies, Leiden University (CWTS) (2010). *The Leiden ranking*. Accessed March 12, 2010 from: http://www.cwts.nl/cwts/LeidenRankingWebSite.html.

Daily Yomiuri Online (2010). *Japan, China, S. Korea mull academic credit system*. Accessed on March 15, 2010 from: http://www.yomiuri.co.jp/dy/20100301TDY02304.htm.

Ebrey, P. (2010). *The Cambridge illustrated history of China*. Cambridge: Cambridge University Press.

Gernet, J. (1982). *A History of Chinese civilization* (2nd edn.) (J. R. Foster & C. Hartman, Trans.). Cambridge: Cambridge University Press.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The new production of knowledge: The dynamics of science and research in contemporary societies*. London: Sage.

Harman, G., Hayden, M., & Pham, T. (2009). *Education in Vietnam: Challenges and priorities: Higher education dynamics*. Dordrecht: Springer.

Hazelkorn, E. (2008). Learning to live with league tables and ranking: The experience of institutional leaders. *Higher Education Policy, 21*, 193–215.

Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) (2010). In *Data concerning higher education in Taiwan, as presented by Dr. Angela Hou Yung-Chi, international seminar, HEEACT office, Taipei, June 3*.

Huang, F. (2006). Incorporation and university governance: A comparative perspective from China and Japan. *Higher Education Management and Policy, 18*(2), 35–49.

Huang, F. (2009). *The case study of Japan.* Unpublished paper. Hiroshima: Hiroshima University Research Institute for Higher Education.

Hvistendahl, M. (2009). Academics needed, by job lot. *The Australian*, May 27, p. 25.

Japanese Student Services Organization, JSSO (2010). *Data on international students in Japan*. Accessed on February 2, 2010 from: http://www.jasso.go.jp/statistics/intl_student/data09_e.html.
Kember, D. (2009). Opening up the road to nowhere: Problems with the path to mass higher education in Hong Kong. *Higher Education, 59*, 167–179.
Kong, L., Gibson, C., Khoo, L.-M., & Semple, A.-L. (2006). Knowledges of the creative economy. Towards a relational geography of diffusion and adaptation in Asia. *Asia Pacific Viewpoint, 47*(2), 173–194.
Kuroda, K. (2009). *Possibilities and challenges in contructing a new regional collaborative educational framework in Asia.* GIARI Working Paper 2009-E-1. Global Institute for Asian Regional Integration, Waseda University. Tokyo: Waseda University.
Levin, R. C. (2010). *The rise of Asia's universities.* Speech to the Royal Society, London, February 1. Yale University Office of Public Affairs. Accessed April 17, 2010 from: http://opa.yale.edu/president/message.aspx?id=91.
London, J. (2006). Vietnam: The political economy of education in a 'socialist' periphery. *Asia Pacific Journal of Education, 26*, 1–20.
Marginson, S. (2010a). Nation. In P. Murphy, M. Peters, & S. Marginson (Eds.), *Imagination: Three models of imagination in the age of the knowledge economy* (pp. 225–325). New York: Peter Lang.
Marginson, S. (2010b). The global knowledge economy and the culture of comparison in higher education. In S. Kaur, Morshidi Sirat, & W. Tierney (Eds.), *Quality assurance and university rankings in higher education in the Asia Pacific: Challenges for universities and nations* (pp. 23–55). Penang: Universiti Sains Malaysia Press.
Marginson, S. (2010c). Imagining, strategizing and ordering the global. In R. King, S. Marginson & R. Naidoo (Eds.), *Handbook on globalization and higher education.* Cheltenham: Edward Elgar (forthcoming).
Marginson, S., Murphy, P., & Peters, M. (2010). *Global creation: Space, mobility and synchrony in the age of the knowledge economy*. New York: Peter Lang.
Marginson, S., & van der Wende, M. (2009). The new global landscape of nations and institutions. In *Organization for Economic Cooperation and Development Higher education to 2030. Volume 2: Globalisation* (pp. 17–62). Paris: OECD.
Mok, K.-H. (2009). *When neo-liberalism colonizes higher education in Asia: Bringing the "public" back into the contemporary university.* Unpublished paper. Centre for East Asian Studies, University of Hong Kong, Hong Kong.
Murphy, P. (2010). Portal power and thalassic imagination. In S. Marginson, P. Murphy, & M. A. Peters (Eds.), *Global creation: Space, mobility and synchrony in the age of the knowledge economy* (pp. 51–76). New York: Peter Lang.
Murphy, P., Peters, M., & Marginson, S. (2010). *Imagination: Three models of imagination in the age of the knowledge economy*. New York: Peter Lang.
National Science Board, NSB, United States (2010). *Science and engineering indicators 2010*. Accessed April 18, 2010 at: http://www.nsf.gov/statistics/seind10/.
Newby, H., Weko, T., Breneman, D., Johanneson, T., & Maassen, P. (2009). *OECD reviews of tertiary education: Japan*. Paris: OECD.
Oba, J. (2007). Incorporation of national universities in Japan. *Asia Pacific Journal of Education, 27*(3), 291–303.
Ohmri, F. (2009). *Why is Japan invisible in global higher education?* Unpublished paper. Kumamoto: Kumamoto University.
Ordorika, I. (2003). *Power and politics in university governance: Organization and change at the Universidad Nacional Autonoma de Mexico*. New York: RoutledgeFalmer.
Organization for Economic Cooperation, Development, OECD. (1998). *National reviews of education policy. Korea*. Paris: OECD.
Organization for Economic Cooperation, Development, OECD. (2001). *Korea and the knowledge-based economy: Making the transition*. Paris: OECD.
Organization for Economic Cooperation, Development, OECD. (2009). *Education at a glance, 2009*. Paris: OECD.
Organization for Economic Cooperation, Development, OECD. (2010). *Education at a glance, 2010*. Paris: OECD.
Roberts, J. (2006). *A history of China* (2nd ed.). Houndmills: Palgrave Macmillan.
Roberts, A., Chou, P., & Ching, G. (2010). Contemporary trends in East Asian higher education: Dispositions of international students in a Taiwan university. *Higher Education, 59*, 149–166.
Rong, W. (2009). *Reforms and consequences in higher education system in China.* In *Paper presented to "Reforms and consequences in higher education system: An international symposium", Center for*

National University Finance and Management, National Center of Sciences, Hitotubashi Chiyoda-ku, Tokyo, Japan, January 26.

Salmi, J. (2009). *The challenge of establishing world-class universities*. Washington: World Bank.

Shanghai Jiao Tong University Graduate School of Education, SJTUGSE (2010). *Academic ranking of world universities.* Accessed April 17, 2010 from: http://ed.sjtu.edu.cn/ranking.htm.

Sharam, Y. (2010). China: More autonomy for universities. *University World News* April 4. Accessed on April 5, 2010 from: http://www.universityworldnews.com.

Sidhu, R. (2009). The 'brand name' research university goes global. *Higher Education, 57*, 125–140.

Sugimura, M. (2009). *Higher education strategies and international student flows in Asian countries.* GIARI Working Paper 2008-E-18. Global Institute for Asian Regional Integration, Waseda University. Tokyo: Waseda University.

Tien, F. (2009). Recruiting China students to colleges in Taiwan: An analysis of Taiwan's higher education policy. In *Paper presented to an international seminar on higher education markets in East Asia, Hiroshima University, Japan, October 24–25, 2009*. Taipei: Center for Teacher Education, National Taiwan University.

Times Higher Education, THE (2010). Tigers burning bright. *Cover*, June 17, pp. 32–33.

UNESCO Institute for Statistics (2010). *Data on education*. Accessed October 2, 2010 from: http://www.uis.unesco.org/ev.php?ID=2867_201&ID2=DO_TOPIC.

Varghese, N. V. (2009). Globalization, economic crisis and national strategies for higher education development. International Institute for Educational Planning (IIEP) Research Paper, UNESCO. Paris: IIEP.

Verbik, L., & Lasanowski, V. (2007). *International student mobility: Patterns and trends*. London: Observatory on Borderless Higher Education, OBHE.

Wesley, M. (2007). Jealous suitors: Sino-Japanese competitive regionalism and the future of East Asia. In M. Heazle & N. Knight (Eds.), *China-Japan relations in the twenty-first century. Creating a future past?* (pp. 207–221). Cheltenham: Edward Elgar.

Willekens, F. (2008). Demography and higher education: The impact on the age structure of staff and human capital formation. In OECD, *Higher education to 2030. Volume 1: Demography* (pp. 105–124).

World Bank (2010). *Data and statistics*. Accessed April 17, 2010 from: http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20798108~menuPK:64133152~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html.

Yamamoto, S. (2007). The incorporation of national universities and its impact on higher education in Japan. *Higher Education Forum*, 79–85.

Yang, P. (2009a). Who gets more student aid in China? A multilevel analysis. Unpublished paper. Graduate School of Education, Peking University.

Yang, R. (2009b). Enter the dragon? China's higher education returns to the world community: The case of the Peking University personnel reforms. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXIV, pp. 427–461).

Yang, L. (2010). The disappearing role of education finance policies in higher education access: Panel data analysis of twenty-one Asia-Pacific countries in a global setting. In S. Marginson, S. Kaur & E. Sawir (Eds.), *Higher education in the Asia-Pacific: Strategic responses to globalization*. Dordrecht: Springer (forthcoming).

Zha, Q. (2009). Diversification or homogenization: How governments and markets have combined to (re)shape Chinese higher education in its recent massification process. *Higher Education, 58*, 41–58.