establishing how the excellence initiatives actually caused the positive changes would require an in-depth evaluation.

In the absence of impact analyses of the recent excellence initiatives, comparing the results of the top universities in the Academic Ranking of World Universities (Shanghai Ranking) over the past decade (2004–2015) offers a few insights. The four countries that have made most progress are China (24 additional universities in the top 500), Australia (five additional universities), Saudi Arabia and Taiwan (four additional universities each). All four countries have had one or more excellence initiatives, which have facilitated sustained investment in support of their top universities.

At the bottom of the list, the main "losers" are Japan and the United States, which place, respectively, 15 and 24 universities fewer among the top 500 in 2014, compared to ten years earlier. In the case of the United States, it is interesting to note the relatively higher proportion of public universities that dropped out of the ranking, which tends to confirm the adverse impact of the significant reduction in public subsidies since the 2007 financial crisis.

At the institutional level, the five universities that have climbed most significantly in the ranking over the past decade—Shanghai Jiao Tao University and Fudan University in China, King Saud University in Saudi Arabia, the University of Aix-Marseille in France, and the Technion-Israel Institute of Technology—have all received funding from their respective national excellence initiative.

What Positive Changes Can Be Observed?

Besides supporting entire universities in their improvement efforts, many excellence initiatives have offered funding to build critical mass by establishing new centers of excellence or strengthening existing ones, oftentimes with a focus on multidisciplinary approaches. A recent OECD review of excellence initiatives found that one of their major benefits has been to provide funding for high-impact/high-risk basic research, as well as for interdisciplinary and cooperative research endeavors.

Excellence initiatives often mark a momentous philosophical shift in the funding policies of the participating countries, notably in Europe. In France, Germany, Russia, and Spain, for instance, where all public universities had traditionally been considered to be equally good in terms of performance, the excellence initiatives have brought a move away from the principle of uniform budget entitlements towards a substantial element of competitive, performance-based funding.

Indeed, the selection process to choose the beneficiary universities and/or centers of excellence is perhaps the most noteworthy element of excellence initiatives. In the majority of cases, the government's approach has involved a competition among eligible universities with a thorough peer review process to select the best proposals. The peer review process usually relies on the work of expert evaluation teams including a mix of national and international experts.

As competition for funding among universities gets fiercer, the importance of cooperation should not be overlooked. Evidence shows that researchers are most effective when they participate in collaborative projects, nationally or internationally. The Canadian program of chairs of excellence, for example, has brought about unexpected synergies resulting from multiple collaborations across universities.

One of the other positive outcomes of excellence initiatives is that they have allowed a new generation of university leaders to emerge. The successful transformation and upgrading of universities, which is what excellence initiatives pursue, requires indeed a bold vision and the capacity to change the mindset of the academic community in the search of academic excellence.

Risks Associated with Excellence Initiatives

At the same time, excellence initiatives may engender negative behaviors and carry adverse consequences. Policy makers and university leaders must keep in mind the risk of harmful effects on teaching and learning quality because of the research emphasis of most excellence initiatives; reduced equality of opportunities for students from underprivileged groups as universities become more selective; and diminished institutional diversity as all institutions aspire to become world-class universities. Another challenge faced by several excellence initiatives is that, in the absence of an appropriate governance reform to free them from civil service regulations and limitations, beneficiary universities tend to create parallel tracks to provide a positive environment for their star researchers, with state-of-the-art laboratories and US-style doctoral schools operating in isolation from the rest of the university, which may remain untouched by the changes financed through the excellence initiative. ■

Funding World-Class Universities

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Governments always face a choice between access and excellence: should resources be spent narrowly on a

few institutions in order to make them more "world-class," or should they be spread more widely in order to build capacity and increase access? During hard times, these choices become more acute. In the United States, for instance, the 1970s were a time when persistent federal budget deficits, combined with a period of slow growth, caused governments to slash their higher education budgets. Institutions often had to choose between their access function and their research function, and the latter did not always win.

In many senses, the world since 2008 has been in a similar situation; a combination of slow growth and fiscal deficits are forcing choices between widening access and increasing research-intensity (which is of course the basis of "world-classness"). The question is: what choices are in practice being made in different countries?

For this exercise, I assembled data on real institutional expenditures per student in higher education, in ten countries: Australia, Canada, France, Germany, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. These ten countries collectively house 91 of the top 100 universities in the Academic Rankings of World Universities (ARWU, also known as the "Shanghai Rankings") and so can give us a relatively strong picture about what is happening at the world's very best research institutions. Expenditures are preferred to income as a measure of financial capacity because the latter is inconsistent and prone to sudden swings (especially where endowment returns are concerned), which detracts from the longer-term trend analysis. Insofar as is possible, and in order to reduce the potential impact of different reporting methods and definitions of classes of expenditure, I use the most encompassing definition of expenditures, given the available data.

The availability of institutional data across countries is uneven. Reasonably consistent annual data at the institutional level can be obtained in Australia, Canada, Sweden, Switzerland, the United Kingdom, and the United States; however, institutional-level data is spotty in Germany, Japan, and the Netherlands, and in France no real institutional data is available. For the first six countries, comparisons between the finances of "top" universities (i.e., those in the top 100 of ARWU) and other universities is possible; for the other four, only general comments at the national level can be made.

An examination of this data reveals a number of important findings:

1) Since 2008, total per-student expenditures across the sector as a whole have risen in only three countries: Japan, Sweden, and the United Kingdom. In the United Kingdom, student numbers have risen, but institutional expenditures have increased even more, thanks to the influx of money from the massive new tuition fees introduced in 2012. This is equally true at top universities and across the sector as a whole; in both cases, per-student increases are about 8 percent in real terms since 2008. In Japan, universities have received a very slight increase in funding (just over 3 percent) but student enrollments have been flat. In Sweden, there have been small but steady increases in institutional income/expenditures, but the real news is that enrollments have been decreasing rapidly as part of what appears to be a policy of trying to maintain quality; as a result, sectorwide, per-student expenditures have risen roughly 15 percent since 2008. The surprise here perhaps is that per-student expenditures in Germany is no different than in 2008 despite the federal-länder "higher education pact." Partly, that is because of the choice of base year (if 2007 were chosen instead, we would see a significant rise), but also because one of the intended outcomes of the pact—greater access to university studies—has in fact come true, thus diluting the new money.

2) Only in Canada, Switzerland, and the United States are "top" universities doing better than the rest of the pack. In the United States, ARWU-100 universities have seen per-student income climb 10 percent since 2008, while the rest of the system has stood still or declined a bit. This has mainly been due to their ability to charge increased tuition and expand their research funding, especially at the major private universities. In Switzerland, expenditures are up across all institutions, but student growth has been slower at "top" universities than elsewhere, so per-student expenditures growth has been higher among the elite schools (10 percent since 2008) than the rest of the sector, where it has fallen slightly. In Canada, per-student funding at top universities has stayed constant, but this is better than at other institutions, where per-student funding has fallen somewhat.

3) Overall, Switzerland, the United Kingdom, and the United States are the only countries where "top" universities are continuing to increase their per-student revenues in the wake of the economic crisis. These three countries already monopolize the top twenty positions in the ARWU rankings; in theory at least, this should solidify their standing at the top.

4) In Australia and Sweden, "top" universities are doing worse than the rest of the system. In Sweden, the sector as a whole has seen per-student incomes increase by 15 percent, but because the top universities have been attracting more students, they have had no increase at all in per-student income. In Australia, the entire sector is seeing a fall in per-student income, but it is worse in the "top" universities (15 percent) than in the sector as a whole (10 percent).

What does this mean for the future of world-class universities? Strikingly, while money is an important ingredient, the success of universities does not rest solely upon it. Certainly, money does not seem to have much of a material short-run effect on ARWU rankings: if it did, Australia's universities would be doing much worse than they are. Clearly, institutional strategy, hiring practices, and the quality of university management matter as well.

But it is equally plain that money makes a lot of other challenges in higher education much easier. If present trends continue, it seems likely that private American universities will keep their positions at the top of international rankings tables and perhaps even widen their lead. Top American public flagships, along with British and Swiss universities, will find it easier to cope than most.

Elsewhere, the problem seems to be in part that new money often only follows new students. That is, universities who want more money to pursue a more research-intensive path must first admit more students, mainly undergraduate ones. Governments may think they are offering universities a good bargain this way, but frankly this is not always helpful. Much of the new money simply gets spent educating the students themselves and there is very little "extra" to devote to excellence. Governments who wish their universities to pursue world-class status quite simply need to find ways to decouple revenue growth from enrollment growth. That could mean relinquishing control over tuition fees, or increasing the size of excellence programs, or some other measure.

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The alternative to raising more money in order to pursue world-class university status is to make universities more efficient and find more "margins" within the institutions that can be reinvested in research. It seems clear that Australian ARWU-universities have been doing exactly this for some years now, and governments around the world may want to look at the ways in which institutions there have found success. Given the overall fiscal difficulty many governments are currently experiencing, this may be a more productive way for institutions to continue pushing for world-class status than waiting for further infusions of public money.

As Ernest Rutherford is reputed to have once said: "Gentlemen, we have run out of money. It is time to start thinking." ■

Two Central Obstacles to Russian Academic Excellence

Philip G. Altbach

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For the past several years, the Russian government has been investing significant funds to upgrade 15 of the best universities to compete with the world's best research universities and join the top ranks of the global rankings as part of the Russian Academic Excellence Project, known as the 5-100 Project. At a recent meeting in Moscow, the top seven of these universities were each awarded 0.9 billion rubles (about US$15 million) for 2016, and the others somewhat less. Most of the universities have made significant progress since the inception of this Excellence Initiative in 2013—reforming governance, streamlining administration, stimulating interdisciplinary studies, and especially improving research output.

Although Russia has a distinguished academic tradition, many talented academics, and government backing to join the top ranks of global research universities, there are two fundamental structural barriers to success—created by the traditional separation of "academic science" and "medical research" from the universities and placing them in specialized academies. There are many other challenges as well—but these two structural realities are deeply embedded in the Russian academic structure, and without changing them it will be impossible for Russian universities to be fully internationally competitive.

Key Structural Challenges

The first and most fundamental impediment is the "academy of science" system that traditionally has located research in a large number of separate institutes belonging to the Russian Academy of Sciences. Universities have traditionally been tasked with teaching and have had only mod-