Major shifts in global higher education: A perspective from Asia

2017 HEPI Annual Lecture

Professor Tan Chorh Chuan

Higher Education Policy Institute

HEPI Report 103

About the Author

Professor Tan Chorh Chuan was President of the National University of Singapore (NUS) when he delivered this HEPI Annual Lecture.

Since then, he has joined the Singaporean Ministry of Health as both Executive Director of the new Office for Healthcare Transformation and the country's first Chief Health Scientist.

Acknowledgements

The 2017 HEPI Annual Lecture was kindly sponsored by Pearson and Wiley.

The Lecture was transcribed by Caroline Davies.

The cover photo is by Leah Kelton of Whispers of Light Photography & Design.

Foreword

Professor Sir David Eastwood, Vice-Chancellor of the University of Birmingham and member of the HEPI Advisory Board

The Annual Lecture has always been the high point of HEPI's year. This is the 14th Annual Lecture since HEPI was founded. The first and second were delivered by Ron Dearing and Robert Reich. The twelfth and thirteenth were delivered by Andreas Schleicher, Director of Skills and Education at OECD, and Martha Kanter, who was President Obama's first Under Secretary for Education. So we have set the bar high.

The Annual Lecture has generally had an international flavour. At its best, higher education operates without boundaries and at HEPI we have always been keen to learn from the experiences of other countries. Our own pressing contemporary national challenges, and those of other western nations, must not stop us from looking outwards. Indeed, that global perspective on higher education is more important than ever. Surprisingly, therefore, the HEPI Annual Lecture has never before had a specific focus on the rise of Asia, its higher education system and its global importance. This lecture puts that right.

The first time I met our lecturer, Professor Tan, I recognised not only a remarkable intellect but also a transformatory university leader. He has a unique perspective on universities, on higher education systems and on global higher education.

As his lecture shows, Asian universities have changed the paradigm for developing a university. Many have achieved a

standing, a stature and a maturity much more rapidly than had previously been thought possible. It is easy but mistaken to think that must primarily be a function of resource. It is also a function of leadership. This lecture includes challenges that are very familiar to us: challenges of making our universities fit, not just for tomorrow, but for a generation of students who are going to live and work differently. Universities are going to have touchpoints with their graduates over a much longer period of their lives than traditionally has been the case.

Professor Tan's lecture includes some challenging questions for us in the UK. It shows our present debate on higher education has become too narrow and is in danger of becoming quite old fashioned. Were that to be the predominant discourse around higher education, then we would duck the challenges explored in the following pages and we would betray the next generation.

Major shifts in global higher education: A perspective from Asia

2017 HEPI Annual Lecture

Introduction

My wife, Evelyn, and I are avid backpackers. Some years ago, we visited Angel Falls in Venezuela. We started from a small village called Kamarata and travelled up river by boat for three days. Along the way, we had to navigate a number of rapids. After one particularly exciting passage, I asked our boatman: 'What is the most important thing you must focus on?' Without hesitation, he said: 'Reading the water well.'

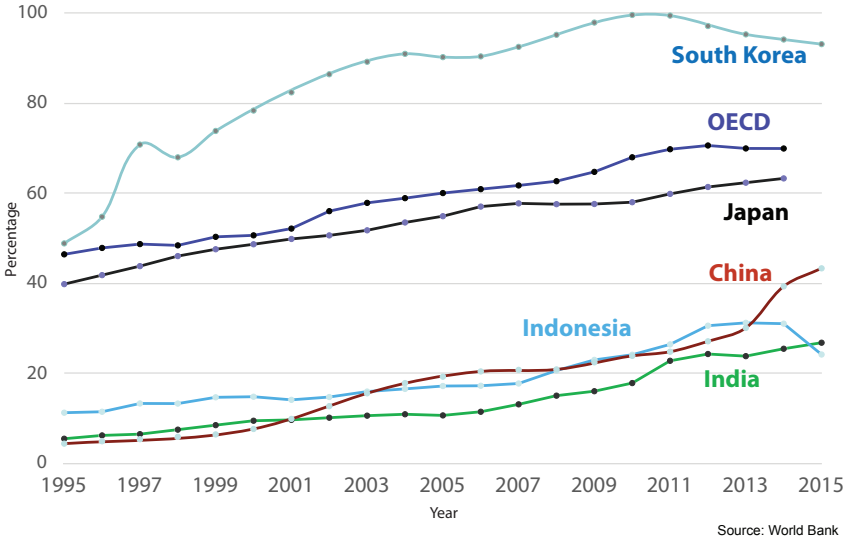
For most of us in higher education, it is very important to try and read the water well, to discern the main currents, and the important eddies, what they mean in general and, more specifically, for ourselves and our institutions.

Massification

Higher education in Asia has been developing very rapidly and there have been a number of important overlapping currents. These include 'massification' of higher education, strong interest among some institutions in liberal arts education and a tremendous focus on world-class research. As in most other parts of the world, there was not a MOOC (Massive Online Open Course) current but a MOOC tsunami. Fortunately, no one was injured and no institutions were damaged in the process. There has been a continuing interest in internationalisation and, in recent years, a lot of attention to university governance,

particularly in East Asia. But, in the interests of time, I will address only the first three trends, starting with massification.

Gross Enrolment Rate, tertiary 1995-2015



This chart shows the gross post-secondary enrolment over two decades in Asia. In the developed economies of Asia, such as South Korea and Japan, high participation rates have been maintained. But the big story in the last decade has been the unprecedented rise in China and, to a lesser extent, India. The numbers involved are remarkable. It is estimated that, by 2020, China alone will have over 37 million students in higher education and India will have over 27 million. This is positive because many more students are having the opportunity to develop intellectually and pursue expanded career options.

But it has also brought about significant challenges. The first is graduate unemployment and graduate under-employment.

- In South Korea, where tertiary enrolments are very high, over half a million people enter the job market every year, of whom 60 per cent are graduates, but there are only 200,000 permanent positions available. So, the jobless rate among the young has risen to over 8 per cent. This by itself is not a particularly high figure in global terms, even for some European countries, but from the East Asian and Korean perspective, it is a historic high.

- In India, the higher education sector has expanded very rapidly, largely on the back of private institutions, but there are issues with quality and a concern that a high proportion of graduates are not employable in any sector by industry standards.

- In China too, the rapid pace of expansion has resulted in a mismatch in the supply of and demand for graduates. In the major cities, there are large concentrations of graduates and graduate unemployment is relatively high. In the medium-sized and smaller cities, there are more jobs requiring graduates than there are graduates. This mismatch is made worse by the fact many graduates leave university with skills that do not match those needed by industry. As a result, unemployment rates are relatively high and graduate salary premiums are falling. One of the responses the Chinese Government is reported to be considering is converting several of these colleges into vocational schools.

There is another implication for small countries like Singapore. The very top 1 per cent of graduates in China in 2016 is more than double the total number of babies born in Singapore in that year. In small countries like Singapore, and also for countries which are slightly larger but not as big as China, we must ask ourselves what talent edge our graduates must have in an Asia where there will be far more graduates in far bigger countries.

Liberal arts education

So massification has raised important questions about the quality of teaching and learning. One significant trend has been the rise in interest in liberal arts education at several leading Asian universities. Although the numbers of such universities are relatively small, I think they represent a larger trend pushing for a different form of education than that which has traditionally been provided.

Some years ago, I was hosted by some colleagues in Nanjing University in China and they invited me for dinner in the 'Top Scholar Restaurant'. The walls were adorned with pictures of famous scholars from the Chinese past. One particular scholar, Ju Yin, was too poor to buy candles. So he collected fireflies in translucent bags, hung them from the ceiling and used their light to study late into the night. Another, Sun Jing, could afford candles, but his innovation to prevent himself falling asleep was tying his hair to the ceiling. This underscores the traditional focus on education, a tradition which also involves quite a lot of rote learning from established texts which are revered.

In many ways, the Asian interest in liberal arts represents a desire to move from education with a very early narrow specialisation to one that encompasses greater academic breadth. It also reflects a shift away from lectures, which until recently was the dominant form of instruction in Chinese universities, to more interactive learning, such as tutorials, symposiums and seminars. The idea is to try and foster greater levels of creative thinking and critical thinking among students and graduates. The interest in liberal arts is fairly distributed throughout Asia. In China, for example, there are institutions like Duke University and New York University, which have set up liberal arts programmes in partnership with Chinese universities. There is the Yuanpei College in Peking University as well as colleges in Korea and Japan.

In Singapore, we have the Yale-NUS College. NUS decided to partner with Yale on a liberal arts college because we wanted to develop a new form of education which we hope will nurture graduates who have the ability to both zoom out and zoom in. In other words, graduates who can zoom out to see the bigger picture and the connections between issues and also zoom in to go deep and rigorously into specific issues, and to think of different approaches and solutions. We believe this zoom out / zoom in ability is going to be very important in the future, together with graduates who have a much more multi-centric view of the world, with a deep appreciation of Asia and the world. NUS was also driven by our interest to attract very high-potential students from Singapore and globally for we had noticed that many of the top students in Singapore are now more interested in a liberal arts type of education.

We decided not to emulate existing models of liberal arts education but to work with Yale to develop a new model bringing together some of the best elements from US liberal arts education with the intellectual traditions, contexts and cultures of Asia. It was with that common goal that Yale and NUS worked hard from 2011 on the opening of the new Yale-NUS college at NUS in 2013. From the outset, there were three key uncertainties.

- The first was whether or not we would be able to deliver a completely new curriculum that would be able to bring together the best of East and West. An independent review by Yale and NUS faculty has answered this positively.

- The second concern was whether or not there was sufficient demand for liberal arts education among students in our region. When we first started talking about this to prospective students in Singapore and the region, many thought the liberal arts involved theatre, fine arts, and dancing, and the level of familiarity with liberal arts education was fairly low. So we were delighted and relieved that, when we launched in 2013, we had 10,000 qualifying applications for 150 places. For the latest class of 2021, we had nearly 8,800 applications for 250 places, and the 250 students admitted came from 45 nationalities. So we have found strong demand for liberal arts education among high-performing students.

- The third issue, which parents are particularly interested in, is graduate placements. From the first Yale-NUS class that graduated in 2017, more than 90 per cent secured jobs or graduate-study positions within six months of graduation. The sectors they are involved with include the public sector,

consulting, science and research, education, finance and start-ups. The companies that have hired these students include international companies like McKinsey, Goldman Sachs as well as start-ups like Carousell in Singapore. Several of the students have also gone on to graduate positions: one received a Rhodes Scholarship in Oxford, one was awarded a Schwarzman Scholars position and a number secured fellowships.

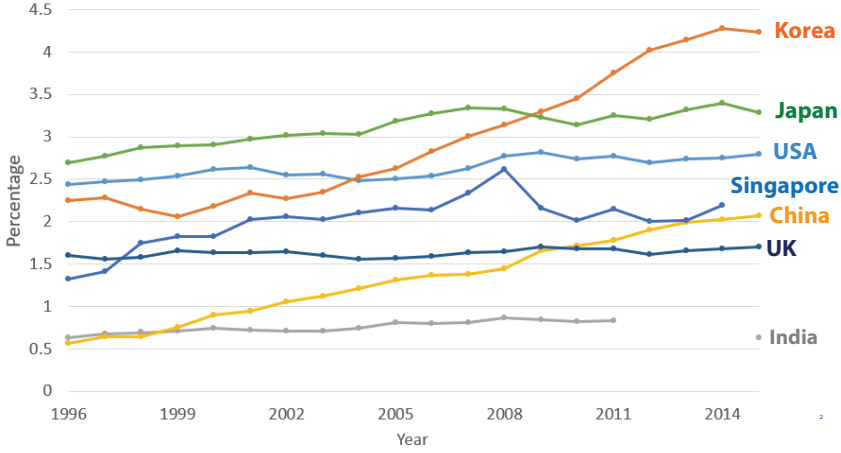
All in all, we are very encouraged by these early results. It reassures us that we are on the right track. We will continue to build on the programmes and curricula and look to see how our graduates are performing in 10 years' time, when we hope they will be assuming leadership positions in different sectors of society and the economy in Singapore and around the world.

World-class research

Beyond liberal arts education, there has been strong interest among universities in Asia in developing more world-class research. Many of us are familiar with the tremendous investments being made by countries in Asia to boost research and development (R&D). For example, as the next chart shows, Korea has become the most research-intensive country in the world, in terms of expenditure on R&D as a percentage of GDP. However, the most impressive strides have been taken by China, which has demonstrated a very sharp increase in investment in R&D, particularly over the last decade.

Research Expenditure

Gross Domestic Expenditure on R&D [as % of GDP]



Source: UNESCO Institute of Statistics

One result of this is that research output from China has also increased remarkably. China today accounts for about 15 per cent of the world's total scientific publications, including a growing proportion of the high-impact work. For the top 0.1 per cent of papers on Scopus, as rated by citations, China's share has grown from less than 1 per cent in 1997 to about 20 per cent now. However, if you look at citations which are normalised to the citation levels in their fields, known as a field-weighted citation impact (FWCI), China still lags behind the rest of the world. The world average is a FWCI of 1, whereas the figure for China in 2015 was 0.86 per cent.

Driving innovation ecosystems

I want to turn now to some of the key areas of present focus among universities in Asia. There are three which are particularly interesting.

- Universities in Asia are driving innovation and enterprise, much as universities are also doing in other parts of the world.

- Universities in Asia are also focusing on addressing broader local and global challenges and endeavouring to contribute to societal advancement.

- In several parts of Asia, particularly in Singapore, there is now a strong focus on lifelong continuing education.

In the interests of time, I will address only the first of these. As we all know, universities have substantial talent and research strengths. Through the mechanisms of commercialisation of intellectual property, start-ups, spin-offs and industry collaborations, universities contribute to the formation of new enterprises and the creation of new services and innovations. Universities can attract and boost industries and, in some cases, anchor industry clusters. This all contributes to the growth of national and in some cases global innovation systems. Humanities colleagues also contribute to addressing social and global challenges. They contribute to public understanding of issues and policy innovations that lead to societal advancement.

But I want to concentrate on the contribution universities make to innovation systems. Traditionally, there are three fundamental mismatches that impede close collaborations

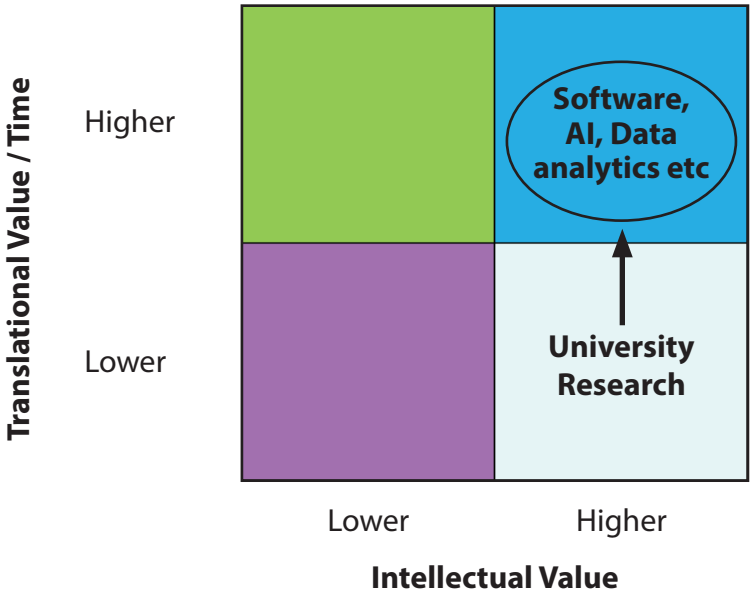
between universities and industry in R&D, namely in time frames, incentives and culture.

The time frame of academics tends to be indefinite whereas industry is much more focused on doing things quickly. Academics like to publish papers; industry is largely concerned about commercial outcomes and profits. In terms of culture, again, our academic colleagues like the freedom to explore and to pursue long-term research, while industry is often about timelines, schedules and deliverables.

In the same way, these traditional mismatches that impede university / industry partnerships in R&D, also affect the ability of universities to start up and spin off companies. But the landscape is changing, because industry players are adopting open innovation approaches and strategies when working with universities, to identify and recruit new talent through universities and to in-source intellectual property from universities. At the same time, in response to this, many more universities are embracing innovation and enterprise as core parts of their mission. In several countries – including Singapore – the government provides incentives that encourage universities and industry to work closer together in a much more substantive manner.

In universities, there have also been changes that have led to better alignment between the incentives and time frames for research and its translation. I want to explain this using a two-by-two matrix. In this matrix, where the x axis represents intellectual value and the y axis translational value, university research tends to be in the lower right quadrant. It is usually

of higher intellectual value, but relatively lower translational value.



What we have seen in recent years is that in certain fields – such as artificial intelligence (AI), computer science and data analytics – there are marked reductions in the time and barriers to move from a high quality basic research discovery to its high-impact application and commercialisation. So it is possible for universities to excel in basic research and create impact through its translation. As a result, more universities are moving into these areas because they represent a sweet spot between academic value and translational value. That means a higher quality of academic research and greater translational impact.

One notable observation concerns China. While China has been rapidly increasing its investments in R&D, much of that investment has been spent in more applied research. Less than 5 per cent was spent on basic research in 2013. Professor Wei Yang, the President of the National Natural Sciences Foundation in China, reported this in *Nature*:

> *For several decades, short-term and focused technological research and development (R&D) has been the main driver in China. Large public grants were channelled to promising or urgent areas to deliver new turbine engines, high-speed trains, solar panels or drugs in 5–10 years. Now China must take a longer and broader view, and nurture its science roots.*

This represents a fundamental change in thinking. Unlike the situation in most other countries, where universities tend to be in the right lower quadrant, for many universities in China, they start out being in the left upper quadrant, doing much more translational work. Now, the direction they are heading in is diagonally down to more high-impact academic work, with the objective in the longer term of creating much greater impact in translation.

This very long-term strategic view of R&D is impressive. In some areas, like artificial intelligence and data analytics, China is making massive investments, and also has access to huge amounts of data. In these areas, China could move straight into a situation where it is creating research of high academic value as well as commercial impact.

The changes at institutional level in China have also been remarkable. Tsinghua University is one of the top engineering

schools. Its research budget in 2016 was $750 million. Ten years before that, it was only a third or less. But what is impressive is the huge amount of funding through Tsinghua Holdings: $7.6 billion to support 500 start-ups with a value of about $18 million. The scale of the ambition is reflected in their aspiration to set up 1,000 incubators across China, with another 50 globally. And Tsinghua is not unique in this respect. I was at Zhejiang University for its 120th anniversary, and today it already has 90 incubators throughout China with with more in the pipeline.

This trend is most impressive in China, but is not confined to China. If you look at Korea, both KAIST and Seoul National are rated regularly among the top three most innovative universities in the Asia-Pacific region. And India is also planning to set up seven new research parks, where it is hoping to use its Indian Institutes of Technology (IITs) to drive industry and academic R&D innovation.

So it is useful to ask if there are more fundamental trends that are fuelling this push. I believe there are. We are entering a new age of empowerment, where technology is enabling individuals to do many things not possible before. My wife is a good photographer whereas I am a bad photographer. But, today, my photos are almost as good as hers, occasionally better, because she uses her old iPhone and I use a very fancy camera. Technology is levelling up skills across sectors, and new business and funding models are empowering start-ups and small businesses to pursue ideas successfully at a local, regional or even global scale.

A few months ago, I visited the Faculty of Engineering in NUS to see what the students were doing. I found they had worked

with *National Geographic* to build a 'flying car', which is really a paraglider. But the point that struck me is that, when I was a student, it was quite unimaginable to think about building a flying car. These students had just gone about it. Unafraid to try, and abetted by technology and know-how, they were able to pull it off.

All of our universities have stories like these. In Asia, rapid growth creates excellent conditions for universities to develop the education, research and entrepreneurial programmes that ride on the new opportunities and also to offer solutions to some of the serious challenges that rapid economic growth creates.

The future: job-ready graduates and delivering societal impact

Finally, I would like to take a few minutes to talk about what all these currents and eddies mean for universities, with particular reference to how we, at the National University of Singapore, have viewed the changes of the past few years. I am mindful of the Samuel Johnson test. He was asked to review a manuscript, and after reading it, he told the author:

> *My congratulations to you sir. Your manuscript is both good and original; but the part that is good is not original, and the part that is original is not good.*

But I want to talk just briefly about the three really critical questions that these trends hold for myself and my colleagues in NUS, and more generally, for universities for the future.

We know the nature of work is changing fundamentally, driven by technology, software and artificial intelligence, often

covered under the rubric of the Fourth Industrial Revolution. We know that people are going to live longer, they are going to work longer, and that many of our graduates will work in many different jobs across many sectors: not so much 'a career for life' any more, but 'a lifetime of careers'. As I mentioned earlier, for smaller countries like Singapore, where our total annual birth rate is only 0.5 per cent of new graduates in China, what should we do to ensure that our graduates maintain a human capital edge in Asia?

These are difficult questions. I will not attempt to go through all our thinking, but we have been asking what general skills apply across most job sectors that graduates should master to be successful and employable throughout their lives. These include: critical thinking; communications, writing and exposition; digital literacy; and quantitative reasoning. We also need to consider what specific skills our graduates need for their first and second jobs. Beyond academic curricula, we have placed more emphasis on experiential learning in order to develop the strong personal and interpersonal qualities that are essential for success, as well as programmes that help cultivate the habit and ability for effective lifelong learning.

I have already mentioned the zoom out / zoom in ability that we are trying to inculcate. The challenge now is taking this and spreading it out among a much larger and more diverse student population. Beyond this, there is another even more challenging area - how do we help our students and graduates develop an entrepreneurial mindset - not in the narrow sense of starting a business, but about having the imagination to see new possibilities, and the boldness to seize new opportunities? This entrepreneurial mindset is one of the most critical things

for success in a fast changing and unpredictable world. How do we go about achieving this?

At NUS, we have also thought deeply about how our university can have a truly transformative impact, bringing benefits to the majority in society.

This has resulted in a number of new initiatives. One of the things we have been working on is trying to bring together the diverse research strengths in our university that can contribute to the transformation of selected sectors. For example, we brought our multidisciplinary research strengths in medicine, finance, behavioural science, engineering, computing, data analytics and others, to contribute to the transformation of our healthcare delivery system. We developed close partnerships with the Ministry of Health, public agencies, industry and the community.

What has been particularly exciting for us has been the close partnership with the Ministry of Health. The Ministry has allocated a new campus where we will work together to develop new models in healthcare delivery and design new types of buildings in which these can occur. We will use the entire campus as a test bed. Even more importantly, the Ministry will be creating 'sandboxes' where innovation can occur, so long as patient safety and outcomes are assured – and where we can experiment with finance and payment redesign. Currently, many innovations in health system transformation have a limited impact because of the financing arrangements.

This creates a very exciting opportunity for us to work on new models of care delivery that can lead to the transformation of

the health system. In particular, we can bring many different research capabilities to bear on the complex questions that will surface. It also opens up new opportunities to collaborate with other academic institutions, industry and start-ups. By working together, we can fuel the transformation of an entire sector.

We can also take this entire construct, all these different places where we are working together on healthcare transformation, and use them as new settings for students to learn. It will create exciting new learning environments that are automatically cross-disciplinary and where the things students do bridge fundamental research and applications in the real world. Students will be able to work with local and international researchers and faculty with the goal of nurturing students with a very different mindset for tackling future problems.

Conclusion

This is all easy to articulate, but hard to do. Let me close by telling you about the Border Roads Organisation in India. They are responsible for building and maintaining roads in northern India, near the Himalayas. They also put up very nice, bright yellow road signs. Of these, the road sign I like the best, which encapsulates the spirit in which we have to face the future and seize the opportunities it presents, says: 'Impossible will take time, difficult will be done immediately'.

Trustees

Professor Sir Ivor Crewe (Chair)
Sir David Bell
Dame Sandra Burslem
Professor Sir Peter Scott
Professor Dame Helen Wallace

Advisory Board

Professor Dame Janet Beer
Professor Sir David Eastwood
Professor Dame Julia Goodfellow
Professor Carl Lygo
Professor David Maguire
Professor Sally Mapstone

Partners

BPP University
Ellucian
Elsevier
Higher Education Academy
Jisc
Kaplan
Mills & Reeve LLP
Oracle
Pearson
PwC
Times Higher Education
Unite Students
UPP Group Limited

President

Bahram Bekhradnia

Previous HEPI Annual Lectures

2003 Lord Dearing
2004 Robert Reich
2005 Lord Broers
2006 Prince Hassan of Jordan
2007 Professor Yves Meny
2008 Lord Giddens
2009 Professor Rick Levin
2011 Dr Jamil Salmi
2012 Professor Choon Fong Shih
2013 Bahram Bekhradnia
2014 Professor Paul Wellings
2015 Andreas Schleicher
2016 Dr Martha J. Kanter

Previous HEPI Annual Lectures are available at http://www.hepi.ac.uk/category/events/lectures/

HEPI was established in 2002 to influence the higher education debate with evidence.
We are UK-wide, independent and non-partisan.
February 2018 ISBN 978-1-908240-35-4

Higher Education Policy Institute
99 Banbury Road, Oxford OX2 6JX
Tel: 01865 284450 www.hepi.ac.uk

Printed in the UK by Oxuniprint, Oxford
Typesetting: Steve Billington, www.jarmanassociates.co.uk