



FINANCE and DEVELOPMENT
December 2014

21st Century Health Threats

Matchmaker Alvin Roth Profiled

China Learns to Tango

The Fight for Global Health

Finance & Development

is published quarterly in English, Arabic, Chinese, French, Russian, and Spanish. English edition ISSN 0015-1947

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Washington, DC, 20090, USA
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Postmaster: send changes of address to *Finance & Development*, International Monetary Fund, PO Box 92780, Washington, DC, 20090, USA. Periodicals postage is paid at Washington, DC, and at additional mailing offices. The English edition is printed at Dartmouth Printing Company, Hanover, NH.



FINANCE & DEVELOPMENT A QUARTERLY PUBLICATION OF
THE INTERNATIONAL MONETARY FUND
December 2014 • Volume 51 • Number 4

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The First Wealth

“THE first wealth is health,” American philosopher Ralph Waldo Emerson wrote in 1860.

Emerson's quote, cited by Harvard economist and health expert David E. Bloom in this issue's lead article, reminds us that good health is the foundation on which to build—a life, a community, an economy.

Humanity has made great strides, developing vaccines and medical techniques that allow us to live longer, healthier lives. Other developments—such as increased access to clean water and sanitation—have helped beat back long-standing ills and pave the way for better health.

But the story is not one of endless progress. As we went to press, the world was dealing with the worst outbreak of the Ebola virus on record, a grim reminder of our vulnerability and of the distance yet to go. And, though not often the subject of headlines, the great disparities in health—evident, for example, in the 38-year gap in life expectancy between Japan (83 years) and Sierra Leone (45 years)—raise issues of equity and point to the need to press forward on multiple fronts.

In this issue, we've assembled a lineup of accomplished authors to look at global health from a variety of angles. They look at today's health systems—the amalgam of people, practices, rules, and institutions that serve the health needs of a population—and at the economics behind them.

In his broad-ranging article, Bloom underscores the role good health plays in an individual's or household's ability to rise, or stay, above the poverty line. Several articles explore health care spending: Victoria Fan and Amanda Glassman examine the shift in public health spending from central governments to states and cities; and Benedict Clements, Sanjeev Gupta, and Baoping Shang take a look at whether the recent slowdown in public health spending in advanced economies is permanent.

We offer several reports from the front lines: health ministers from Colombia and Rwanda discuss major challenges in their jobs, and the CEO of a pharmaceutical company looks at impediments to developing drugs to fight emerging diseases. Another special feature considers four major health threats of the 21st century.

Elsewhere in this issue, Maureen Burke profiles 2012 Nobel Prize winner Alvin Roth, and Picture This offers insight into our increasingly urbanized world.

Jeffrey Hayden
Editor-in-Chief

Illustration: pp. 42, 43, ThinkStock Images; p. 44, Michael Gibbs; p. 45, ThinkStock Images and Michelle Martin/IMF.

Photography: Cover, Narinder Nanu/AFP/Getty Images; p. 2, Noah Berger; p. 6 Jodie Coston/Getty Images; p. 12, William Campbell/Corbis; p. 16, Ministerio de Defensa de España/Corbis; p. 17, Michael Prince/Corbis; p. 18, Edward Rozzo/Corbis; p. 19, Science Stills/Visuals Unlimited/Getty; p. 21, Herminso Ruiz; p. 23, Amélie Benoist/BSIP/Corbis; p. 26, Stéphane Saporito, WHO; p. 28, WHO; p. 30, Karen Kasmauski/Corbis; p. 33, Stephanie Novak; p. 34, Jaipal Singh/epa/Corbis; p. 37, ThinkStock Images/Getty Images; p. 38, Violetta Markelou; p. 39, Tim Martin/Getty Images; p. 42, Frederic Soltan/Corbis; p. 43, Stephen Jaffe/IMF; p. 47, G.M.B. Akash/Panos; p. 52, Greg A. Syverson/Getty Images; pp. 56, 57, Michael Spilotro/IMF.

The FIXER

Maureen Burke profiles Nobel laureate Alvin E. Roth, who uses game theory to make people's lives better

ALVIN Roth still recalls his visceral reaction in 1995 when he got the call from Bob Beran of the National Resident Matching Program. The “Match”—a clearinghouse that annually pairs thousands of newly minted U.S. physicians with jobs—was looking for someone to direct its redesign.

“Why me?” Roth remembers thinking, with an uneasy feeling. He knew, of course, why Beran had sought him out. Roth had written a book on matching and studied many market failures that preclude demand and supply from working accurately, including in the medical labor market. His investigation of clearinghouses and optimal matchups—such as between brides and grooms or doctors and hospitals—had earned him prominence in his field.

But as a theorist, he had not needed to worry about the details of implementing a mechanism to ensure a stable match, as optimal pairing is called. It had been enough to identify problems in the process. If he agreed to redesign the Match, though, he would have to find solutions.

This project marked Roth's first venture into the real-world practice of market design, for which he would win the Nobel Prize in economics with Lloyd Shapley in 2012.

Physician, heal thy market

Roth had studied the market for new doctors. He knew that in the 1940s, competition for scarce medical students compelled hospitals to offer residencies to students increasingly early in their schooling, sometimes more than a year before graduation.

Clearly broken, the system was revised a few years later when medical schools agreed not to release information about their students until a certain date—but then, new issues emerged. Students on the waiting list for their first-choice hospital balked at accepting offers for their second choice, holding out as long as possible. As a result, waiting lists remained static until the very end of the selection period, when decisions were often made in haste. And when an offer was ultimately rejected, it was often too late for the hospital to make offers to other desirable candidates.

The process of matching new doctors and hospitals had become a messy process that displeased both medical students and their potential employers. To better align the preferences of medical students and hospitals, the Match—which paired students with hospitals using rank-order preference lists from both sides—was introduced in the early 1950s.

But there were new problems. The number of female medical students had grown dramatically, and many couples who met in medical school requested residencies in the same city. The Match could not accommodate these requests, so many people simply circumvented it, which signaled a breakdown in the system.

Roth agreed to refine and modernize the program and, together with Elliott Peranson, developed the mathematical procedure, or algorithm, that is still used today to match up new doctors and employers. The algorithm has been adopted by over three dozen labor market clearinghouses.

Matching markets

Economists traditionally study markets where prices adjust so that supply equals demand. But Roth is a game theorist who specializes in “matching markets”—markets in which changes in price alone do not clear the market. Participants can’t just choose what they want, even if they can afford it; they also must be chosen. Think college admissions or the dating market.

A pioneer of a new branch of economics called market design, Roth uses the mathematical tools of game theory to fix systems whose market mechanism has failed. Market designers have a clear-cut task in markets without prices, because if price is not playing a signaling role, there has to be another mechanism for clearing the market. Economists like Roth help design these mechanisms.

Market designers try to understand “the rules and procedures that make various kinds of markets work well or badly,” Roth explained in a 2007 article in the *Harvard Business Review*. “Their aim is to know the workings and requirements of particular markets well enough to fix them when they’re broken or to build markets from scratch when they’re missing.”

Much of Roth’s work builds on theory initiated by Shapley. In awarding the Nobel, the Royal Swedish Academy of Sciences cited the pair for “the theory of stable allocations and the practice of market design.” Shapley is generally credited for his theoretical contribution and Roth for putting the theory to practical use.

The deferred acceptance algorithm—proposed by Shapley and David Gale in their 1962 paper “*College Admissions and the Stability of Marriage*” published in *The American Mathematical Monthly*—underpins this work.

This algorithm looks at how 10 women and 10 men can be paired up, based on the individual preferences of each. Women can propose to men, or men can propose to women. In the more traditional scenario, the process begins with each man proposing to the woman he likes the most. Each woman then looks at the different proposals she has received (if any), retains what she regards as the best proposal (without yet accepting it), and rejects the others.

The men who were rejected in the first round then propose to their second choices, while the women again keep their most attractive offer and reject the others. This continues until no men want to make any further proposals. Each of the women accepts the proposal she holds, and no further iterations are needed. Gale and Shapley proved mathematically that this algorithm always leads to a stable matching—that is, one in which no couples would break up and form new matches that would make them better off.

Roth has used variations of the algorithm to match students to schools, law clerks to judges, and more. “Markets help people live their lives better,” Roth says simply. “We should improve them when we can.”

Problem child

Alvin Roth was born in 1951 in the New York City borough of Queens. His parents, first-generation Americans, taught typing and stenography in the public high school system. Roth was always “a bit of a problem child,” he claims. Unhappy in school, he dropped out at age 16.

At the time, he was enrolled in Columbia University’s Science Honors Program, which held math and science classes on Saturday mornings for gifted youth from the New York City area. With the help of people associated with the honors program, he was admitted to Columbia’s undergraduate engineering program without a high school diploma. He graduated in three years with a bachelor’s degree in operations research.

“Who knew that I didn’t mind taking classes and learning? But I didn’t like high school very much,” Roth says. “We weren’t a good match.”

Roth moved to Stanford University in 1971 to pursue a PhD in operations research, sometimes described as a scientific approach to managing complex systems. There, he gravitated toward game theory, his interest sparked by a class with visiting professor Michael Maschler from the Hebrew University of Jerusalem. Roth also connected with Bob Wilson, a game theorist who taught at the Stanford Business School and became an important mentor.

Roth’s dissertation solved a problem that had been raised 30 years earlier in mathematician John von Neumann and economist Oskar Morgenstern’s seminal *Theory of Games and Economic Behavior*, the book that started the field of game theory. Roth downplays this accomplishment, saying the whole topic turned out to be a dead end. But dead ends are not necessarily bad, he adds. “The field has made a lot of progress by exploring dead ends.”

Before leaving California to take up a teaching position at the University of Illinois at Champaign-Urbana, he made a pilgrimage of sorts to visit Shapley, then an eminent game theorist at the RAND Corporation, a think tank in Santa Monica. The young Roth didn’t know Shapley, but because the field was so small in those days, seeking out its leaders somehow made sense. “It wasn’t hard to get the idea that, if you proved a new theorem in game theory, then you should go tell Shapley about it.”

The boundaries of the discipline, meanwhile, were shifting. “Shortly after I got my PhD in 1974, it looked like game

theory was going to thrive as a part of operations research. But it didn't—it thrived in economics," Roth says.

At Illinois, where Roth was appointed at the age of 22 as assistant professor in the departments of Economics and Business Administration, he began doing experiments in game theory with psychologist colleagues, among them J. Keith Murnighan.

Murnighan, now a professor at Northwestern University's Kellogg School of Business, remembers Roth as brilliant. "For

Markets help people live their lives better. We should improve them when we can.

a while he worried that he wouldn't have any great ideas after he turned 25," given the tendency of mathematicians to peak young, Murnighan says.

Roth found, after a time, that the two professions had divergent views on how to test game theoretic predictions in a laboratory. But his interest in experimental economics has endured, and he continues to view laboratory work as an important way of testing assumptions about behavior.

"If you're a game theorist, rules are data. One of the things I want to know about a market is, what are its rules and what are the *newest* rules?" Roth explains. "Because when you observe people making rules, you suspect that they're observing some behavior that they're trying to moderate." This, in turn, gives the researcher a window on the market and provides clues as to what the market's optimal design might be, he says.

Kidney exchange

In 1982, Roth moved to the Economics Department of the University of Pittsburgh, while his wife Emilie—a cognitive psychologist he'd met at Illinois—started a job at the Westinghouse Corporation's Research and Development Center in Pittsburgh.

Their 16-year stay in Pittsburgh overlapped with a couple of notable events. The University of Pittsburgh Transplantation Center—one of the world's preeminent transplant hospitals—opened in 1985, led by Thomas Starzl (for whom it is now named), often called the father of organ transplantation. A few years later, Boston surgeon Joseph Murray won the Nobel Prize in medicine for performing the first successful kidney transplant.

It's not surprising that, around that time, the problem of matching patients needing a kidney transplant with transplantable kidneys caught Roth's attention.

By the early 2000s, hospitals had begun to perform a limited number of live kidney exchanges involving two donor-patient pairs. In these exchanges, the patient in each of two incompatible patient-donor pairs was compatible with the donor in the other pair, allowing each patient to receive a kidney from the other's intended donor.

Still, there was a considerable shortage of kidneys. In 2002, more than 55,000 patients were on the waiting list in

the United States for deceased donor kidneys. About 3,400 patients died while on the waiting list, and another 900 became too sick for transplantation.

Roth—by then at Harvard University—penned a 2004 paper with Utku Ünver and Tayfun Sönmez in which they argued that the number of transplants could rise substantially if there were an "appropriately designed clearinghouse" that drew from a database of incompatible patient-donor pairs. Their proposal, published in the *Quarterly Journal of Economics*, involved exchanges with no restrictions on number.

They sent the paper to several surgeons, but only one—Frank Delmonico, then the Medical Director of the New England Organ Bank—responded. Their work with Delmonico resulted in the formation of the New England Program for Kidney Exchange, which brought together 14 kidney transplant centers across the region.

But despite the success in organizing kidney exchanges, Roth noticed that the number of surgeries arranged by the New England Program for Kidney Exchange was growing much more slowly than expected. "I worked with a colleague of mine, Itai Ashlagi of the Massachusetts Institute of Technology, to try to figure out what was going on," Roth says. In the general patient population, more patients are easy to match than hard to match. But when they looked at who was enrolling in the exchange, they saw fewer easy-to-match pairs than expected and far more than expected hard-to-match pairs.

"What was going on was something game theoretic," says Roth. "When we started the kidney exchange, we were mostly dealing with patients and their surgeons, but as kidney exchange became a regular part of American transplantation (although still at a small level), the players changed, and the important players became the directors of transplant centers."

But directors of transplant centers have different strategies than individual surgeons, because they see many more patients and donors, explains Roth. "What they [directors] were starting to do was withhold the easy-to-match pairs and match them internally at their hospital, and only show us the hard-to-match pairs." This was a problem that could be fixed, but it was a politically tricky one, Roth says.

"But that's one of the fun things about market design," Roth observes. "Not only is the market not exactly the way we conceived of it when we wrote our initial paper, but the fact of having a market has actually changed it."

Increasingly, Roth says, kidney transplants are organized through what are known as "nonsimultaneous chains," in which a long chain of transplants can take place over time, initiated by an altruistic donor who is willing to donate a kidney but does not have a particular recipient in mind.

The chain starts when this donor gives a kidney to a patient whose willing donor is healthy but immunologically incompatible. The would-be donor of the first recipient then donates a kidney to a sick patient in another incompatible pair, and so on, until the chain ends, sometimes with the last donor giving a kidney to a patient on the waiting list. Such chains, which have involved up to 60 people, allow donation programs to reach far more people than the original exchanges.

Potential for organ sales?

Of course, the kidney shortage might be greatly reduced if these organs could be legally bought and sold, some believe. The human body can function just fine with one kidney. Done correctly, therefore, donation is a low-risk procedure that can save lives. So the widespread reluctance to consider monetary markets for kidneys is something Roth is keen to understand better.

Buying and selling kidneys is illegal everywhere except in Iran, where there appears to be no shortage of kidneys. “That strikes me as a big data point that we ignore at our peril,” Roth says.

“It could be that, by explaining carefully how a well-regulated market could bring the benefits of voluntary exchange between consenting adults, we could move in that direction,” he adds. “But when you see something that’s against the law nearly every-

where, you also have to think that maybe there’s some obstacle to it, even if you haven’t completely understood it yet.”

These differing attitudes toward organ sales and other “repugnant transactions”—transactions some people favor but others want banned—have led Roth to study this phenomenon in more depth (see box).

Roth spent almost as long in Cambridge as in Pittsburgh—14 years—dividing his time between Harvard’s Department of Economics and the Harvard Business School (HBS).

“At Harvard, I occupied two offices and crossed the Charles River twice almost every day, as I would walk from HBS to Economics and then back to get on my bike or in my car for the trip home,” Roth wrote in his autobiographical statement on nobelprize.org. “It was a short walk, but it sometimes felt like a big change in perspective. As a market designer I was glad to be able to work on both sides of what sometimes seemed like a wide river, between theory and practice and simple abstraction and messy detail.”

During this period, in addition to the work on kidney exchange, he helped redesign school choice systems for public schools in New York City and Boston, using a modified form of the deferred acceptance algorithm. He also helped fix the U.S. entry-level labor markets for gastroenterologists and PhD economists, among others. Roth has written about each of these cases in detail, revealing the myriad ways markets can unravel.

And he does so in an amazingly accessible way.

“Al has remarkable skill at taking economic concepts and explaining them to laymen,” observes Parag Pathak of the Massachusetts Institute of Technology, who studied market design under Roth at Harvard and later worked with him on redesigning the school choice system in New York City. “He was able to translate our ideas into a very digestible piece that the Department of Education could then use to explain to its constituents why it was changing the system.”

“It’s really easy to get lost in the world of science—to create your own world and stay detached from reality,” says Atila Abdulkadiroglu, an economics professor at Duke University who also worked with Roth on school choice. “With Al, he always asks, who is this research going to benefit outside the scientific community?”

In summer 2012, Roth returned to Stanford after nearly 40 years—but this time to the Economics Department, as the Craig and Susan McCaw Professor of Economics. (He remains an emeritus professor at Harvard.)

A few months later, Roth was awarded the Nobel—something he termed “a great honor” but which resulted in an onslaught of email, as well as speaking engagements and other commitments. “After a year of heavy travel, I began to worry that I would be condemned to forever talking about work I had done long ago and not about the work I was doing then,” he joked.

The prize did help resolve one piece of unfinished business, though. After learning of the Nobel, his high school, Martin Van Buren, in 2014 granted him a high school diploma—albeit an honorary one. ■

Maureen Burke is an Assistant Editor on the staff of Finance & Development.

Repugnant transactions—why should we care?

There are transactions that some people favor and others want banned. Roth writes about such transactions in his 2007 paper “Repugnance as a Constraint on Markets” and believes they merit further study.

Even if there are willing suppliers and demanders of certain things, aversion by others may constrain or prevent the transaction, Roth notes. Prostitution is one example of a “repugnant transaction”; buying and selling ivory is another. What constitutes a repugnant transaction varies widely across cultures. Surrogacy, payment for carrying another woman’s child, is legal in California, but not in many other jurisdictions.

What people consider repugnant can also change over time. Indentured servitude, for example, was once a common way for Europeans to buy passage across the Atlantic to America. Now, the practice is seen as unacceptable and is illegal.

With same-sex marriage, the reverse has happened. Prohibited everywhere in the United States until recently, it is now legal in more than 30 states and gaining acceptance. “It’s hard to pinpoint the negative externality that makes some people object to other people getting married,” says Roth. “But people do object.”

Some transactions that are perfectly acceptable as in-kind exchanges become repugnant once money is added to the equation. Monetary compensation for organ donation is a case in point. There are three common arguments against it—that human body parts would become objectified, that poor people could feel coerced into selling their organs, and that such transactions would lead to darker practices, such as using organs as collateral for loans.

Why should economists study repugnant transactions? Roth points to the church’s ban on charging interest in medieval Europe, a kind of repugnancy still present in some cultures but that seems hard to imagine on a large scale today. “We’d hardly have a capitalist economy if we didn’t have a market for capital,” Roth says.

So the role of economists, he says, is to figure out what exactly people find repugnant about certain transactions, then try to design and regulate these markets in a way that benefits society without the perceived harms.



The Shape of Global Health

The world has come a long way, but still has a long way to go

David E. Bloom

THE Ebola outbreak has dominated global health news for much of the second half of 2014. This is understandable given the gruesome nature of Ebola virus disease and its lethality, the current absence of a vaccine or cure, and the prospects for Ebola's rapid and widespread transmission in the presence of weak and slow-to-react local, national, and global health systems—magnified by the prospect of human error.

Ebola also has the potential to impose a heavy economic burden on affected countries and to cause panic and promote political and social instability in already fragile settings. Ebola conjures up comparisons with other killer infectious diseases—like bubonic plague, smallpox, polio, influenza, and HIV.

But notwithstanding past major assaults on, and contemporary threats to, public health, it is important to remember that humanity has made huge achievements in the prevention and management of infectious disease. These advances

have been due in large measure to increased access to clean water and sanitation, the development and widespread use of safe and effective vaccines, revolutions in medical diagnosis and treatment, and improvements in nutrition, education, and income. Health systems—the combination of people, formal rules and institutions, informal practices, and other resources that serve the health needs of a population—have also made significant contributions. Especially effective are systems that emphasize disease prevention, aim for universal coverage, and capably conduct surveillance to detect actual and potential threats to public health—promoting better health behaviors and higher health standards and training, retaining, motivating, and enabling health workers.

Health is indisputably a fundamental aspect of well-being, and there are myriad pathways through which its protection and promotion improve human welfare, both for individuals and for societies. Future perils notwithstanding, technological and institutional innovations hold much promise for making the world healthier, wealthier, and more equitable and secure. Health spending is more than a burdensome consumption expenditure, it is an investment in productivity, income growth, and poverty reduction.

Adding years

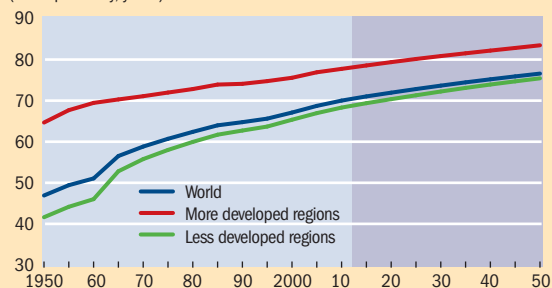
One of the clearest indications of advances in health is the sharp improvement in how long people live. Over the past six decades, global life expectancy has increased more than 23 years and is projected by the United Nations Population Division to increase almost another 7 years by 2050 (see Chart 1). The chart estimates how long children born in a specified year would be expected to live if they were subject to that year's age-specific mortality rates for their whole life. The steady increase in life expectancy between 1950 and 2010 reflects a sharp drop in infant and child mortality (the infant mortality rate declined globally from 135 per 1,000 live births in 1950 to 37 in 2010) and longer life spans of adults. Life expectancy hovered around 25 to 30 years throughout most of human history, so recent and projected gains rank among humankind's greatest achievements.

Chart 1

Living longer

Life expectancy is increasing worldwide and is projected to continue to rise in coming decades.

(Life expectancy, years)



Source: United Nations, *World Population Prospects* (2013).

Note: The United Nations Population Division classifies the "more developed regions" as Europe, North America, Australia/New Zealand, and Japan; the "less developed regions" comprise Africa, Asia (excluding Japan), Latin America and the Caribbean, Melanesia, Micronesia, and Polynesia. Data after 2012 are projected.



Disease burden varies

Infectious diseases are bigger killers in developing economies, while noncommunicable diseases are more prevalent in advanced economies.

(percent)

	Share of Disability-Adjusted Life Years			Share of Deaths		
	Global	Developing	Developed	Global	Developing	Developed
Noncommunicable Diseases						
Cardiovascular and circulatory diseases	11.9	10.2	21.3	29.6	25.1	43.4
Neoplasms	7.6	6.2	15.3	15.1	12.3	23.7
Mental and behavioral disorders	7.4	6.7	11.1	0.4	0.3	1
Musculoskeletal disorders	6.7	5.7	12.3	0.3	0.3	0.4
Diabetes, urogenital, blood and endocrine diseases	4.9	4.7	5.8	5.2	5.2	5.1
Chronic respiratory diseases	4.8	4.8	4.5	7.2	7.9	5
Neurological disorders	3	2.7	4.4	2.4	1.9	4.1
Cirrhosis of the liver	1.3	1.2	1.7	1.9	2	2
Digestive diseases	1.3	1.3	1.5	2.1	2.1	2.2
Other noncommunicable diseases	5.1	5.1	5.2	1.2	1.4	0.6
Infectious Diseases						
Diarrhea, lower respiratory infections, and other common infectious diseases	11.4	13	2.5	10	12	4
HIV/AIDS and tuberculosis	5.3	6	1.7	5	6.3	1.1
Neglected tropical diseases and malaria	4.4	5.2	0.1	2.5	3.3	0.03
Other	24.9	27.2	12.6	17.1	19.9	7.37

Source: Institute for Health Metrics and Evaluation, Global Burden of Disease (2010).

Note: Disability-adjusted life years measure the effective life years lost to sickness, disability, or death. The "Other" category includes deaths from such things as injuries, nutritional disorders, and neonatal and birth complications.

Nevertheless, the economic and fiscal implications of the improvements in life expectancy, and the meaning of longer lives for human welfare, are unsettled. Researchers present a mixed picture of whether postponing death also postpones the age at which people's minds and bodies begin to break down and they lose their functional independence.

Although living longer may not always mean living better, life expectancy gains are a hopeful indicator of what is possible in the face of both long-standing and new health threats. These threats include infectious diseases like Ebola, malaria, tuberculosis, HIV, hepatitis, diarrhea, and dengue (including drug-resistant forms of these and other pathogens), as well as chronic infirmities such as cardiovascular disease, cancer, respiratory disease, diabetes, neuropsychiatric conditions, sense organ disorders, and musculoskeletal disorders.

In 2013, 6.3 million children died before reaching their fifth birthday. That represents a decline from 90 child deaths per thousand live births in 1990 to 46 in 2013. Although this is a major improvement, even this lower level of early childhood deaths highlights a major failing of health systems. Most early childhood deaths can be prevented based on existing knowledge and relatively inexpensive interventions such as vaccination, oral rehydration, improved nutrition, access to contraception, use of insecticide-treated bed nets, improved prenatal care, and reliance on skilled birth attendants. Unintended pregnancies are also an important factor contributing to infant and maternal mortality. Unplanned pregnancies were estimated to account for 40 percent of the 213 million pregnancies that occurred globally in 2012. Thirty-eight percent of these unplanned pregnancies resulted in births, which accounted for a disproportionate share of the roughly 300,000 estimated maternal deaths caused by complications in pregnancy and childbirth.

Noncommunicable diseases

The campaigns that led to the eradication of smallpox and the near-eradication of polio are generally regarded as the most successful public health interventions ever. But the lessons these eradication efforts offer for battling noncommunicable

diseases, which account for almost two-thirds of the world's estimated 53 to 56 million deaths a year, are not altogether clear.

That is because death, or its prevention, is not the only issue in dealing with noncommunicable diseases. A healthful lifestyle is also important. The disability-adjusted life year

Death, or its prevention, is not the only issue in dealing with noncommunicable diseases.

(DALY) measures the effective years lost to disability and premature death. The table depicts the distribution of deaths and DALYs by cause—globally, and broken down by developed and developing countries. Infectious diseases account for disproportionately more deaths in developing countries, while noncommunicable diseases are relatively more prominent in developed countries. This contrast reflects a phenomenon known as the *epidemiological transition*. While the transition is a sign of progress, because infectious diseases tend to strike early in life, the fact remains that many deaths from noncommunicable diseases are premature in the sense that they occur before age 70. Some developing countries, such as Bangladesh and Ghana, are only midway through their epidemiological transition and face a heavy dual burden of infectious and noncommunicable disease. Among noncommunicable diseases, cardiovascular and circulatory diseases are the dominant cause of death, followed by cancer. DALY measures indicate that mental illness is also a notable contributor to the global burden of disease—with corresponding adverse implications for labor productivity and quality of life.

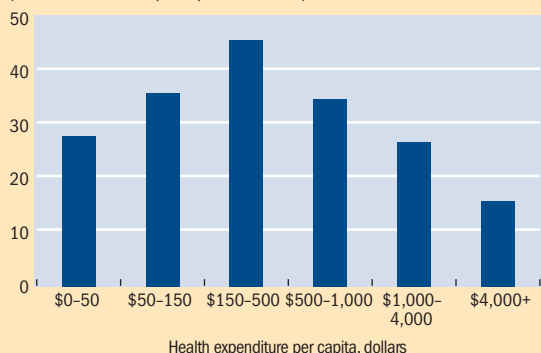
Noncommunicable diseases are expected to account for a growing share of the overall disease burden—both from

Chart 2

Spend a little, spend a lot

Health spending varies widely across the globe.

(number of countries per expenditure class)



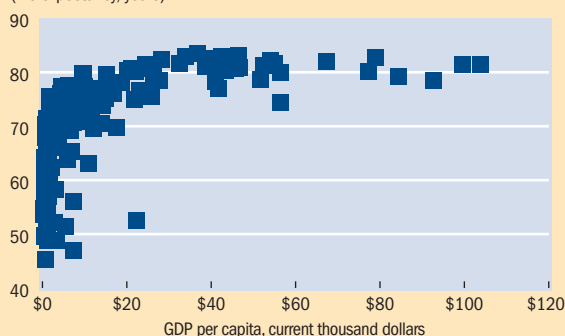
Source: World Bank, *World Development Indicators* (2014).
Note: Data are for 2012.

Chart 3

The rich are healthier

People who live in higher-income countries tend to live longer than do those in lower-income countries.

(life expectancy, years)



Source: World Bank, *World Development Indicators* (2014).
Note: Data are for 2012.

aging populations and from the bad effects of tobacco use, physical inactivity, poor diet, and harmful alcohol use.

There are 967 million adult smokers in the world (18 percent of the adult population), with nearly 6 million tobacco-related deaths each year. Rates of tobacco use are highest in eastern Europe and east and southeast Asia. Tobacco is also consumed in smokeless form, mainly in south and southeast Asia. Although the global rate of smoking (and also the number of cigarettes consumed per smoker) has decreased by about 10 percentage points since 1980, the number of smokers has increased because of population growth. The leading cause of illness and mortality associated with tobacco use is chronic obstructive pulmonary disease, which is responsible annually for an estimated 3 million deaths and 77 million DALYs. Lung cancer is responsible for 1.5 million deaths and 32 million DALYs. Generally, women have much lower rates of smoking than men, although the gender gap has narrowed in recent decades.

Sedentary behavior

The growth of service sector employment, at the expense of agriculture and industry, has been marked and widespread in recent decades and has been accompanied by a rise in sedentary behavior. The shift is magnified by the increase in the proportion of the world population living in urban areas, where there are often fewer opportunities for physical activity. In 1950, 30 percent of the world lived in urban areas; today 54 percent do (see “Moving on Up,” in this issue of *F&D*). The World Health Organization estimated that in 2008, 31 percent of adults worldwide were insufficiently physically active.

As people eat fewer fruits and vegetables and more refined starch, sugar, salt, and unhealthful fats, there has been a rise in the number of overweight or obese adults (from 29 percent of the global population in 1980 to 38 percent in 2013) and children (from about 10 to 14 percent in the same period). Weight issues contribute to high blood pressure, high blood sugar, and high cholesterol, as well as increases in cardiovascular disease, diabetes, and certain cancers.

Alcohol consumption is growing globally, especially in China and India. Many populations exhibit high rates of heavy episodic drinking that contribute to cirrhosis of the liver, heart disease, cancer, and injury. Binge drinking rates are quite high in Ukraine and Russia and tend to rise with per capita income across countries. Roughly 6 percent of global deaths are attributable to alcohol (7.6 percent among men and 4 percent among women).

Unsettling disparities

In many respects, the most jarring features of the global health scene are the massive disparities between our achievements and failings. For example,

- There is a 38-year gap between the country with the longest life expectancy, Japan at 83 years, and that with the lowest, Sierra Leone at 45.
- Fourteen countries have a life expectancy at birth of less than 55 years, while 25 have a life expectancy greater than 80 years.
- Life expectancy has increased in every wealthy industrialized country over the past two decades, but has declined in five African countries: Botswana, Lesotho, South Africa, Swaziland, and Zimbabwe—mainly because of HIV-related deaths.
- Nineteen countries have an infant mortality rate greater than 60 per 1,000 live births, while in 32 countries fewer than 4 infants die out of each 1,000 live births.
- Ninety-nine percent of child deaths occur in low- and middle-income countries.
- The rate of child mortality in low-income countries is 12 times higher than in high-income countries.
- Globally, women can expect to live over four years longer than men. But that difference is less than two years in 24 countries, presumably a reflection of a preference for sons that manifests itself in mistreatment of female children, gender-based violence, and gender inequities, such as restrictions on women's access to adequate nutrition and health care.
- In 2012, 28 countries (mostly in sub-Saharan Africa, representing approximately 13 percent of the world population) spent less than \$50 per capita on health care, while

16 countries (10 percent of the world population) spent more than \$4,000 per capita (see Chart 2). Norway spent the most, at \$9,055 per capita—about 600 times the \$15 per capita spent by Eritrea at the other end of the spectrum.

Health matters

The American philosopher Ralph Waldo Emerson famously wrote in 1860 that “the first wealth is health.”

Health matters because people value living a long life that is as free as possible of physical and mental impairment. Development economists routinely illustrate the well-established connection between income and health, which is shown on a country-level basis in Chart 3. Countries with higher incomes tend to have healthier populations, traditionally seen

Good general and reproductive health are powerful engines of economic growth.

as the result of the superior nutrition and the better access to safe water, sanitation, and health care that higher income brings.

But beyond one’s individual health, the health of others also matters, for reasons that include moral, ethical, and humanitarian concerns and human rights law. Public health also matters because of the contribution it makes to building socially cohesive and politically stable societies. For example, the inability of governments to satisfy their people’s basic health needs erodes trust and may lead to repeated cycles of instability and collapse. This is one reason why the United Nations Security Council in September 2014 declared Ebola not only a public health crisis but a threat to peace and security—an assessment it made years earlier about HIV/AIDS.

In recent years, economists have deepened their understanding of the economic importance of health, viewing it as a form of human capital that can be put to productive use, just like people’s knowledge and skills. Insofar as health is a fundamental determinant of the value of labor, which is the main asset most poor people possess, it is especially important to an individual’s or household’s ability to rise, or stay, above the poverty line.

The most rigorous evidence of the economic value of health comes from microeconomic analyses—because they are typically based on large sample sizes and rich measures of health and income and what determines them. In addition, many micro studies, which focus on individual health issues, are based on randomized controlled trials, widely considered the gold standard in this area. Some of the most compelling studies have shown the beneficial impacts of such things as

- deworming on school attendance and subsequent earnings in Kenya;
- iron supplementation on workforce participation, productivity, and earnings in Indonesia;
- iodine supplementation on cognitive function in Tanzania; and

- hookworm and malaria eradication on school attendance and labor earnings in the Americas during the last century.

Macroeconomic studies, which look at the big picture, are inherently less rigorous, but suggest that good general and reproductive health are powerful engines of economic growth, with GDP per capita getting an estimated 4 percent boost from each additional year of life expectancy. Several channels appear to be operative here. These include the positive effects of health on workforce productivity; school attendance, educational attainment, and cognitive function; savings rates, because people save more in anticipation of a longer retirement; and foreign direct investment, which often carries with it new technology, job creation, and increased trade. Fertility also tends to decline in a healthier population, which leads to a so-called *demographic dividend* of generally rising incomes, because the labor force grows faster than the portion of the population (young and old people) that depends on it.

Focus on the future

The prominence of global health has increased dramatically during the past two decades, with the subject occupying a central role as both an indicator and instrument of social and economic development.

According to a November 2013 article in *The Atlantic* magazine, of the top 20 innovations that have most shaped the nature of modern life since the invention of the wheel about 6,000 years ago, five are directly related to health: penicillin, optical lenses, vaccination, sanitation systems, and oral contraceptives.

Innovations in health abound. *Personalized and precision medicine*, fueled by advances in molecular and genetic testing, offers new possibilities for individualized prediction and treatment of disease. *Technological innovations*, such as the development of new or improved vaccines and drugs and genetically modified organisms, hold promise for the prevention and management of disease. The advent of *digital health*—including telemedicine, wearable sensors, electronic medical records, breakthroughs in our capacity to analyze large amounts of data, and new methods of transmitting health information and recommendations—opens up exciting new possibilities for higher-quality health care at lower cost. *New diagnostic, assistive, and treatment devices* create similar possibilities.

However, many problems must be tackled before the promise of these innovations can begin to be fully realized across the globe. To do so will require financial muscle, political will, and collaboration among many stakeholders and actors—including nongovernmental organizations, private companies, the media, academia, the medical community, and government departments in the health and related sectors—both within and between countries.

Some solutions will simply require more resources to enable health providers to take better advantage of existing knowledge about how to promote and protect health. Others will require building infrastructure for sanitation, potable water, transportation, communication, education, and energy—all of which are important ingredients in pro-

The outbreak of Ebola fever

Scientists identified the Ebola virus in 1976, after outbreaks in the Democratic Republic of the Congo (near the Ebola River) and Sudan.

The current outbreaks in Guinea, Liberia, and Sierra Leone are associated with the Zaire species of Ebola virus disease, believed to be the most lethal of five known varieties. The current epidemic is the worst on record—perhaps by a wide margin, given severe underreporting of Ebola due to fear, stigma, and poor surveillance by public health systems.

The virus most likely crossed over to humans via contact with blood or other fluids from an infected animal. Once an infected person shows symptoms (which normally takes between several days and several weeks), the virus can be transmitted to other people via contact with bodily fluids that penetrate mucous membranes or broken skin—including after death if, for example, people don't take proper precautions while preparing a body for a funeral. In severely understaffed, underprovisioned, and weak health systems, the fatality rate for Ebola ranges from 40 percent to 80 percent. Moreover, the disease spreads to health workers, and fewer health workers result in an elevation of morbidity and mortality from other diseases and conditions.

The outbreaks are projected to cause billions of dollars of losses both from the cost of the disease itself and from fear

of contagion, which increases employee absenteeism and disrupts many economic activities. Contagion fear also spurs people to leave infected areas, which can promote transmission of the virus and makes it difficult to trace contacts.

Doctors mainly treat Ebola with drugs to address symptoms and by replenishing lost fluids. Experimental drugs that attack the virus are being tested, along with the use of blood serum from Ebola survivors.

Promising vaccines have been developed, but have yet to be tested on humans. Distributing them will likely prove challenging in settings with poor infrastructure and in which the need far outstrips the supply. The possibility that the virus will mutate is also a concern.

In addition to Guinea, Liberia, and Sierra Leone, suspected and confirmed cases have appeared in Nigeria and Senegal, though both countries rapidly controlled the outbreaks and have been declared free of Ebola virus transmission. As of this writing, spot cases have been detected in Mali, Spain, and the United States. In addition to promoting awareness of practices that put people at risk of Ebola virus infection, and encouraging infection prevention practices, the public health response to Ebola has included quarantine of suspected cases and identification, tracing, and monitoring the health of their contacts.

viding and accessing quality health care. Yet others will require new policies and institutional arrangements to motivate people to make positive lifestyle changes and encourage business innovation in the design and delivery of health-promoting products like vaccines and drugs and services such as medical examinations, public health messages, and surgeries. Continued scientific advances must feed those product pipelines and supply chains and address the formidable challenges presented by health threats from diseases such as Ebola; chikungunya (a viral infection spread by mosquitoes, which typically causes fever and joint pain); MRSA (methicillin-resistant staphylococcus aureus) and other antibiotic-resistant infections; and noninfectious threats such as obesity, depression, and environmental health problems (see “Global Health Threats of the 21st Century,” in this issue of *F&D*).

The capacity and reach of health systems must also be expanded, with new models for conducting epidemiological surveillance and for the efficient deployment of physicians, nurses, pharmacologists, community health workers, and counselors. Coordination of different actors and stakeholders, at the local, national, and global levels, will be required to avoid duplication of effort and ensure productive information sharing, rational and grounded priority setting, and technical and economic efficiency. Coordination is also required to protect health from such spillovers of economic progress and globalization as cross-border mobility, climate change, desertification, drought, and food and drug contamination.

All of these efforts will have to be undertaken in a financially responsible manner, which will be increasingly challenging as populations grow and age beyond traditional working years and as health systems expand their reach and broaden their service mandates. Fiscal problems in many countries will make it difficult for governments to

devote additional resources to health (see “The Efficiency Imperative,” in this issue of *F&D*).

When it comes to health strategies, the notion that one size fits all is ill founded, because social structures, customs, political systems, economic capacities, and historical legacies vary so widely across countries. For example, in some cultural settings it is unacceptable for females to be examined or treated by male physicians. In others, families expect to participate actively in the provision of in-patient care. Standards for certifying medical practitioners, and even the philosophy and nature of medical practice (for example, mainstream, homeopathic, Hindu-based ayurvedic, and traditional Chinese), vary across settings as well.

Other matters that must be considered include the decentralization of national health systems (see “Going Local,” in this issue of *F&D*), the implementation of pay-for-performance models, and the promotion of current and future population health and well-being through contingent cash transfer approaches, which reward indigent households for taking specific actions such as vaccinating children (or keeping them in school).

Government has a natural role to play in interventions that efficiently promote socially desirable levels of health provision. Unregulated markets will find it hard to do that for reasons that include spillover effects associated with infectious diseases and the sometimes opportunistic behavior of private health providers who use their superior information and perceived status to exploit consumers by advising them to undertake unnecessary and costly procedures.

How to organize a health care system is a major issue. Whether health care systems are most efficiently and pragmatically organized vertically, as a bunch of disease- and disorder-specific programs (aimed at dealing, for example, with HIV/AIDS and malaria), or horizontally, as a unitary system

to deal with all diseases and disorders, is a subject of perennial debate among health researchers and policymakers. Even though vertical programs can count the most impressive public health successes and are relatively more amenable to rigorous evaluation, there has, in recent years, been a notable policy shift from vertical to horizontal interventions (and to diagonal interventions, in which disease-specific initiatives are used to drive systemwide improvements). This shift has occurred partly from concerns that the success of vertical programs often comes at the expense of draining other parts of the health sector of critical human and financial resources. The shift also reflects the view that vertically organized health systems inefficiently duplicate infrastructure and health delivery mechanisms. Many professionals also believe that horizontal programs are better able to evolve as new health threats emerge and are better able to shape the social environment—for example, by encouraging healthy lifestyles and adherence to drug regimens.

Private sector's role

Private enterprise is also important to improving health and could perhaps assume an expanded role. Its strengths include effective messaging and distribution channels; the capacity for innovation, implementation, and rapid expansion; and adherence to commercial principles that promote financial sustainability. Private spending on health (over \$2.9 trillion globally in 2012, of which 44 percent was direct household spending) is significant in all countries, but especially in low- and middle-income countries (see “Private vs. Public,” in this issue of *F&D*). The virtues of a strong private sector notwithstanding, governments must nevertheless engage in essential activities, including provision of a safety net for those not adequately served by private providers and monitoring and regulating health markets to prevent exploitation, corruption, and other malfeasance. Public-private partnerships that bring together governments, multinational bodies, and private operations to finance and provide health care are especially desirable when they achieve an efficient division of labor between the sectors.

The nature of prevention, early detection, treatment, and care activities—and the balance among them—will always matter. Disease prevention will figure prominently in the future, likely through expanded vaccination programs, smoke-free spaces, bans on tobacco advertising, the imposition of tobacco taxes, and increased emphasis on in utero and early childhood health. Early detection is crucial because diseases caught early are typically easier and less expensive to treat. Treatment—especially in older populations with their many afflictions—must take into account the interaction of conditions and drugs and shift the focus from cure to quality of life. It is also likely that the state will have to assume an increased burden of long-term care because declining fertility and the increased participation of women in the paid labor force reduce the number of family members able to provide physical care and companionship to older folks. Investment in health could deliver handsome returns and promote fiscal solvency, especially if it limits health care costs by focusing

on disease prevention and early detection, helping people to work longer and more productively.

Global health governance—the increasingly large and complex architecture and interplay of institutions focused on global health—needs strengthening to promote transparency, accountability, efficiency, and more widespread, active, and coordinated participation to address the web of national health problems and solutions (see “Overseeing Global Health,” in this issue of *F&D*). The World Health

Early detection is crucial because diseases caught early are typically easier and less expensive to treat.

Organization has long been the cornerstone of global health governance. But fresh and compelling versions of global partnerships have emerged in recent years—such as the World Health Organization Framework Convention on Tobacco Control, GAVI, the Vaccine Alliance (for increasing access to immunization in poor countries), and the Global Fund to Fight AIDS, Tuberculosis and Malaria (to finance prevention and treatment activities). However, new mechanisms are also needed to promote more timely and effective disease surveillance and response, international data sharing, and intellectual property standards that guarantee the private sector, especially pharmaceutical companies, appropriate financial incentives to conduct research and development while maintaining the flexibility to deal with urgent health needs among the poor.

The Millennium Development Goals (MDGs), established by the United Nations in 2000 to target improvements in poverty, education, and health, are an excellent symbol of good global health governance. Although not legally binding, the MDGs have great legitimacy because they were affirmed by 189 members of the United Nations. They also lend themselves to accountability because they are readily measured and publicized. Although it is impossible to rigorously estimate the contribution the MDGs have made to improvements in global health, they do seem to have focused the attention of the international development community on health and sparked increased health spending, especially in low-income countries. The MDGs also highlight the need for increased efforts to address hunger, child mortality and chronic undernutrition, and maternal mortality.

Health will surely remain prominent in the post-2015 development agenda, although the nature, focus, and concrete indicators of the new goal (or goals) are not yet clear. Especially interesting will be the place of noncommunicable diseases; the emphasis on process, inputs, and risk factors rather than health outcomes; and whatever lessons the world community takes from the spread of diseases like Ebola and applies in defining a new set of aspirations for global health. ■

David E. Bloom is Professor of Economics and Demography in the Harvard School of Public Health.

Going LOCAL

In emerging and developing economies, public health spending is moving from central governments to states and cities

Visiting a hospital built by Partners in Health for the Rwandan Ministry of Health, Butaro, Burera, Rwanda.

Victoria Fan and Amanda Glassman

NOTHING is certain but death and taxes, or so the saying goes.

Economists might add a third certainty: health spending growth. As countries grow economically, two important trends converge as part of a *health financing transition*—health spending per person increases and out-of-pocket spending on health services decreases (see Chart 1).

But if increases in total health spending seem inevitable, declines in impoverishing

health payments are not. Despite reduced out-of-pocket spending on average, many households are still devastated by medical bills, especially in low-income countries. Research suggests that government or public mobilization of resources for health—and with it policies that improve the efficiency of public money for national health systems—must grow if out-of-pocket spending is to continue to shrink.

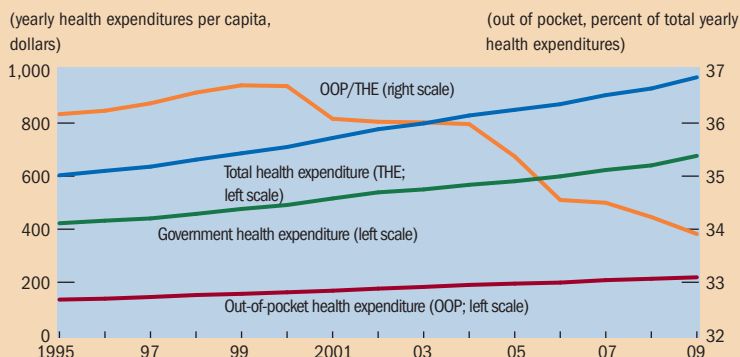
Yet much public spending for health does not take place at the national level—particularly in large federal countries with self-governing regional entities such as states and provinces (see Chart 2). Many tough decisions on how to allocate public health funds efficiently and effectively are made not in a capital city but by regional and local governments. In advanced economies this is nothing new. As incomes rise in emerging market and developing economies and as they continue to democratize, decentralize, and urbanize, spending by subnational governments will likely continue to grow. In Brazil, for example, subnational spending on health rose from 25 percent to 55 percent of total public health spending between 1980 and 2009 (see Chart 3).

Yet the effectiveness of regional and local government health systems spending on improving health outcomes and reducing

Chart 1

Up, up, and away

Health spending is rising steadily across the globe, but patients are paying a decreasing share of those expenditures out of pocket.



Source: Fan and Savedoff (2014).

Note: Data are the average of 126 advanced, emerging market, and developing economies.

OOP/THE = out-of-pocket expenditures as a percent of total expenditures.



medical impoverishment varies widely. Moreover, in too many cases, public health systems—which aim to protect well-being through prevention programs such as vaccination and surveillance and control of epidemics such as the recent Ebola outbreak—take a backseat to the more visible and prestigious medical functions that treat diseases, often in hospitals, with expensive technologies, achieving small health gains.

These trends warrant an examination of subnational spending on health—including successful local health reforms in emerging market and developing economies, and central government efforts to spur local innovation and performance.

Local moves

Many subnational entities have undertaken successful reforms in health, health care, and wellness, even as national reforms foundered. These include changes in financing and payment, organizational and regulatory actions, and even attempts to change individual behavior, by encouraging exercise or discouraging smoking.

Some of these changes have occurred in advanced economies. In the United States, for example, the state of Massachusetts undertook an expansion of health insurance coverage in 2006. It required uninsured people to buy private policies and subsidized the purchase of insurance by the poor. The experiment became the template for a controversial, sweeping national expansion of health insurance that took effect in 2014.

But many changes are also occurring in emerging market and developing economies:

China: Shanghai, the nation's major commercial city, undertook multipronged health care reform to reduce out-of-pocket health expenditures and improve health at lower cost (Cheng, 2013). For example, Shanghai's community health clinics were offering residents 1,000 drugs under an *essential drugs* list—even before China embarked on national health reform in 2009, which made 307 essential drugs available to everyone in the country. The city may have China's most advanced and integrated health information technology system, with all

hospitals and doctors linked to patients' medical records. That helps regulators monitor physician behavior, control costs, and ultimately improve health outcomes. The city is also at the forefront of developing an integrated delivery system across primary, secondary, and tertiary care. China's other provinces are watching Shanghai's actions closely.

Colombia: In Medellín, the second largest city in the South American nation, the government started a unified health provision network intended to reduce disparity in health care quality across the city (Guerrero and others, 2014).

Pakistan: In Punjab province, the government enacted a performance-based resource allocation model designed to clearly link a district's funding to its health needs. Under the model, each of Punjab's districts automatically receives 70 percent of its base allocation. To claim the remaining 30 percent a district must improve performance according to defined indicators, such as the proportion of babies delivered at a health facility or by a skilled birth attendant and the proportion of fully immunized children ages 18 to 30 months. The performance-based approach gives Punjab's districts a clear incentive to improve health outcomes.

Brazil: The city of São Paulo runs the Agita São Paulo program, which promotes an active lifestyle through its message that 30 minutes of physical activity a day is an achievable and pleasurable health goal. São Paulo also holds mega-events to encourage people to change their behavior and improve overall population wellness. The campaigns were replicated by many other Brazilian cities (PAHO, 2011).

The push from above

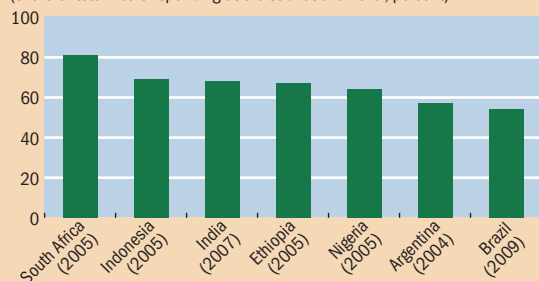
But even as spending and innovation devolve to regional governments, national governments play a critical role in overseeing and directing the subnational entities and leveraging the funds that central governments transfer to them to support their health activities. Central governments can decide how to transfer funds to regional governments or pay health care providers to spur better performance in states or provinces and at even lower levels, such as municipalities.

Chart 2

Local spending

In many emerging market and developing economies, health spending by regional and local governments is outpacing central government spending.

(share of total health spending at the subnational level, percent)



Source: Authors' calculations.

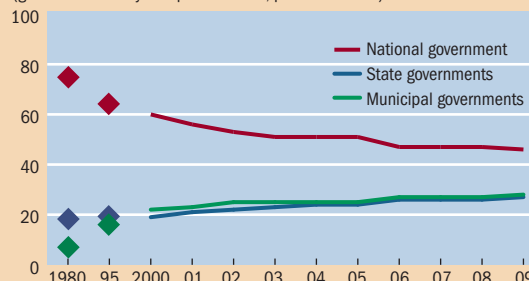
Note: Year for which data are drawn varies by country and is in parentheses.

Chart 3

Regions rising

In Brazil, health spending by states and municipalities rose from about 25 percent of total health spending in 1980 to 55 percent in 2009.

(government outlays for public health, percent of total)



Source: Langevin (2012).

In Rwanda, for example, the national government initiated incentive payments to subnational public and nonprofit faith-based providers, among others. The payments were conditioned on improvements in the amount of services and the quality of care provided to HIV/AIDS patients and mothers and children. The payments were approved on the basis of independent and representative audits of performance reports. As a result of the program, child nutrition improved significantly and provision of health care services increased by 20 percent (Gertler and Vermeersch, 2013).

In Argentina, the federal government uses incentives to induce the nation's provinces to improve birth outcomes. The national government bases the incentive on enrollment of uninsured families in its Plan Nacer program, reductions in newborn deaths, and provision of quality prenatal care. The program reimburses provinces \$5 a month on a per capita basis for each person enrolled and an additional \$3 a month for reaching targets such as improved birth weight and vaccination coverage. That is, 60 percent of the reward is based on the number of people enrolled in the program and 40 percent on improved health coverage and outcomes. The result was a 22 percent decline in neonatal mortality between 2004 and 2008 (Gertler, Giovagnoli, and Martinez, 2014).

India's national health insurance program for the poor, Rashtriya Swasthya Bima Yojana (RSBY), set up incentives for the nation's states to buy in to the program. In each state, private insurance companies compete annually, on a district-by-district basis. A designated agency in each state chooses the most competitive and best-value premium for each district. Then, for each person enrolled, the states pay 25 percent of the premium and the central government pays the rest. There is no payment for performance. The district-level insurers are motivated to enroll as many people as they wish to maximize revenue. The program, which began in 2007, now covers more than a 100 million people with a relatively generous package for hospitalization. Early results suggest that fewer people have been impoverished because of out-of-pocket health payments (La Forgia and Nagpal, 2012). RSBY is relatively inexpensive and accounts for just a fraction of all public spending for health in India.

The capacity conundrum

Still, despite the promise of decentralization, there are serious challenges to moving government functions and expenditure responsibilities to the subnational level. Even when regional governments have great decision-making power, the state or province may have trouble following through because of little administrative capacity or lack of accountability—often both.

In Mexico, for example, where most health spending occurs at the regional or local level, the federal government tried to measure the performance of the nation's states against benchmarks on such health interventions as early breast cancer detection and treatment (Lozano and others, 2006). Yet in some cases, states discontinued their reporting and the federal government ceased publication after only one round of benchmarking.

In many settings, increasing subnational responsibility and spending is associated with large differences in the standard of care, equity, and outcomes between wealthier and poorer regions in a country. There are many reasons for these gaps: differences in population characteristics, such as age, income,

Policymakers can benefit greatly by adopting an attitude that fosters experimentation and learning.

and underlying general health, risks, and behavior; a different revenue base; and local investment priorities. These gaps occur in advanced economies too. In the United Kingdom, the National Health Service's 2011 *NHS Atlas of Variation* revealed large differences in health services according to where people live.

In India, lower-performing and poorer states in the north-central belt, such as Bihar and Uttar Pradesh, lack administrative capacity and have difficulty spending the funds allocated to them by the central government. The ability to spend centrally allocated health funds ranges from 42 percent (Uttar Pradesh) to 89 percent (Maharashtra).

The differences in regional provision of health services—the result of varying resources and priorities—means that without policies to ensure portability of health benefits from one state or province to another, families that move within a country can find themselves without health coverage. In China, people's ability to receive health care is tied to the region in which their household is registered (Roberts, 2012).

In some cases, functions that should be performed at the national level have been delegated to regional bodies with deleterious effects. Taxes aimed at improving health, such as on tobacco or alcohol; disease surveillance; and emergency response and risk pooling for expensive and rare diseases often make more sense at the national level, for example. A single case of a high-cost, rare disease can quickly bankrupt a local health system barring appropriate financial risk-sharing mechanisms. A rapidly growing epidemic that requires an all-country control response—for example, the recent outbreak of the Ebola virus in parts of west Africa (where public spending for health already is extremely low) can easily overwhelm local authorities.

In general, public health functions—such as vaccination and preventive services that are not profitable due to lack of demand—get short shrift both nationally and subnationally. Regional and local governments in some countries have reorganized their health departments in ways that reinforce a bias toward medicine (the treatment of diseases and conditions) and neglect public health, which focuses on preventing disease and maintaining a healthy population. In India, only the state of Tamil Nadu did not merge its health department unit focused on public health with the medical department.

Perhaps as a result of this focus on prevention, Tamil Nadu's health outcomes are among the best among the Indian states, whereas it ranks among the lowest in health care spending.

Rarely are policy challenges simple to solve; instead multiple solutions and attempts are needed. Policymakers can benefit greatly by adopting an attitude that fosters experimentation and learning. But experimentation, innovation, and learning are technically difficult and resource intensive and often threaten long-held ideas and entrenched interests.

In some countries, experimentation and innovation are led by states and provinces, and some have sought to institutionalize experimentation. In the United States, the Innovation Center at the U.S. Centers for Medicare and Medicaid Services facilitates systematic development of solutions to address low value and high cost in the U.S. health system. By ensuring funding for a 10-year period and with independence from the payer, Medicare and Medicaid, the Innovation Center buffers the usual disincentives and risks of innovation. The center has piloted a range of new models and approaches, including accountable care organizations and medical homes that aim to share financial risks between insurers and providers to encourage better coordination of patient care while reducing costs. Medicaid, the federal-state program to provide health services to the poor, allows for considerable variation among U.S. states in terms of coverage. With the Innovation Center's financial and technical support, states can experiment with models tailored to their needs.

China experiments

Institutional experimentation is not limited to the United States and other high-income countries. China has historically experimented, usually starting on a small scale, in a few of its roughly 2,800 counties. Its flagship rural health insurance program, the New Cooperative Medical Scheme (NCMS), was tried in a few counties before it was expanded nationally in 2003. The NCMS essentially offered basic health insurance for rural residents, who were paying largely out of pocket for health care.

In South Africa, the federal government has encouraged pilot projects for health insurance in 11 of its 54 districts, with the intention of adopting a national health insurance scheme to complement the existing public system of health facilities. Yet the pilots showed lack of technical capacity in the districts and insufficient technical assistance from the central government. No major initiatives for national health insurance have been announced since the pilots.

International donors can play a role in fostering experimentation at the subnational level. For example, the World Bank and GIZ, the German government's development agency, provided significant technical support to India's RSBY. The World Bank lends to state and provincial governments—in 2008 ranging from 10 percent of its total country lending to Mexico to more than 60 percent in countries such as India and Pakistan (World Bank, 2009). But these operations require a sovereign guarantee, which may or may not facilitate innovation in the subnational entities that can service debt. Subnational governments are theoretically eligible

but have only rarely been recipients of grant support from public-private partnerships such as the Global Fund to Fight AIDS, Tuberculosis and Malaria and GAVI, The Vaccine Alliance, which seeks to foster public health by subsidizing vaccinations and immunizations. If global health funders pay more attention to subnational governments, more creative approaches may yield or leverage greater health gains.

Health systems are increasingly local, and that should mean a change in how national and international policymakers approach issues of financing, fiscal transfers, and payment and provision policies. At a minimum, there should be greater attention to the ways subnational governments spend on health and how incentives for performance can cascade from central governments to states.

The health promise of more local power can only be made real if policy is aligned at all levels for better health system performance. ■

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GLOBAL HEALTH THREATS of the 21st Century

The world is a healthier place today but major issues continue to confront humanity

THE world's health greatly improved in the past century. Major killers such as smallpox and polio have been eliminated or contained. A large part of the world's population has access to clean water and better sanitation. Medicine can cure or improve many conditions that crippled or killed people only decades ago.

Nonetheless, human health continues to confront serious threats, as demonstrated by the recent outbreak of the Ebola virus.

Pandemic Risk

Olga Jonas

AMONG policymakers who worry about it at all, optimists think a severe pandemic is a once-in-a-century event.

But before the onset of the 2014 Ebola epidemic, most people, including policymakers, seldom thought about pandemics (worldwide epidemics)—which explains why the risk of contagion is undermanaged and the Ebola crisis is here at all.

The global community continues to confront serious threats from infectious diseases, as demonstrated by the ongoing Ebola crisis. Ebola is still largely confined to three small west African countries, where the human, social, and economic damage is already high. If the crisis is not contained, damaging health and economic impacts would be replicated in other developing countries and even on a global scale in the case of a pandemic.

Contagion surprises and then worsens because the authorities and the public are unaware of the risk and implications of exponential spread. Even without a global spread, disease outbreaks can be very costly. They occur with unnerving frequency. Recent years saw Severe Acute Respiratory Syndrome (SARS) and H5N1 and H7N9 avian flu—and now we face the Ebola crisis. With current policies, one of these, or another pathogen, will cause a pandemic.

According to economist Lawrence Summers, awareness of pandemic risks is much too low, and “every child should learn about the 1918 flu pandemic,” when 100 million died, out of a world population of less than 2 billion people. Although a



recent World Bank report identified pandemics as one of the three major global risks—together with climate change and financial crises—most official discussions, reports, and communications take no notice of pandemic risk.

As a result, governments do little to reduce the risk, even though the measures are known and the costs are low—involving mostly strengthening veterinary and public health systems to detect and control outbreaks. After all, contagion does

not start in a vacuum. A staggering 2.3 billion animal-borne infections afflict people in developing countries every year.

Even without a global spread, disease outbreaks can be very costly.

Uncontrolled livestock diseases and exposure to pathogens from wildlife can periodically spawn widespread contagion because weak veterinary and human public health systems fail to stop outbreaks and allow them to spread.

Policies thus shape the onset of contagion. Chronic neglect of veterinary and human public health is both a disastrous policy choice and the prevailing practice in most countries and donor programs.

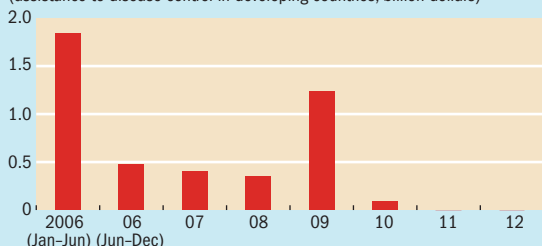
The economic imperative is compelling. Fear—which can spread faster than disease—changes consumer, business, and



Up and down

Funding to prevent pandemics rose during public concern about flu outbreaks in 2006 and 2009 and declined when public awareness fell.

(assistance to disease control in developing countries, billion dollars)



Sources: United Nations and World Bank (2010); and World Bank (2012).

Note: In a high-risk environment it would cost \$3.4 billion a year to bring public health and veterinary systems in 139 developing countries to disease control standards set by the World Health Organization and the World Organization for Animal Health.

government behavior. Though it was quickly contained in 2003, SARS cost \$54 billion, a toll driven by shocks to business and consumer confidence. The Ebola outbreak has severely disrupted trade, production, and health care in the most affected countries. In a pandemic, similar effects would cascade globally, with outcomes that the U.S. Department of Defense has characterized as the equivalent of a “global war.”

A 4.8 percent drop in global GDP is a realistic outcome in a severe flu pandemic, equivalent to \$3.6 trillion (based on global GDP in 2013). Even if the optimists are right that the probability of a pandemic is just 1 percent a year, the risk to the global economy is \$36 billion annually over a century. The world is spending about \$500 million now to prevent pandemics, so it's a safe bet that \$36 billion a year would more than eliminate the risk. Spending up to that amount is warranted.

Fortunately, defenses against pathogens cost a fraction of this amount. A World Bank study (2012) found that spending \$3.4 billion annually would bring veterinary and human public health systems in all developing economies to performance standards set by the World Health Organization and the World Organization for Animal Health. The standards cover capacity for early detection, correct diagnosis, and prompt and effective control of contagion. (None of the countries that experienced the 2014 Ebola outbreak met these standards.) Robust public health systems would control pathogens that can cause pandemics as well as other, locally threatening, diseases.

The fragility of our defenses is illustrated by the responses to H5N1 and H1N1 influenza. Financing surged from 2006 to 2009, driven by awareness of risks, but then plummeted when policymakers stopped paying attention (see chart). Fluctuation in funding is not related to the level of the risk; risk rises when public health capacity degrades as funding dries up once the outbreak is over.

An effective infrastructure of defense requires steady support. Without robust public health systems in all countries, the dire prospect is that the still-expanding Ebola epidemic will not be the last, or the worst, crisis caused by late detection and ineffective control of a disease outbreak. ■

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Environmental Hazards

Ian Parry

ALTHOUGH many environmental hazards threaten human health—including water contamination and toxic releases from factories and landfills—the two biggest concerns are air pollution and global warming, both caused in large part by fossil fuel combustion.

According to the World Health Organization (WHO, 2014), indoor and outdoor air pollution is responsible for 7 million premature deaths a year—one-eighth of global mortality. *Outdoor air pollution*, by itself, accounts for 2.7 million deaths and *indoor air pollution* 3.3 million, while 1 million deaths are caused by a combination of outdoor and indoor pollution. Pollution kills because people inhale particulates small enough to penetrate their lungs and bloodstream, increasing the prevalence, for example, of cardiovascular and respiratory conditions.



Nearly 90 percent of the outdoor pollution deaths occur in densely populated, low- and middle-income countries, particularly in the western Pacific and southeast Asia. The costs of health damage caused by outdoor air pollution vary considerably, depending on the country and type of fossil fuel being burned.

For example, according to IMF estimates (Parry and others, 2014), in 2010, health costs from coal use in China, which has high population exposure to air pollution and limited emission control, were \$11.70 per gigajoule (GJ) of energy—more than twice the world price of energy from coal. By contrast, in Australia, where population density is lower and fewer people are exposed to coal emissions, damages were 80 cents per GJ. Coal generally causes the most air pollution per unit of energy, followed by diesel, while natural gas and gasoline cause the least pollution.

Greater use of control technologies (such as those that filter sulfur dioxide in coal-fired plants) is likely to reduce future emission rates from energy production, lowering health risks. Offsetting this benefit, however, is increasing demand for energy in the developing world and urban population growth, which increase exposure to pollution.

Nearly all indoor air pollution deaths (from cooking and heating fuels) are in lower- and middle-income countries. These deaths might be reduced by promoting cleaner fuels (charcoal rather than coal, say), improved technology (such as better-ventilated stoves), and providing more households with electricity.

Properly reflecting environmental costs in energy prices is especially critical.

Fossil fuel combustion is also the main cause of rising atmospheric concentrations of heat-trapping gases, such as carbon dioxide. While the most important reason for mitigating greenhouse gas emissions is the extreme planetary risks—such as runaway warming, dramatic sea level rises from melting ice sheets, and reversal of the Gulf Stream (Nordhaus, 2013), *climate change* could affect human health at the local level in many ways.

According to the World Bank (2014), for example, weather-related events such as floods, droughts, and extreme temperatures have been rising, especially in Asia and the Caribbean, and are key sources of death (for example, through famines) as well as economic losses.

Health risks also include heat stress, spread of infectious diseases, declining food and water security, and aggravated air pollution. Of particular concern are health threats from a higher prevalence of diarrhea (affecting those with poor

sanitation), malaria (from mosquito migration in tropical regions), and malnutrition (from reduced living standards). Future risks might be mitigated, however, through improvements in income, sanitation, and health care; technology developments (such as malaria eradication); and adaptations (such as increased use of bed nets).

Taking action

Policies to reduce fossil fuel use can have large domestic health benefits and need not await global coordination. Improving environmental-health outcomes should be part of a broader strategy involving carbon pricing, clean technology investments and transfers to developing economies, and reduced subsidies for nongreen energy sources. Properly reflecting environmental costs in energy prices is especially critical and would, at a global level, reduce outdoor air pollution deaths from fossil fuels by an estimated 63 percent and energy-related carbon emissions by 23 percent. At the same time, actions to make energy prices reflect environmental costs would raise new revenue equal to 2.6 percent of GDP (Parry and others, 2014). ■

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Noncommunicable Diseases and Mental Disorders

Dan Chisholm and Nick Banatvala

MENTAL disorders and other noncommunicable diseases—mainly cardiovascular disease, diabetes, cancer, and chronic respiratory illness—claim many lives prematurely, cause massive ill health, and compromise human and economic development. In 2011, about 15 million people died prematurely (before age 70) from such diseases, 85 percent of them in low- and middle-income countries. Moreover, 80 percent of the years people live with disability are the result of noncommunicable diseases, especially mental and behavioral disorders. Yet the associated health problems can be prevented or mitigated.

The mounting burden imposed by noncommunicable diseases and mental health problems has many causes, including aging populations, rapid and unplanned urbanization, and lifestyle choices such as consumption of unhealthy food (partly because of irresponsible marketing and low risk awareness). Many people suffer from such diseases because of tobacco use and consumption of foods high in salt, fat, and sugar. And in urban areas changes in diet and physical activity, exposure to air pollution, and the widespread availability and consumption of alcohol are contributing factors. Overwhelmed by such forces, few governments, let alone individuals, are keeping



pace with the need for protective measures, such as smoke-free laws; regulations to discourage consumption of bad fats, salt, and sugar; policies to reduce harmful alcohol use; and better urban planning to promote physical activity. Simply put, the odds are often stacked against good lifestyle choices.

Noncommunicable diseases and mental disorders lead to increases in individual and household poverty and hinder social and economic development. About 100 million people in the world fall into poverty every year as a result of paying for health services they need. In low-resource countries, treatment can quickly drain household resources.

Businesses are hurt as well, through diminished labor supply and productivity. An analysis by the World Economic Forum (2008) estimated that Brazil, China, India, South Africa, and Russia—the biggest emerging market economies—lost more than 20 million productive life years to cardiovascular disease alone in 2000, a figure expected to rise by more than 50 percent by 2030. If prevention efforts remain unchanged, the cumulative global economic losses over the next two decades from noncommunicable diseases and mental disorders could amount to \$47 trillion. This exponential rise would hit emerging market economies increasingly hard as they grow (Bloom and others, 2011). A separate study estimated that the global cost of dementia—which is also expected to rise exponentially—was \$604 billion in 2010 (ADI, 2010).

Prevention and care for people with these diseases come with a price tag, but a relatively small one compared with the projected costs of inaction. For example, the average yearly cost of implementing the most cost-effective interventions for the prevention and control of cardiovascular disease in *all* developing economies is estimated at \$8 billion a year. However, the expected return on such an investment—a 10 percent reduction in the mortality rate from coronary artery disease and stroke—would reduce economic losses in low- and middle-income countries by about \$25 billion a year (WEF, 2011).

Current investments are particularly meager for mental health; many low- and middle-income countries allocate less

than 2 percent of their health budget to the treatment and prevention of mental disorders. As a result, an enormous number of people are not treated for mental disorders—severe or common.

Cost-effective, affordable, and feasible interventions include development of strategies to reduce tobacco and alcohol consumption, promotion of good lifestyle choices, measures to reduce dietary salt intake, treatment of common mental disorders in primary care, and management of people at risk for heart attack and stroke. Together, these efforts could reduce premature

The odds are often stacked against good lifestyle choices.

death rates from noncommunicable diseases by at least 25 percent at an annual cost of just a few dollars a person. Such efforts call for political commitment, strong multisectoral partnerships, and reorientation of health care systems toward chronic (as opposed to acute) disease prevention and control. ■

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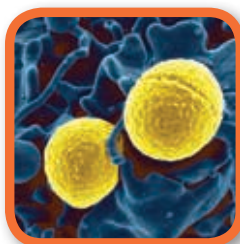
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Antibiotic Resistance

Ramanan Laxminarayan

ANTIBIOTICS have transformed the practice of medicine. However, a massive scale-up in their use has resulted in an increase in drug-resistant strains of disease-causing bacteria and a global decline in antibiotic effectiveness. Rising incomes in low- and middle-income countries have generated huge demand for antibiotics, but high infection levels and uncontrolled antibiotic use in these countries are leading to treatment failures for people unable to afford expensive second-line drugs when antibiotics don't work. In high- and upper-middle-income countries, antibiotic use re-



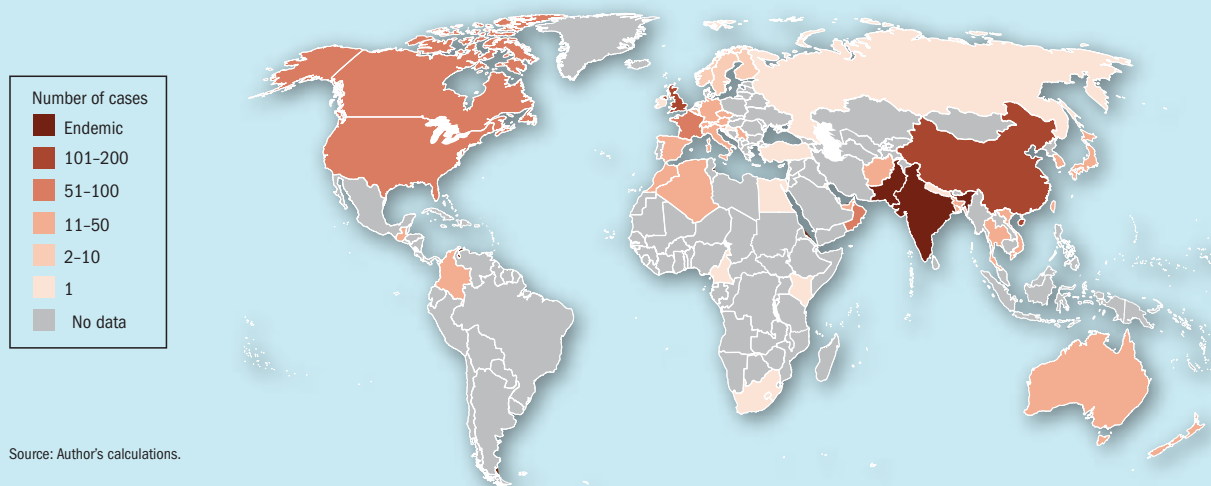
mains high, particularly in hospitals, and resistance is driving up treatment costs.

Lack of access to antibiotics still kills more people than resistant bacteria, but antibiotics are not a substitute for good public health policy, vaccinations, clean water, and proper sanitation. The infectious disease mortality rates in low- and lower-middle-income countries today vastly exceed those in high-income countries before antibiotics were introduced in 1941.

Globally, most antibiotics are used in agriculture—added in low doses to animal feed for growth promotion and dis-

Spreading fast

New Delhi metallo-beta-lactamase genetic elements, which make bacteria antibiotic resistant, were first reported in 2008 in India and Pakistan and are now reported worldwide.



ease prevention. As in hospitals, antibiotics have become a lower-cost substitute for good hygiene and infection control, which prevent disease in the first place. Antibiotic use for growth promotion is banned in the European Union, where evidence shows that most animal operations can manage without them. But proposed bans face opposition in the United States and other countries.

Resistance is driven by local factors but has global consequences.

Resistance—a natural phenomenon—is accelerating because no single patient, physician, hospital, insurer, or pharmaceutical company has an incentive to reduce antibiotic use. Drug costs are reimbursed by health insurers and third-party payers, but infection control is typically uncompensated. Like climate change, resistance is driven by local factors but has global consequences, as shown by two examples: antibiotic-resistant gonorrhea emerged in Vietnam in 1967, then spread to the Philippines and finally the United States, where penicillin resistance to the disease reached 100 percent in less than a decade. New Delhi metallo-beta-lactamase genetic elements, which make bacteria antibiotic resistant and were first reported in 2008 from patients in India and Pakistan, are now reported worldwide (see map).

The global burden of resistance is poorly quantified but is likely to be concentrated in three categories: the costs of resistant infections, the costs of antibiotics, and the inability to perform procedures that rely on antibiotics to prevent infection. Patients infected with resistant strains of bacteria typically require longer hospitalizations and face higher treatment costs.

Even more serious is the effect on the health care system. Many surgical procedures, such as transplants and bypass operations, require antibiotics to keep the patient free of infection. Before antibiotics, even simple appendectomies

resulted in many deaths, not because of the procedure but because bloodstream infections could not be controlled. Cancer treatments, transplants, and even root canals are jeopardized by resistance.

Maintaining antibiotic effectiveness in the long term requires a balance between *conservation* of existing antibiotic effectiveness and innovation in drug development.

Conservation is accomplished by reducing the need for antibiotics (through vaccination and infection control) and their unnecessary use (through diagnostics, incentives for clinicians to prescribe fewer antibiotics, restrictions on access to powerful antibiotics, and public education). Norms that govern physician-patient interactions and patients' expectations drive unnecessary use. Because physicians face no penalty for writing prescriptions for antibiotics and receive no compensation for spending time to explain why they are not necessary, prescription rates remain high.

New antibiotics have been developed, but the cost of bringing any new drug to market is very high. The rate at which new antibiotic compounds are being discovered is slowing. Fourteen of the 17 classes of antibiotics in use today were discovered before 1970. Most innovation involves reengineering existing compounds rather than finding new mechanisms.

Public investment in antibiotics is justified because the lack of effective drugs can create public health emergencies. Secondary bacterial infections are big killers during influenza pandemics, for example. The United States and Europe are encouraging the development of new drugs. But unless incentives for drug development are tied to conservation, these initiatives may simply put off till tomorrow a problem that will take a high toll on society. ■

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Cost of Progress

Prices of new medicines threaten Colombia's health reform

Alejandro Gaviria



IN a little more than two decades, Colombia has made big strides toward universal health care coverage. It now covers 97 percent of its citizens with the same package of benefits, guarantees access to new technologies to the poorest segments of the population, and has reduced out-of-pocket expenses more than any

other developing country (Fan and Savedoff, 2014). But new and expensive medicines have put heavy pressure on that progress.

In 1993, Colombia reformed its health care system to ensure financial protection and equitable access for the whole population. The reform substantially increased the amount of public money devoted to health care and mobilized private resources—private hospitals and insurers boomed. The greater involvement of the private sector brought about some positive changes—increasing efficiency and, at least for a while, helping contain costs.

The reform was successful in many ways. In 1993, 30 percent of Colombians from the poorest fifth of the population reported no access to health care in case of serious illness. Twenty years later this percentage had fallen to 3 percent. Today more than 20 million people, half the population, receive fully subsidized health insurance from the state. Many urban poor people get the same care as the most privileged.

But success is fragile. Many of the positive changes have been put at risk by technological pressure. In the second half of the past decade, new medicines not included in the package of benefits covered by insurers began to be paid for with public funds. Pharmaceutical companies, providers, and doctors quickly realized that the state was willing to pay for almost everything (at almost any price). Payments for new medicines increased and financial problems mounted. Debts with providers grew rapidly. And public confidence in the system deteriorated.

What's more, these developments reduced the egalitarian aspect of the reforms. In 2000, the Colombian health care system was ranked first by the World Health Organization in terms of "fairness of financial contribution." In Colombia, individuals contribute to the system according to their income—the state fully covers premiums for the poor—and all receive the same package of benefits. Sadly, technological pressure reversed some of this "fairness."

Paying for the technologies not included in package of benefits turned out to be quite regressive. The chart shows the distribution of payments by income quintile. Less than 1 percent of total payments went to individuals in the poorest 20 percent, while 40 percent went to individuals in the top quintile—who have better information and more access to specialists than do poorer people. In theory the access is the same for all. In practice it is not. It is difficult to imagine a more regressive use of public money.

Colombia's health care expenditure per person is one-fifth that of a typical developed country. But inclusion of new technologies is essential to maintaining the legitimacy of the system, making sustainability a problem. Colombia is grappling with paying for expensive new medicines. Congress approved a law to permit excluding payments for ineffective technologies. The government created an agency to assess all new technologies. Price regulation was adopted, and a policy to deal with similar versions of biologic drugs (those made from proteins of living organisms rather than chemically synthesized) has been drafted. The pharmaceutical industry, which benefited greatly from an unregulated environment, opposed some of these policies.

This Colombia health story has three parts:

- A progressive health care reform achieved great social progress in a short time.
- Technological pressure, mainly from expensive new medicines, threatened the sustainability and progressiveness of the reforms.
- Institutions to incorporate new technologies in an orderly and legitimate way were hastily put together despite resistance.

Colombia's experience with regulating medicine prices, allowing generic drug competition for biologics, and assessing

technologies has important lessons for developing countries that must cope simultaneously with the challenges of universal health care and technological pressure. ■

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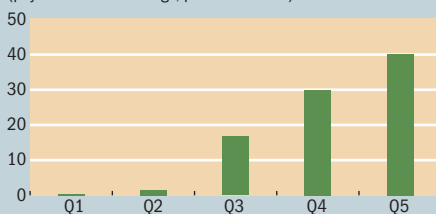
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Regressive disbursements

Most of the payments by the Colombian government for new drugs not covered in a standard insurance package went to higher-income earners.

(payments for new drugs, percent of total)



Source: Colombian Health Fund, FOSYGA.
Note: Data are for 2012. Recipient groups range from the lowest 20 percent of income (Q1) to the highest 20 percent (Q5).

BILL OF HEALTH

The recent slowdown in the growth of public health spending in advanced economies is not likely to last

Benedict Clements, Sanjeev Gupta, and Baoping Shang

CONTAINING growth in public health spending is one of the most important fiscal issues facing advanced economies. Such spending has grown substantially over the past three decades (Clements, Coady, and Gupta, 2012) and accounts for about half of the increase in noninterest government spending over these years.

During the same period private health spending—which on average accounts for about a quarter of all health expenditures in advanced economies—also rose. While higher spending has coincided with enormous improvements in health, it has also put substantial pressure on budgets, particularly now, when total public debt as a percent of GDP has reached unprecedented levels in advanced economies.

Since 2010, growth in public health care spending has slowed, and it is crucial to understand what that means. Will the slowdown persist and is health spending under control? In the past, periods of slow growth typically were followed by periods of acceleration (see Chart 1). Will this slowdown be different? The answers to these questions have important implications for the long-term economic outlook for advanced economies. Rising health care spending in those economies could force governments either to reduce spending in other priority areas (such as education and infrastructure) or slow their progress in reducing public debt—both of which could have a bearing on growth prospects in these economies.

Simultaneous slowdowns

The slowdown in the growth of public health spending that began in 2010 occurred in almost all advanced economies. Public health spending includes outlays for services provided in government hospitals and health facilities, as well as for public health insurance that pays for treatment from private hospitals, doctors, and nurses. On average, public health spending in those economies fell from 7.4 percent of GDP in 2009 to 7.1 percent of GDP in 2011. In 2012, the most recent year for which comparable data across countries are available, average public health spending rose slightly as a share of GDP. The growth of public health spending, adjusted for inflation, tells a similar story—it fell from 4.5 percent in 2009 to close to zero in 2010. While real spending growth rebounded in 2011 and 2012 it was still well below its historical average.

The spending slowdown was larger in countries that were hit hard by the global financial crisis and experienced sharp declines in output—Greece, Iceland, Ireland, Portugal, and Spain. But in countries less affected by the crisis—such as Germany, Israel, and Japan—spending slowed little or not at all (see Chart 2). The slowdown has touched nearly all categories

of health care spending: inpatient, outpatient, pharmaceutical, preventive, and public health (Morgan and Astolfi, 2013).

The slowdown in growth for all types of spending in nearly all advanced economies—and at about the same time—suggests that it was driven by a common factor. The common element appears to be the global financial crisis, which affected economic activity and governments' capacity to finance continued health care spending growth.

Whether the slowdown will persist depends on how the underlying drivers of spending evolve in the future. There are five main drivers.

Population aging: Health care needs typically increase as people grow older. The average age of the population in advanced economies is projected to rise over the next 20 years as a result of continued increases in life expectancy and likely will contribute to further increases in health care spending.

Income growth: Growing incomes are typically associated with rising demand for more and better health services. However, the precise value of the income elasticity (that is, the change in demand for health services in response to a change in income) is hotly debated and uncertain. Recent studies indicate that the income elasticity of demand for health care is less than or about 1.0 (Maisonneuve and Martins, 2013).

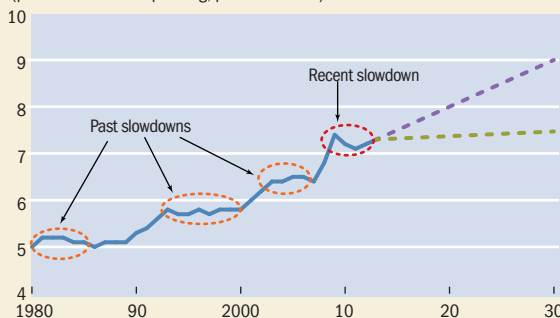
Technological advances: Improvements in medical technology are among the most important determinants of health care spending. The continued development of new procedures

Chart 1

Future in question

Will the current slowdown in health care spending increases stick (green dashed line) or, as has happened before, be followed by a new surge (purple dashed line)?

(public health care spending, percent of GDP)



Sources: Organisation for Economic Co-operation and Development, Health Statistics 2014 database; and authors' estimates.

Note: Circled areas represent periods of slowdown in health care spending increases in advanced economies.



Child with pediatrician, Lausanne, Switzerland.

and medicines has dramatically expanded the prevention and treatment of medical conditions, but because the technology is expensive, it has also contributed to rapid spending growth.

The Baumol effect: Named for its progenitor, economist William J. Baumol, the effect refers to the relatively high increases in unit labor costs in sectors where it is difficult to achieve productivity gains, including in services provided by government. In manufacturing, productivity can be improved by implementing new processes that reduce the number of workers needed to produce a given level of output. In health care, however, it is difficult to improve productivity, because of the limited potential to cut the number of doctors and nurses without compromising the level of services. Salaries in health care rise in line with economy-wide averages but productivity does not, so unit labor costs rise more sharply in health.

Health policies and institutions: Health care policies and institutions can influence spending through their effects on both demand and supply. On the demand side, policy determines the coverage of public benefit packages or the degree to which patients share costs (for example, copayments for doctor visits or for prescription drugs). On the supply side, policy influences spending directly (for example, for public health clinics) or indirectly through payments to private hospitals and doctors financed by public health insurance (such as Medicare in the United States).

There is no evidence that population aging, technological advances, or the Baumol effect has changed dramatically in recent years. These factors do not likely explain the sudden slowdown in public health spending observed since 2010. Slower income growth, as a result of the recent economic crisis—or changes in health care policies and institutions—could explain the slowdown. However, it is important to distinguish between *structural reforms* that are designed to improve the functioning and efficiency of the health care system and measures that are temporary (but unsustainable) responses to macroeconomic and fiscal conditions. Structural changes are likely to have a lasting impact on the growth of public health spending, while the effects of temporary measures are likely to diminish as macroeconomic and fiscal conditions improve.

Immediate savings

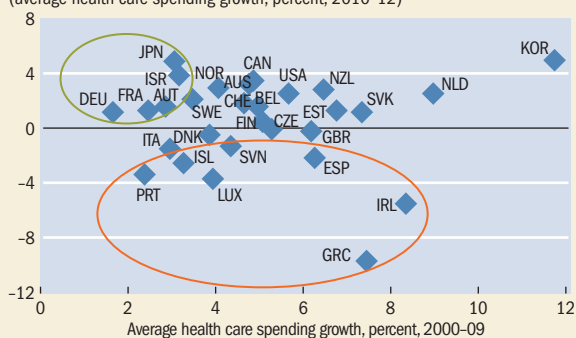
In addition to slower income growth, the spending declines during the recent slowdown appear to reflect policies that reduced the *level* of spending in the short run in response to tightening macroeconomic and fiscal conditions. Thus, these policies are unlikely to influence the long-term *growth* of health care spending. The measures introduced in many countries were focused mainly on generating immediate savings, rather than on improving the efficiency and quality of health spending. Measures have focused on across-the-board cuts in national health budgets in Greece, Ireland, Italy, Portugal, and Spain; cuts in prices for pharmaceuticals and other medical goods in Austria, Belgium,

Chart 2

Slowdowns

Countries hit hardest by the global financial crisis had the biggest slowdowns in health spending increases.

(average health care spending growth, percent, 2010–12)



Sources: Organisation for Economic Co-operation and Development, Health Statistics 2014 database; and authors' estimates.

Note: All data are in real, inflation-adjusted terms. Countries circled in green experienced little or no growth slowdown. Countries circled in orange experienced the biggest growth slowdowns. Country abbreviations conform to those published by the International Organization for Standardization.

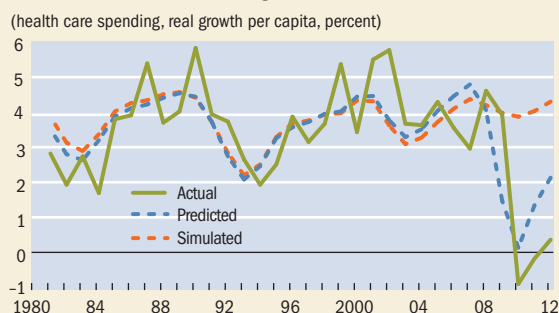


Greece, Ireland, the Netherlands, Portugal, and Spain; reduced payments to providers in the Czech Republic, Estonia, Ireland, and Spain; and cuts in wages and salaries in the Czech Republic, Denmark, Greece, Ireland, Portugal, Slovenia, Spain, and the United Kingdom (Mladovsky and others, 2012). While these macro-level measures (so called because they affect overall spending in an untargted manner) can help trim spending in the short run, they are less effective in containing spending

Chart 3

As predicted

Public health care spending is closely related to economic developments such as unemployment and output, which suggests that spending growth will accelerate as advanced economies recover from the global financial crisis.



Sources: Organisation for Economic Co-operation and Development, Health Statistics 2014 database; and authors' estimates.

Note: All data are in real, after-inflation terms. *Predicted* denotes the growth rates in public health spending forecast by an economic model based on macroeconomic factors such as unemployment, economic growth, and government debt. The predicted behavior corresponds reasonably closely to actual growth from 1980 to 2012. The *simulated* line after 2008 shows the model's projection of the growth in health care spending had the global crisis not occurred. (It replaces the actual performance of the macroeconomic factors in 2008–12 with their averages in 2000–07.)

growth in the long run without accompanying reforms—for example, those that introduce competition and improve incentives for providing cost-effective care (Clements, Coady, and Gupta, 2012). Furthermore, some of these macro measures, such as cuts in health promotion and disease prevention, could raise spending pressures over the longer term because their adverse effects on health could increase the need for more expensive medical interventions in the future.

Econometric analysis indicates that macroeconomic and fiscal indicators (such as economic growth, unemployment, and gross government debt) are important determinants of the growth in public health care spending because of their direct or indirect effect on some of the previously described main drivers of that spending. The analysis, based on a model using annual data for all advanced economies during 1980–2012, showed that a slowdown in economic growth and rising unemployment reduce the growth of health care spending.

High government debt also reduces spending growth, because heavily indebted governments cannot afford to raise spending much. Nearly all of the decline in the growth of public health spending between 2008 and 2010 can be explained by these factors. For this period, the observed growth of health care spending and the value predicted by our model are very close (see Chart 3). Furthermore, the model also correctly predicts the subsequent increases in the growth of public health spending in 2011 and 2012. Had the economic crisis not occurred, the model predicts, health spending growth would have stayed largely unchanged on its precrisis path. While far from conclusive, these findings suggest that the recent slowdown is mostly temporary.

Future of spending

Available health care spending data from seven countries (Finland, Germany, Iceland, Italy, Korea, Netherlands, Norway) indicate a further increase of 0.1 percent of GDP in 2013, which is consistent with the predictions of the model. In the United States, data from the Bureau of Economic Analysis indicate faster growth in consumer spending for hospitals, nursing homes, and physician visits and other health care services during the first quarter of 2014, though some of this may be attributed to insurance expansion under the Patient Protection and Affordable Care Act (so-called Obamacare). More recent studies for the United States also suggest that the slowdown was driven mostly by economic conditions, not structural change in the health care sector (Chandra, Holmes, and Skinner, 2013; Dranove, Garthwaite, and Ody, 2014).

While the slowdown is likely to be mostly temporary, it could still have a permanent impact on public health spending in some advanced economies for two reasons:

- When the historical growth rate of public health spending resumes, that growth will be from a lower base of spending as a percent of GDP than had there been no crisis.
- Some of the macroeconomic and fiscal factors that dampen spending growth (such as high public debt ratios) are not expected to return to precrisis levels in the near future.

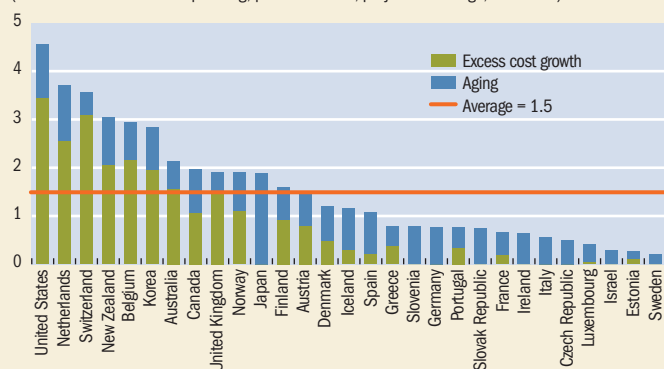
In our projections (see Chart 4), we incorporate the lower spending levels due to recent measures and assume that

Chart 4

Spending on the rise

Public health care spending will increase by about 1.5 percent of GDP in advanced economies over the next 15 years. Less than half will be from aging populations; the rest is from technology, rising incomes, and structural factors.

(increases in health care spending, percent of GDP, projected average, 2014–30)



Sources: Organisation for Economic Co-operation and Development, Health Statistics 2014 database; and authors' estimates.

Note: All data are adjusted for inflation. Excess cost growth is the growth in public health spending that exceeds the growth of GDP after controlling for population aging. It reflects better but more expensive technology, income growth, and rising unit labor costs (the Baumol effect).

spending growth rates will only gradually return to historical averages as economies recover. The projections to 2019 are based on the macroeconomic projections from the IMF's *World Economic Outlook* (economic growth, general government public-debt-to-GDP ratios, and unemployment rate). Beyond 2019, the projections assume that excess cost growth (the difference between the growth of real health care spend-

Health care spending is not fully under control in advanced economies.

ing and GDP growth, after adjusting for the effect of aging) will gradually return to its historical average by 2030. On average, we project that public health spending will increase by 1½ percentage points of GDP during 2014–30. Less than half of the increase will be the result of population aging; the remainder will reflect excess cost growth because of better but more expensive technology, income growth, the Baumol effect, and health policies and institutions.

The results also suggest there will be widespread differences in spending increases across countries in the next decade and a half. In the United States, public health spending (including all health programs of the federal and state governments) is projected to increase by 4½ percentage points of GDP. Public health spending in Greece, Iceland, Ireland, Portugal, and Spain is expected to increase, on average, by less than 1 percentage point of GDP. This reflects the lingering effects of the global crisis on public finances and macroeconomic conditions in these countries.

Consequences for fiscal policy

The implications of these projections for the long-term public finances of advanced economies are considerable. To meet their own medium-term fiscal targets, these economies will have to raise revenues or further reduce spending. One way to gauge the magnitude of the required adjustment is to assess how much countries would have to raise their “primary balances” (revenues minus expenditures, excluding interest) over 2014–20 to meet their objectives. Recent estimates indicate that the required adjustment would, on average, be about 2¼ percentage points of GDP (IMF, 2014). On top of this, countries will have to contend with increased pension spending, which is expected to rise by 1 percentage point of GDP over the next 15 years because of population aging. As a result, total fiscal adjustment needs (including projected increases in health care spending) are 4¾ percentage points of GDP—a daunting figure that underscores the need to improve the efficiency of government spending, which is possible in a number of areas. These include reforms to public sector wages and employment; better aligning education spending to evolving needs, which are changing as the population ages; and targeting social benefits to low-income households, which would allow governments to meet their equity objectives at a lower cost.

When it comes to health care, advanced economies are not helpless and can take many steps to control spending and contain the rise in these outlays in years to come. Among the many potential actions are the following:

- Reforms that foster competition and choice, which could include competition among insurance and health service providers and disclosure of information on the price and quality of health services.
- Greater emphasis on primary and preventive care, which can reduce the need for more expensive care by keeping the population healthy.
- Improvements in provider payment systems to increase incentives to provide cost-effective treatment. Shifting away from simple reimbursement systems based on provider costs or services can reduce incentives for unnecessary care. Such improvements could include payments for services based on “diagnosis related groups,” which specify treatment protocols for a given set of medical conditions and an associated structure of fees.
- More widespread adoption of health information management systems to collect, store, and exchange patient data. These systems have the potential to both strengthen health outcomes and reduce costs.

In other words, health care spending is not fully under control in advanced economies, which underscores the need for long-lasting structural reforms to preserve and extend the impressive gains in health achieved in the past and reduce the growth of this spending to a more manageable pace. ■

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Overseeing Global Health

Devi Sridhar and Chelsea Clinton

New actors, with new priorities, are crowding a stage the World Health Organization once had to itself

THE recent outbreak in west Africa of the highly infectious and often fatal Ebola virus highlights the need for global cooperation in health. The current Ebola crisis—along with the outbreak of Middle East respiratory syndrome (MERS) and the resurgence of polio in the Middle East and Africa—is simply the latest example of governments’ inability to control the spread of infectious diseases when they act in isolation: global rules negotiated among governments are crucial to protecting the health of citizens.

The Ebola outbreak is precisely the type of crisis world governments had in mind when they founded the World Health Organization (WHO) in 1948 and placed it at the center of *global health governance*.

The fight against Ebola, which the WHO declared an international emergency in August 2014, requires careful reporting of the spread of the disease to allow authorities to track it, concerted international efforts to contain it, and resources to treat those infected. These needs pertain to global health governance—the rules and related formal and informal institutions, norms, and processes that govern or directly influence global health policy.

The essential functions of health governance, which are generally within the purview of the WHO and its governing board, include convening key stakeholders, defining shared values, establishing standards and regulatory frameworks, setting priorities, mobilizing and aligning resources, and promoting research.

Global governance requires governments to forgo aspects of their sovereignty by delegating certain prerogatives and authority to an international agency such as the WHO. Rules such as the International Health Regulations, which direct countries’ response to international health risks, are a clear example of such delegation of authority.

But in recent years new organizations have begun to crowd the global health stage. Specific concerns—about, say, HIV/AIDS or maternal mortality—have brought more money into the global health system. But those additional funds are often channeled through the new institutions. Some work within the WHO, some outside it, and others do both. In contrast to the wide, integrated mandate of the WHO, the focus of most of these new organizations is *vertical*, concentrated on narrow goals, such as a particular disease or condition.



WHO Ebola awareness campaign in the village of Kolobengu, Guinea.



Protecting the health of citizens across the world requires long-term investment in the WHO and its broad mandate. But donors with focused, short-term objectives are driving much WHO activity, and new partnerships aimed at specific diseases and issues are gaining prominence. Yet there is growing awareness of the need to strengthen health systems—the people, organizations, and resources at the center of health care delivery—to complement disease-specific efforts. Moreover, the recent efforts of Latin American, Asian, and African nations to play a larger role in global institutions is affecting global health governance.

A growing crowd

The original purpose of the World Health Organization was, among other things, to ensure that governments would collaborate on health matters with a long-term perspective. To that end it was given more authority and resources than its predecessor organization under the League of Nations. Virtually every government in the world is a member of the one-country, one-vote World Health Assembly, which governs the WHO.

As a result of this changing environment, the WHO faces both financing and governance difficulties.

However, the WHO is no longer the only global health institution and today faces stiff competition in some areas from new actors, such as the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund); GAVI, The Vaccine Alliance; and the Bill & Melinda Gates Foundation, the world's largest private foundation whose core focus is global health.

Over the past half century, the World Bank too has become increasingly influential in global health care, with considerable resources, access to senior decision makers in ministries of finance, and in-house technical expertise. The bank has lent billions of dollars to governments to help them improve their health services.

As a result of this changing environment, the WHO faces both financing and governance difficulties. Although total resources have not diminished, they have not grown much in recent years either. The organization's 2012–13 budget was \$3.95 billion; its 2014–15 budget is \$3.97 billion (WHO, 2013). But the real challenge is the constraints on the way much of that money can be spent. About 80 percent of the WHO budget is “voluntary” funding from donors with specific mandates and cannot usually be spent for general purposes. A shortage of unrestricted funds was one of the factors that hindered the WHO response to the recent Ebola outbreak (see box). What has been criticized as a slow initial reaction to the epidemic has sparked some calls for creation of a new global fund to respond to infectious disease outbreaks.

Voluntary funding—which comes from government donors such as the United States and Japan and from private

Response to Ebola

The World Health Organization (WHO) has been criticized for a slow and weak initial response to containing the Ebola virus outbreak in west Africa. The agency cites a lack of in-house technical expertise and staff. Because so much of its budget is decided by donors who earmark funds for their short-term priorities, the WHO's core strength in emergency and epidemic and pandemic response has atrophied over the past decade. Its outbreak and crisis budget was cut in half, from \$469 million in 2012–13 to \$241 million in 2014–15 (WHO, 2013), and its epidemic and pandemic response department was dissolved and its duties split among other departments (*New York Times*, 2014). In September 2014, donors such as the Bill & Melinda Gates Foundation pledged funds to the WHO, but there is a need for long-term sustainable financing for the organization that is at the center of global health governance.

sources—can be earmarked for specific diseases or initiatives, such as the Stop TB Partnership, or specific regions, such as the Americas. Over the past 12 years, voluntary contributions have increased 183 percent, while assessed core contributions from member countries have increased only 13 percent (Clift, 2014). During 2012–13, the WHO had discretion over the use of only 7.6 percent of voluntary funds. Moreover, administrative costs for management of the more than 200 voluntary contributors approached \$250 million, more than 5 percent of its budget. Still, without voluntary funding it is likely that the total WHO budget would be much smaller.

Governments overall remain the WHO's primary source of funds (assessed and voluntary), but nongovernmental organizations (NGOs) are increasingly influential. The \$300 million the Gates Foundation donated in 2013, for example, made it the WHO's single largest contributor. In some cases NGOs help implement WHO programs—The Stop TB Partnership, for example, which seeks to eradicate tuberculosis. NGOs are seeking power and voice in global health governance through board membership and voting rights in international institutions, but they have only observer status at the WHO—governments direct policy. The challenge is for the WHO to engage meaningfully with this wider range of stakeholders while maintaining its status as an impartial intergovernmental body that benefits all its members equally.

The WHO has had to deal with some discontent on that issue. For example, in 2007, the Indonesian health minister refused to supply H5N1 virus samples to the WHO for analysis and vaccine preparation, despite global concern about an outbreak of avian flu (Gostin, 2014). The minister argued that vaccines and drugs derived from its viral samples were unlikely to become available to developing countries and invoked the principle of viral sovereignty to withhold samples until a more equitable system for access to vaccines in a pandemic was established. After tense negotiations, member states agreed in 2011 to the Pandemic Influenza Preparedness Framework for the sharing of influenza viruses and access to vaccines and other benefits. The agreement seeks to balance

improved and strengthened sharing of influenza viruses with efforts to increase developing countries' access to vaccines and other pandemic-related supplies.

As the Indonesian incident demonstrates, international institutions must balance buy-in by the powerful (who often have a special degree of influence) against the need to assure all members, including the least powerful, that their interests are best served by belonging to and participating in the organization. Countries must trust an international agency to report infectious threats and use the health information it gathers for the general benefit, without stigmatizing or denigrating the countries where threats arise. The revised 2005 International Health Regulations require its nearly 200 signatory countries to report to the WHO certain public health events of international concern (such as Ebola outbreaks) and establish procedures that the WHO and its members must follow to uphold global public health security. The regulations seek to balance sovereign rights with a shared commitment to preventing the international spread of disease.

The flip side of the emergence of new actors on a stage once occupied by the WHO alone is that countries seeking the best way to achieve their health goals have more options. For example, countries can apply to the Global Fund or the Gates Foundation for money to fight TB and bypass the WHO, forcing the long-time leading player to examine its role and arguably operate more strategically. The WHO was never meant to undertake every global health function, partly because when it was founded there were already regional public health agencies (such as the Pan American Health Organization). Its main strength is as a forum that brings together various stakeholders but permits only member governments to negotiate global health rules and determine the support countries receive from the WHO to disseminate and implement those rules.

Partnership

The still relatively new story in global health cooperation is the emergence of public-private partnerships such as the Global Fund and GAVI. The governance structures of these vertical funds differ in important ways from those of the WHO and the World Bank (Sridhar, 2012).

Vertical funds have *narrowly defined goals*, unlike the broad mandates of the WHO ("the attainment by all people of the highest possible level of health") and the World Bank ("to alleviate poverty and improve quality of life"). The Global Fund's mandate is to attract and disburse resources to prevent and treat HIV/AIDS, tuberculosis, and malaria; GAVI's is to save children's lives and protect health more broadly by increasing access to childhood immunizations in poor countries.

Critics claim that these new global health resources go to pet concerns of donors and often would be better deployed by a multilateral body like the WHO. But it seems unlikely that the resources, which represent a net increase in global health funding, would otherwise be available to serve the broader WHO mandate. The Gates Foundation provided the initial impetus for GAVI with a \$750 million pledge, and the Group of Eight governments (Canada, France,

Germany, Italy, Japan, Russia, United Kingdom, United States) specifically bypassed the United Nations in launching the Global Fund in 2002.

Vertical funds *empower diverse stakeholders*, unlike the WHO, which invests only governments with the authority to coordinate policies and, at times, collective actions. The Global Fund's board includes voting members from civil society, the private sector, and the Gates Foundation—as well as representatives from developing and donor countries. It also includes as nonvoting members such partners as the WHO and the World Bank. GAVI also has a multistakeholder board, which includes as permanent voting members the Gates Foundation, UNICEF, the WHO, the World Bank, and 18 rotating members from developing and donor country governments, vaccine makers, and civil society. Enfranchising nongovernment actors has engendered greater legitimacy for GAVI and the Global Fund among those groups (Wallace Brown, 2010).

These initiatives are *funded entirely by voluntary contributions*, whereas the WHO and the World Bank financial models are based on assessed contributions, despite the growing number of voluntary donations to the WHO. The Global Fund receives voluntary contributions from governments, individuals, businesses, and private foundations. GAVI relies on donor contributions to support the development and manufacture of vaccines. Governments are the more significant source of funding, but solely through voluntary mechanisms.

GAVI and the Global Fund do *not work directly in recipient countries*, unlike the WHO and the World Bank, which work through government agencies and have offices and personnel in recipient countries.

The Global Fund relies on country coordinating mechanisms to develop and submit grant proposals and choose organizations to implement them. These mechanisms usually include representatives from the applicant country's government, local and international NGOs, interested donors and private sector representatives, and people who have the targeted disease. GAVI funds national governments, which use the resources to increase vaccine coverage.

The Global Fund and GAVI *derive legitimacy from their effectiveness in improving specifically defined health outputs and outcomes*, unlike the WHO and World Bank, which stand on their status as inclusive, participatory intergovernmental bodies.

Moving toward health systems

Vertical funds continue to proliferate, and targeted contributions are still the bulk of WHO donor funding. But advanced and developing countries are increasingly focusing on the need for robust primary care and strong hospital systems—a horizontal approach. Ebola's spread across west Africa shows the need for stronger health systems, not only to provide maternal and child health care and confront noncommunicable diseases such as cancer and heart ailments, but also to detect and treat infectious diseases. Ethiopia, for example, established programs to build comprehensive health systems funded by increased domestic investment and donor support.

Vertical funds, though, have stayed out of efforts to strengthen health systems or ensure health care for all members of society (universal health coverage). For the most part these donors believe domestic resources are growing fast enough to enable recipient countries to strengthen their health systems and provide universal health coverage. They also worry that governments would use new funds as an excuse to reduce their health investment. National programs must be country led, these donors believe, and designed domestically because of differences among health systems (for instance, whether a country already has a domestic private care delivery system), domestic insurance markets, and government approaches to prevention of noncommunicable diseases. Many donors are also wary of further fragmenting global health governance.

But the rapid spread of the Ebola virus in West Africa highlighted the difficulties that poorly funded health systems had in identifying, then containing the disease. The United States has pledged more than \$250 million and the United Kingdom more than \$200 million to support the response to the outbreak, some which is destined to improving health systems. Whether the Ebola crisis will elicit more sustained contributions from vertical funders to improve health systems is unclear.

Rise of emerging markets

In recent years, emerging market economies have demanded a greater role in multilateral institutions—from the IMF to the United Nations. That new assertiveness has spilled over into global health, where the major emerging market economies are playing a role that reflects both their domestic needs and their constraints. When the most economically advanced emerging market economies—Brazil, Russia, India and China (BRICs)—have engaged in the area of global health, it has generally been in issue-specific areas, such as access to essential medicines or technological cooperation, such as in TB treatment.

Regional concerns also appear to drive engagement in international cooperation and have given rise to regional health-related bodies in Africa, Asia, and Latin America. Since its launch in 2002, for example, the African Union has involved member states' health ministers in such regional health issues as infectious diseases, health financing, food security, and nutrition. Brazil, India, and South Africa have agreed to work together to coordinate international outreach on health and medicine. Whether these developments will strengthen the WHO—with regional bodies acting largely as WHO adjuncts—or chip away at its authority is hard to predict.

Notably, global health takes a backseat to other international issues, such as financial policies and national security, in China, India, and Russia. Brazil has embraced health issues as central to its foreign policy agenda, but—as measured by its participation in the Global Fund at least—has not stepped up financially.

The Global Fund directors continually call on emerging market economies to shoulder some of the financial burden of fighting HIV/AIDS, TB, and malaria, but Brazil, which has received \$45 million in grants, has contributed only \$200,000. The story is similar with other BRICs. India has received \$1.1

billion and donated only \$10 million; China has received \$2 billion but donated only \$16 million. Russia's record is better: \$354 million received and \$254 million donated.

During the global financial crisis, hard-hit advanced economies scaled back or even eliminated their commitments to the Global Fund. The BRICs weathered the crisis better than many advanced economies. Their failure to step up commitments to the Global Fund (or to GAVI) since the crisis raises questions about their long-term commitment to global health leadership.

How long should the BRICs, the four largest emerging market economies, continue to receive development assistance for health? India is the largest recipient of external health funding, China the 10th largest, and Brazil the 15th largest. At issue is whether aid should continue to subsidize countries that can arguably afford to provide at least basic health care and that have an increasing economic interest in halting infectious diseases, whether old scourges like TB or newer concerns like the avian flu virus.

But despite their middle-income status, Brazil, China, and India remain relatively poor in per capita terms and must focus on economic growth. Because they also face massive health problems, donors still believe that continued health assistance is justified. But multilateral institutions and bilateral donors must continually examine whether middle-income countries should continue to receive aid that might better be used in poorer countries.

A key lesson from the Ebola crisis is the need for a strong, organized global response and an authoritative, well-funded WHO to lead it. Whether the outbreak impels member states and other powerful stakeholders to strengthen the WHO's resources and authority or to set up another institution to fight disease outbreaks will be the critical global governance issue of the next few years. ■

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Student nurses, Batangas Regional Hospital, Batangas City, Philippines.

David Coady, Maura Francese, and Baoping Shang

Public health spending must become more efficient to avoid overwhelming government coffers

HEALTH outcomes have improved dramatically throughout the globe over the past five decades. As one example, life expectancy at birth has increased by about 11 years in high-income countries, 26 in upper-middle-income countries, 21 in lower-middle-income countries, and 20 in low-income countries.

While these improvements reflect a range of factors—including rising incomes and advances in medical technology—increases in public health spending have also been an important factor. In advanced economies, public spending increased on average from 3¼ percent of GDP in 1970 to about 7 percent in 2012. In emerging market economies, spending increased from 2¾ percent in 1995 to 3¼ in 2012, and over the same time span, spending increased from 3 percent of GDP to 3¾ percent in developing economies.

Although there are immense benefits from rising public health spending, these spending increases present fiscal difficulties for government budgets. Public health spending already accounts for a large share of the public purse and is projected to increase further (Clements, Coady, and Gupta, 2012). In advanced economies that already must reduce their deficits to address high public

debt, this spending growth will add to fiscal pressures. In emerging market and developing economies, public health spending must compete with other development priorities, such as for education and infrastructure.

Many countries view improving the efficiency of public health spending as the primary way to ensure continued gains in health outcomes without generating additional fiscal pressures. Containing spending increases through efficiency improvements is also likely to be more politically palatable than forgoing improvements in health outcomes or lowering spending in other areas. The effectiveness of this strategy, however, depends on the extent of inefficiencies in the public health system and the capability of governments to reduce them.

Spending inefficiencies

Identifying the extent of spending inefficiency is difficult.

First, *inefficiency is difficult to define* because public health spending serves more than one objective. The World Health Organization classifies the primary objectives as improving the health of the population, protecting households from financial risk, and responding to people's expectations. But most stud-



ies of spending inefficiency focus on health outcomes, such as some measure of life expectancy. While such studies may capture well the objective of improving health outcomes—because life expectancy is highly correlated with other health indicators of interest—they provide only a partial picture.

Second, *measuring inefficiencies typically involves comparing a particular health system to an “efficient” one*. Because many factors other than spending affect health, and they vary across countries, it is difficult to identify the minimum spending required to achieve given health outcomes.

Sources of inefficiency

Still, studies find significant inefficiencies in the use of public resources in the health sector. The *2010 World Health Report* (WHO, 2010), based on studies of health care systems worldwide, suggests that 20 to 40 percent of total (public and private) health spending in high-, middle-, and low-income countries does little to improve people’s health. A study of the countries that make up the Organisation for Economic Co-operation and Development (OECD) found that inefficiencies in those countries cut life expectancy by about two years on average (Joumard, André, and Nicq, 2010). A more recent study (IMF, 2014) that adjusts life expectancy for health quality finds that the average loss in health-adjusted life expectancy (HALE, see box) from inefficiencies is more than two years (see Chart 1). This is substantial considering that a 50 percent increase in health spending would extend HALE by about one year on average, which points to a large potential for efficiency improvements for all countries.

These inefficiencies have numerous sources and a number of potential remedies.

Evidence for OECD countries suggests that *the type of public health system does not appear to be a major factor* (Joumard, André, and Nicq, 2010). Government involvement in the health sector in most countries is extensive and can take a variety of forms, including direct provision of health services, financing through the tax system, and regulation of services offered by the private sector. But when health care systems are classified according to the involvement of market mechanisms in their provision and financing, differences in efficiency within groups are found to be greater than differences across groups. This suggests that efficiency depends on more specific factors, such as what is included in the health benefit package, how private providers are reimbursed, how cost sharing is structured, and how clinical guidelines are developed and enforced.

The composition of health spending and health care services is also important. Evidence shows that primary and preven-

tive care are in general more cost-effective than hospital care. However, even within each type of care, the cost-effectiveness of different treatments differs significantly. For example, generic drugs are as effective as brand-name drugs, but cost significantly less. A public benefit package should cover or encourage only the most cost-effective treatments.

The composition and characteristics of recipients of public health spending matter. The poor and disadvantaged are less likely to have alternative access to care if public spending is unavailable, so the gain from spending on the poor will be larger than from spending on the rich. Countries with healthier populations tend to have low health inequality.

WHO (2010) grouped the leading sources of inefficiency into five broad categories: *human resources for health*, which includes an inappropriate or costly staff mix and unmotivated workers; *medicine*, which includes underuse of generics and unnecessarily high prices for medicines, use of substandard and counterfeit medicines, and inappropriate and ineffective use of medicines; *hospitals*, which includes overuse of expensive medical technology (such as magnetic resonance imaging), inappropriate hospital size, and medical errors and suboptimal quality of care; *waste, corruption, and fraud*; and an *inefficient mix and inappropriate level of treatment*. Addressing all these inefficiencies could reduce total health spending by more than 40 percent on average (see Chart 2).

Addressing inefficiency

Researchers have identified several areas where reform could reduce health system inefficiency.

- *Health spending should be reallocated toward the use of the most cost-effective services and treatments and provide incentives for such efficient behavior*. For example, primary and preventive care—which ranges from regular doctor visits and immunization to prevention of HIV, smoking, and obesity—is often underprovided and underused. This suggests an important supporting role for government in research and development, public health care provision, regulations and clinical guide-

HALE and hearty

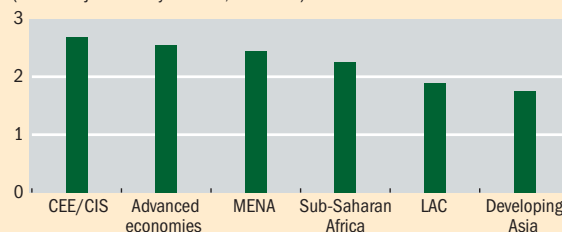
Health-adjusted life expectancy (HALE) represents the number of years expected to be lived in good health. A significant amount of health sector resources is spent to reduce the severity of diseases and improve the quality of people’s lives. To capture this element, HALE takes into account disease prevalence, incidence, and duration and data on a person’s years in different states of health.

Chart 1

Health loss

Inefficiencies in health care subtract more than two years of healthy living from the average lifetime.

(health-adjusted life years lost, 2000–10)



Sources: IMF (2014); and authors’ estimates.

Note: Health-adjusted life years are the number of years of good health an individual is expected to have. The data cover 127 economies: CEE/CIS = central Europe and the Commonwealth of Independent States (16 economies); advanced economies (29); MENA = Middle East and North Africa (7); sub-Saharan Africa (40); LAC = Latin America and the Caribbean (24); and developing Asia (11).

lines, and tax measures (Jamison and others, 2013). In addition, cost sharing could be designed to encourage use of more cost-effective care, particularly in emerging market and low-income countries where health insurance coverage is incomplete. These countries should seek to achieve universal coverage with a benefit package that covers only the most essential and cost-effective services, until the capacity to finance higher public health spending increases. This would not only help reduce inequality but also improve the overall health of the population.

- *Governments should foster competition and choice.* Such reform includes allowing competition for patients among insurers and service providers and dissemination of information on price and quality of health services. This could force health service providers to be more efficient, through such measures as an appropriate mix of doctors, nurses, and administrative staff and better use of infrastructure. Improvements in competition and choice have been shown to be positively associated with better health outcomes, although the effects on costs are less clear (Gaynor, Moreno-Serra, and Propper, 2013). Still, there is a strong role for regulation to ensure the proper functioning of the market and to limit such market failures as underprovision of health care and health insurance. This is likely more relevant for advanced economies, because a high level of administrative capacity is needed for sophisticated regulation.

- *Provider payment systems must be improved.* This reform includes shifting from fee-for-service payments, under which a provider is reimbursed for each service rendered, to case-based payments, such as capitation (providers receive a fixed amount for each patient under their care) and diagnosis related groups, which reimburse based on standard care for a patient's condition. Case-based payments can help reduce incentives to provide unnecessary treatment. However, to prevent undertreatment, strong clinical guidelines and monitoring are needed. This applies to most economies that have a large private health sector.

- *Modern health information technology must be adopted.* Technology appears to help improve health outcomes and lower costs by reducing medical errors and duplication of procedures and tests (Hillestad and others, 2005). But large up-front investments are required, so lack of financing may constrain adoption in some countries.

Improving the efficiency of public health care spending is paramount.

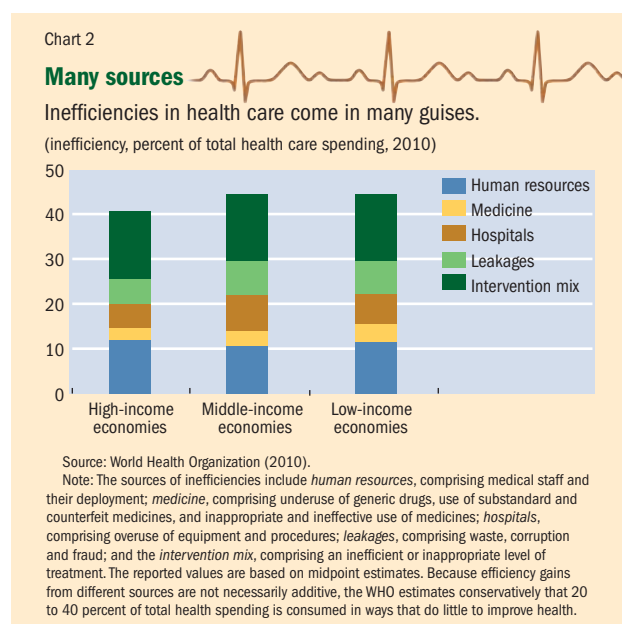
- *Governments must improve the operations of public institutions.* Efficiency can be enhanced through consistent assignment of responsibilities across government levels (by avoiding overlap and excessive administrative costs). The development and enforcement of appropriate clinical regulations can help reduce the overuse or inappropriate use of treatments. Improving transparency and enforcement of regulations, in particular those related to procurement and reimbursement, can help reduce corruption and fraud, which appear to be significant across all economies.

Improving the efficiency of public health care spending is paramount in all economies. Reforms to enhance public spending efficiency must be tailored to each country. In advanced economies, population aging and high public debt mean that governments must stabilize or contain the increase in the ratio of public health spending to GDP without hurting health outcomes. Developing economies must continue to improve health outcomes, while preserving the sustainability of public finances. ■

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Preparation Is Paramount

Rwanda's efforts to prevent Ebola from spreading into the country show that a multisectoral approach beyond health is needed

Agnes Binagwaho

ONE of the greatest challenges to progress in global health is the narrow view that investing solely in health systems is a panacea for managing health threats.

Rather, it is necessary to strengthen all the sectors that affect social determinants of health and governance—including finance, transportation, security, and communication—to ensure a collaborative and effective response to such threats.

As an example, look at how my country, Rwanda, is managing efforts to prevent the spread of the Ebola virus, which has devastated many countries in west Africa.

While it seeks to prevent Ebola from occurring in Rwanda, the health care system should not be distracted from its persistent fight against premature deaths due to maternal and childhood ailments, HIV/AIDS, tuberculosis, malaria, and others. It is critical that it adapt and adjust across all sectors to mitigate such an acute and unanticipated threat.

Ability to govern

The threat tests not only the responsiveness of the health care system, but also the country's ability to govern. Rwanda's response has required mechanisms for multisectoral and collaborative policymaking, as well as a shared mind-set of making the most of every available resource.

For instance, funds are needed to manage the prevention of an outbreak of Ebola—such as to quickly outfit all public hospitals with isolation units and to train health care professionals who can be on the front lines if needed—and the Ministry of Health needs the financial sector to support its decisions. Also, given the potential transmission of the virus from people entering the country, we have had to rely on the transportation sector and the immigration office to implement our foreign travel policies. Furthermore, the security sector has had to enforce emergency procedures—such as 24-hour countrywide readiness to contain any potential Ebola case.

To harmonize these decisions and to keep all stakeholders—especially the general population—informed, it has also been critical to involve the communications sector.

This multisectoral approach was not patched together in the face of this particular crisis. Rather, it was created carefully and collaboratively over time.

For example, leaders of Rwanda are accustomed to meeting in policy “clusters,” including the Social Cluster, which is cochaired by the Ministries of Health and Education. Rather than operating in silos with narrow vantage points, we meet monthly as a group to discuss the bigger picture and build con-



Managing the prevention of Ebola has been extraordinarily costly.

sensus around how we can extract the most value from each use of the limited, but growing, resources of the country. It has put the onus on officials of different ministries to be collaborative problem solvers rather than competitors for government funds.

Costly endeavor

While these habits have benefited policymakers greatly as we navigate this current threat, managing the prevention of Ebola has also been extraordinarily costly—not only in money but in time. Every hour that we work to prevent Ebola is one we are unable to devote to other development objectives, such as improving our health care service delivery. Moreover, these efforts have placed a sizable financial burden on our economy. The investment required to fight this acute threat in the near term may delay the planned construction of a new health center or hospital or road or school. While this has been a costly adjustment, the cost of inaction—or partial or poorly planned action—is far greater.

The threat of Ebola has challenged our health care system to rise to a new level. It has also shown how we can do even more with the limited resources that we have—time and money—both within the health care system and across the sectors that have been involved with the response.

We should constantly strive to improve collective efforts to protect and promote the health and well-being of our people—including, of course, bolstering investment in strengthening the health sector. After all, without health professionals, equipment, and infrastructure, we could not manage any health threat. But the Ebola crisis has also taught us that to improve our response to the next challenge that may await us, we must also strengthen our country's ability to govern collaboratively. This includes investing not only in the provision of emergency health services, but more broadly in all sectors that affect the well-being of the people—who are our greatest resource. ■

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PRIVATE VS. PUBLIC

Jorge Coarasa, Jishnu Das, and Jeffrey Hammer

In many countries the debate should not be about the source of primary health care but its quality

THE private sector provides between one-third and three-quarters of all primary health care in low-income countries, depending on the survey.

But for most patients private sector medicine does not encompass large, modern hospitals and integrated service providers. That private sector exists and caters to a relatively wealthy urban clientele. The private sector for the poor is a mixture of modern providers operating small for-profit clinics or working for nonprofit institutions and providers trained in traditional systems of medicine, herbalists, homeopaths, and many with no qualifications.

It is impossible to generalize about what the private sector is or does in providing medical services to the poor. Nevertheless two generalizations seem to dominate the discussion of private medicine in low-income countries. One promotes the private sector as a cure-all for public sector malaise and general dysfunction. The other believes that predatory practices are so endemic in the private sector that it should be regulated, controlled, and possibly replaced by government-funded and -operated clinics.

To what extent each view is right is an empirical question that depends on the problems that arise when patients and health care providers interact in markets for medical care and on the ability of the government to fix them. For example, patients may not recognize good care and instead demand quick fixes and snake-oil remedies. If they do, the private sector will provide such remedies. Or providers may prescribe treatments that increase *their* financial benefit, not serve the patient's health needs. For

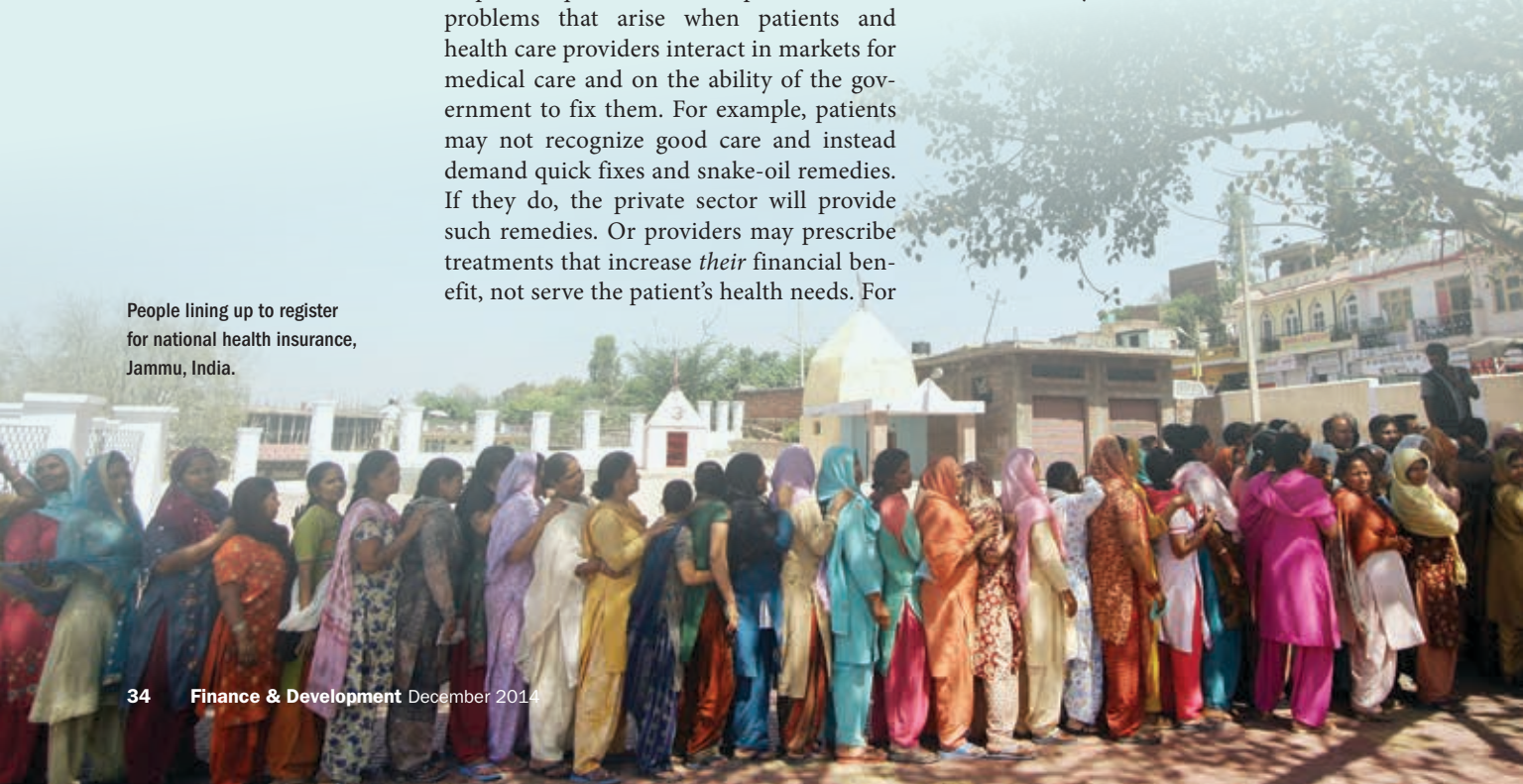
instance, providers may choose cesarean sections when cheaper, normal deliveries are sufficient or dispense unnecessary medicines that earn the provider a profit. Indeed, it is widely believed that “asymmetric information”—when the provider knows more about the patient's condition than the patient does—leads to problems with the private provision of curative health care.

But it is not clear that governments do better. Low-quality private providers and serious market inefficiencies often coexist with low-quality public sector providers. Potential regulators often lack monitoring and enforcement capacity. True public goods—such as the elimination of sources of disease (mosquitoes for example) and good sanitation—must be provided by the government. But when it comes to curative medical care, the picture is less clear.

Large private sector

The private health care sector in low-income countries is generally large and a steadily used source of primary care, despite increases in funding and elimination of user fees for public services in many countries. Demographic and Health Surveys asked household members

People lining up to register for national health insurance, Jammu, India.





where they sought care when a child had a fever or diarrhea. Between 1990 and 2013 (across 224 surveys in 77 countries) half the population turned to the private sector, and between 1998 and 2013—even among the poorest 40 percent—two-fifths sought private care (Grepin, 2014). For adult and childhood illnesses combined, private sector use in the early 2000s (the latest data available) ranged from 25 percent in sub-Saharan Africa to 63 percent in south Asia (Wagstaff, 2013).

One possible explanation for large private sector use is unavailable or overcrowded public facilities, which drives people to private clinics. But people use private providers

People use private providers extensively even when public facilities are available.

extensively even when public facilities are available. And overcrowding does not appear to be an issue. In Tanzania, Senegal, and rural Madhya Pradesh (India), doctors in public primary health clinics spend a mere 30 minutes to an hour a day seeing patients. In Nigeria, the average rural public facility sees *one* patient a day (World Bank, 2011; Das and Hammer, 2014).

The willingness of patients to pay for private services they could get free from a nearby underutilized public facility could reflect various dimensions of quality, such as provider absenteeism in public facilities or inadequate customer attention. From a health and policy standpoint, the preference for private facilities becomes a problem if private sector providers are more likely than public providers to yield to patient demands for products and services that are medically inappropriate (antibiotics and steroids, for example) or to manipulate treatment to increase their incomes. If both problems are *less* prevalent in the public sector, governments should consider expanding the public sector to replace the private sector or think about closely regulating private medicine. The question is whether the quality of care differs across the two sectors.

Quality of care

In fact, the overall quality of care in *both* sectors is poor. Consultation time varies from as little as 1.5 minutes (public sector, urban India) to 8 minutes (private sector, urban Kenya). Providers ask on average between three and five questions and perform between one and three routine examinations, such as checking temperature, pulse, and blood pressure. In rural and urban India, important conditions are treated correctly less than 40 percent of the time; when patients receive a diagnosis, it is correct less than 15 percent of the time. Unnecessary and even harmful treatments are widely used by all providers and in all sectors, and potentially lifesaving treatments, such as oral rehydration therapy in children with diarrhea, are used in less than a third of interactions with highly qualified providers. Less than 5 percent of patients receive *only* the correct treatment when they visit a provider.

Two recent systematic reviews of studies of the quality and efficiency of public and private sector health service provision came to sharply different conclusions. One supported the public sector (Basu and others, 2012) and the other the private sector (Berendes and others, 2011). When we went to the original literature to identify the source of this discrepancy, we were forced to conclude that the short answer to even the basic question of whether the quality of care is higher in the public or private sector is “we don’t know.”

To isolate quality differences across the public and private sector, studies should have data from both. They should also rule out confounding factors arising from differences in patients, training, and resource availability. (It is not useful to compare an untrained private sector provider in a small rural clinic with a fully trained public sector doctor in a well-equipped hospital).

Of the 182 publications covered in the two reviews, only one study (Pongsupap and Van Lerberghe, 2006) satisfied these criteria. This study used standardized patients (mystery clients) to examine how “similar” doctors in the private and public sectors in Bangkok treated anxiety. Standardized patients—local recruits who present the same situation to several providers—are widely regarded as the gold standard in this type of research because they offer an objective measure of quality of care, including how likely the provider is to follow protocols, the accuracy of the treatment, and the use of unnecessary treatments. They allow researchers to evaluate how the *same* patient is treated by different providers. In that study, the authors reported more patient-centered care in the private sector, but no difference in treatment accuracy between public and private providers. No doctor provided the correct treatment (which was to do nothing).

Rural India

In our own research in rural India, we sent standardized patients first to a random sample of providers in the public and private sector and then to qualified doctors who practiced in both (Das and others, 2014). There are several notable findings.

First, *the majority of care in both the public and private sector was provided by people without formal medical training*. In the private sector, this reflects the paucity of trained professionals willing to practice in rural areas. In the public sector, a medically untrained staff member provided care 64 percent of the time because a doctor was not present. Doctors, who are paid a fixed salary, are often absent from public clinics—40 percent of the time in India, 35 percent in Uganda, and more than 40 percent in Indonesia, according to national studies.

Second, *patient-centered interactions and treatment accuracy were highest in private sector clinics with public doctors*. The same doctor spends more time, asks more questions, is more likely to adhere to a checklist of recommended questions and examinations, and has higher treatment accuracy in a private than public practice (see chart). There is no difference in the (high) use of unnecessary medicines across sectors.

Third, *antibiotic overuse was equally high in both sectors*. In the private sector 48.2 percent of qualified and 39.4 percent of less than fully qualified providers dispensed unnecessary

antibiotics. Public doctors in primary health clinics prescribed antibiotics for diarrhea 75.9 percent of the time, spending 1.5 minutes to reach a treatment decision.

Fourth, *in the private sector, greater adherence to a checklist and correct treatment meant higher prices*. This is consistent with market models in which consumers pay a premium

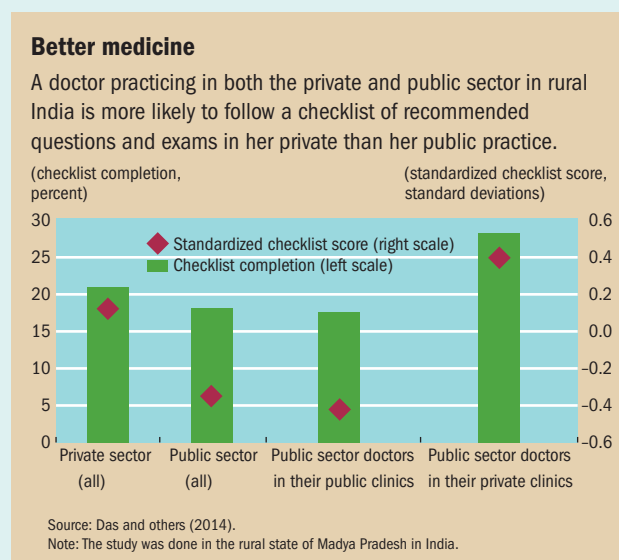
Policies should remove the link between diagnosis and treatment.

for better quality and suggests that they know the quality of the services and care about treatment accuracy. But there was no price penalty for unnecessary treatment, suggesting that patients could not judge whether extra medicines they received were necessary.

The overuse of medicines in the private sector could reflect a link between provider profits and prescribing practice: research shows that when doctors receive no compensation as a result of prescribing them, unnecessary antibiotics are prescribed less often. But antibiotic use is just as high in the public sector. So the profit motive may be part of the story, but it is not the *only* story. Similarly, the conventional wisdom that patients cannot judge quality must also be challenged because legitimate medical quality differentials are correlated with higher prices.

Encouraging better medicine

On the basis of what little evidence there is, the ills of the private sector have been exaggerated. Patients appear to make logical choices driven by factors such as distance, waiting times, prices, and the quality of care. There is scant evidence that patients make irrational decisions to visit private clinics. Although medicines tend to be overused when private health care providers both diagnose patients and receive compensation for their treatment, the same kinds of problems exist in the public sector.



The issue underlying the private-public question is not patient ignorance or irrational behavior, but the overall quality of care, which is low in both sectors. Better infrastructure and training may be necessary, but alone they are not enough to raise the quality of care (Das and Hammer, 2014). The behavior of health care providers and the structures and incentives affecting their work must be changed. To reduce the use of unnecessary medicines, for example, policies should remove the link between diagnosis and treatment in both sectors. This would include a legal barrier between prescribing and dispensing medicines and medical testing.

There is no reason to expand public medical care unless it is at least as good as the services it displaces. Expansion of public care might be appropriate in the rare country whose private market failure is particularly bad *and* whose public sector accountability is particularly good. But even then governments would have to greatly expand the capacity of the public sector or set up a massive regulatory system. A simpler option may be to focus first on what is already there and try to improve it. If policymakers accept that people don't use the public sector because its quality is poor and focus on making things better, patients would choose the best option. ■

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Fiscal Fitness

The move to use taxes to induce healthier behavior has its limits

Patrick Petit, Mario Mansour, and Philippe Wingender



MORE than half of the adults in advanced economies are overweight or obese and the numbers are growing (OECD, 2014). This epidemic of obesity causes 2.8 million deaths a year (WHO) and cost \$147 billion in the United States alone in 2008 (Finkelstein and others, 2009). Public authorities in these countries have considered or implemented a range of measures to fight the epidemic (Jamison and others, 2013), none of which have been more controversial than taxes on fat and sugar.

Modern tax systems rely primarily on broad-based taxes such as those on income and consumption to finance government budgets. However, additional taxes are sometimes applied to achieve broader policy objectives, such as reducing externalities—effects on others that arise from production or consumption but are not reflected in prices. Pollution is a good example. These taxes generally take the form of an excise, a tax on a narrow basket of goods or services.

The success of excise taxes on tobacco has spurred efforts to levy such taxes on unhealthy food in the belief that higher prices will lower consumption. But there are important differences between tobacco and unhealthy food—mainly the kind that contains fat and sugar. The tax base for tobacco is easily identifiable because it comes in fewer consumable forms—unlike fat and sugar—and has no close substitutes; its supply chain is short, simple, and concentrated and therefore easier to control to prevent illicit trade. Moreover, tobacco use has clear external effects in the form of secondhand smoke and health care costs and is unhealthy at any level of consumption. These characteristics justify, and make feasible, an excise tax on tobacco, both from economic and health perspectives.

In comparison, fat and sugar do not damage health when consumed in moderation and generate few externalities. Most important, they come in many natural and artificial forms and are delivered through very different and complex supply chains. So defining the tax base of a specific form of sugar or fat is difficult, and taxing one type of food containing sugar or fat can induce substitution with other unhealthy products. As a result, taxes' relative efficiency in cutting consumption of certain foods is less clear-cut than for tobacco. Moreover, because fat and sugar are considered food items, they are frequently exempt from general sales taxes—making their taxation with excises even less compelling.

That is not to say that there is no role for excise taxes on fat and sugar. Under certain conditions, taxes can effectively

raise revenue and curb consumption of empty calories. For example, soft drinks, which are a major source of calories, can be easily defined for tax purposes, and their consumption can be sensitive to price. But because consumption habits, affordability, and substitution patterns vary significantly across countries, country-specific policies are required.

Moreover, excise taxes sometimes require international coordination to achieve their intended goals. A Danish tax on saturated fat content introduced in October 2011 was repealed after 15 months both because of unclear effects on consumption habits and because Danish shoppers crossed the border to shop in Germany. Other countries, such as France, have had more success using excises to reduce soft drink consumption; there is also evidence of significant impact on consumption among certain socioeconomic groups in the United States (Powell and Chaloupka, 2009).

Fat and sugar excise taxes will probably never be as widespread or effective as tobacco taxes, but they could play a limited role in some contexts, provided they are well designed and adapted to a country's consumption patterns and food supply chains. Let's not forget, however, that obesity is mostly the result of eating too much: addressing that problem could involve revisiting broader policies affecting prices and consumption, such as the taxation of food under general sales taxes, regulation, and subsidies. ■

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There are important differences between tobacco and unhealthy food.



Attention to Innovation

There are impediments to developing drugs to fight emerging diseases

Carol A. Nancy



WHEN new medical threats surface, such as the Ebola virus in Africa, we decry the human toll and ask why pharmaceutical companies don't do more to find medical solutions (Surowiecki, 2014). There are several reasons that innovations are often slow in coming, among them poor economic incentives and bad messaging.

In 2003, after the outbreak in China of Severe Acute Respiratory Syndrome (SARS) that spread to 37 countries and killed 775 people, infectious disease physicians prepared a graphic for the *New York Times* that placed deaths from SARS in context with other global infectious menaces. At the top of the disease-impact list was tuberculosis (TB). Several million people worldwide, most at the peak of their economic productivity, die from TB every year. It is deadly when contracted with HIV/AIDS.

Although we agonize over new, mysterious infections like SARS or Ebola, we long ignored TB, which has killed more people over the last 100 years than any other infectious disease.

If even TB did not attract new drug development efforts until recently, how will research into more localized infections be encouraged? Part of the answer lies in deciding how to finance the enormous development cost, estimated at over \$1 billion per drug (PhRMA, 2013), of introducing new and novel treatments for global health threats that affect but a few thousand people. That is, who will pay?

However, it is not just the economics of new product introductions that discourages pharmaceutical industry interest in infections that are prevalent outside advanced economies (*Wall Street Journal*, 2014). Public health messaging also plays an enormous, if unintended, role. Governments and international health organizations, in trying to manage always-scarce public health resources, tend to concentrate their efforts on more efficient use of existing tools. This emphasis on improvements in delivery is frequently interpreted by pharmaceutical manufacturers, rightly or wrongly, as a signal that authorities see no unmet medical need, only efficiency issues.

TB is an excellent example of how public health messaging impeded drug development for decades. For the last 40 years, TB has been treated with four antibiotics that were discovered between 1950 and 1970. The drugs are reasonably effective when taken in combination for many months, but they have unpleasant flulike side effects and toxicities, such as liver damage. The six-month treatment period and the side effects cause many patients to quit taking their drugs before their infection is cured. As a result, the residual TB bacteria develop resistance to the antibiotics.

When this serious treatment problem was recognized, the public health solution was not to call for safer and faster-acting drugs, but to initiate a delivery program that would help patients take the 40- to 60-year-old drugs faithfully for the full treatment period. Nevertheless, patients continued to stop treatment early, and resistance of TB bacteria to the old drugs increased. Some strains of TB bacteria are now resistant to all available antibiotics. Drug-resistant TB is a major global health threat—the World Health Organization estimates that more

Drug-resistant TB is at least 10 times more costly to treat.

than 500,000 new cases of multidrug-resistant TB are among the 9 million TB cases reported annually. Drug-resistant TB is at least 10 times more costly to treat, with a worldwide success rate of less than 50 percent.

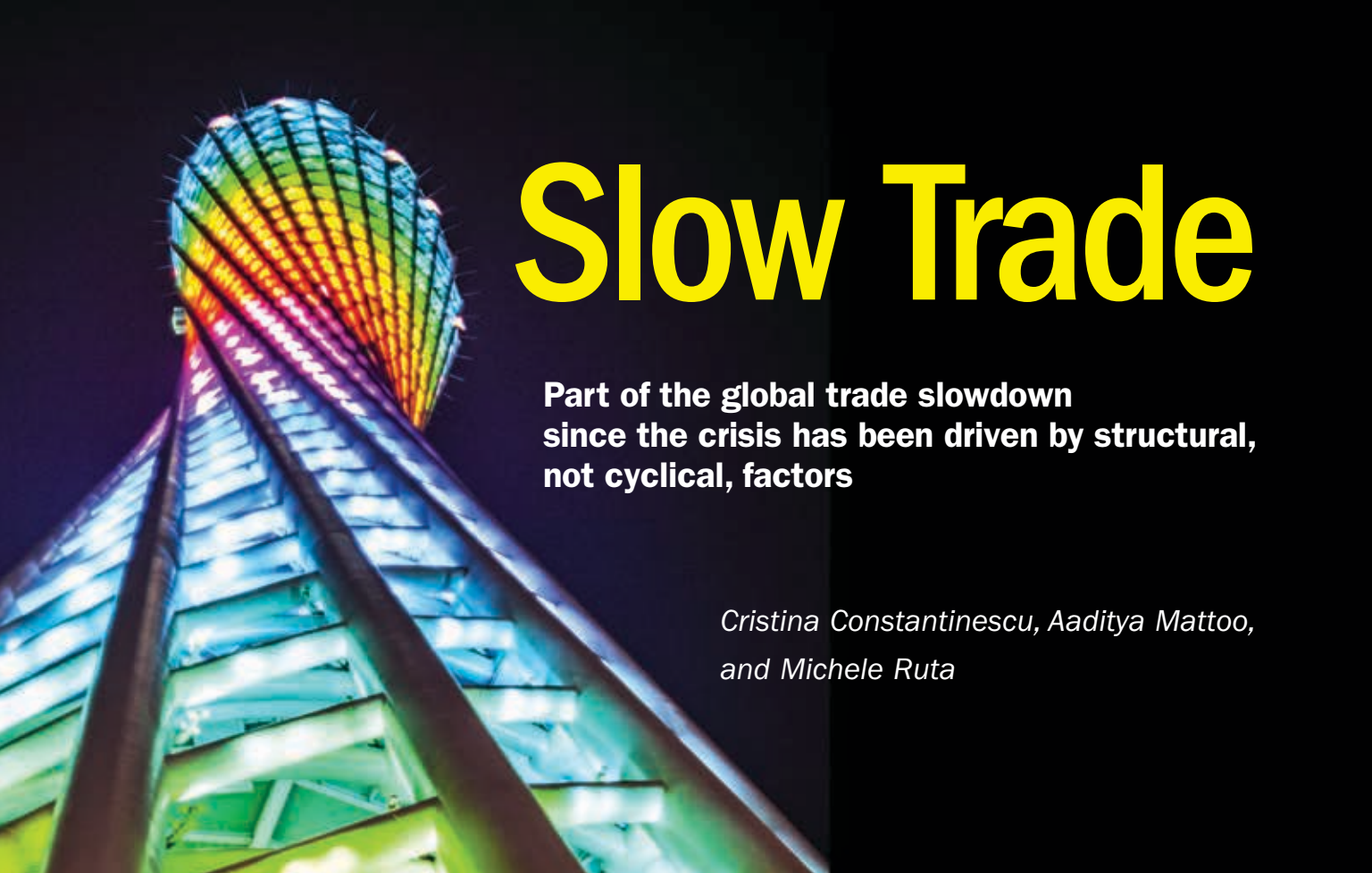
In the last 15 years, statistics on drug-resistant TB convinced the pharmaceutical industry that TB is an unmet medical need, and several companies responded with discovery programs for new drugs that are safer and work better than existing drugs. The 10- to 15-year development timeline for new drugs, from discovery to market authorization, means that the industry is just in time to address the growing crisis of multidrug-resistant TB. Two novel TB drugs were recently approved by the EU and U.S. authorities—in 2012 and 2014—and many other innovative TB drugs are nearing completion of clinical development, including two from my company, Sequella.

There are certainly other infectious diseases that we recognize could cause serious disruption of civil society. To encourage industry to develop drugs that could change the trajectory of potential global epidemics, the global public health community must send the right message—asking for innovation not just efficiency, identifying clearly where it wants research resources dedicated, and providing the economic incentives and reimbursement rates that will justify the enormous development costs of such drugs. ■

Carol A. Nancy is Chief Executive Officer of Sequella, Inc., a private company that focuses on commercializing novel treatments for antibiotic-resistant infectious diseases.

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Slow Trade

Part of the global trade slowdown since the crisis has been driven by structural, not cyclical, factors

Cristina Constantinescu, Aaditya Mattoo, and Michele Ruta

WHAT'S up with world trade growth? After bouncing back in 2010 from the historic low of the Great Recession, it has been surprisingly sluggish.

Trade grew by no more than 3 percent in 2012 and 2013, compared with the precrisis average of 7.1 percent (1987–2007; see Chart 1). For the first time in over four decades, trade has grown more slowly than the global economy. Economists wonder whether this global trade slowdown is a cyclical phenomenon that will correct itself with time or is attributable to deeper and more permanent (that is, structural) determinants—and what the answer means for the future of world trade and income growth.

Cyclical or structural

Many economists argue that the global trade slowdown is mostly a cyclical phenomenon, driven by the crisis that has afflicted Europe in recent years. This view has some empirical support. The European Union (EU) accounts for roughly one-third of total world trade volumes because, by convention, trade between EU countries is counted in world trade totals. The crisis depressed import demand across Europe. Imports in the euro area—the epicenter of the crisis—declined by 1.1 percent in 2012 and increased by a mere 0.3 percent in 2013. From this point of view, if European economies recover, world trade growth should pick up again.

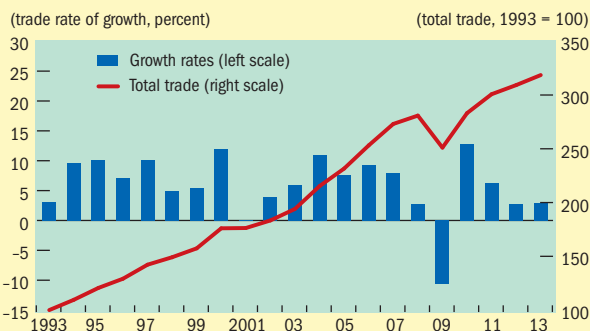
Cyclical components such as the crisis in Europe, however, are only part of the story. A look at the ratio of imports

to GDP over the past 10 years suggests that there are longer-term components of the current trade slowdown. Although most economies recorded a stable ratio of imports to GDP after the crisis, this flatness in import shares appears to pre-date the crisis for China and the United States. For these two countries, import volumes as a share of real GDP have been roughly constant since 2005: a “Great Flatness” seems to have set in before the Great Recession, pointing to the

Chart 1

Growing slower

World trade has been remarkably sluggish in the past couple years, after bouncing back from the Great Recession.



Sources: IMF, *World Economic Outlook*; and authors' calculations.

presence of longer-term determinants of the global trade slowdown (see Chart 2).

Indeed, this prolonged flatness reflects something deeper: a structural change in the relationship between trade and income in the 2000s compared with the 1990s. In a recent paper (Constantinescu, Mattoo, and Ruta, 2014), we analyze this relationship for the past four decades and find that the responsiveness of trade to income—what economists call the long-term trade elasticity to income—rose significantly in the 1990s but declined in the 2000s to the levels of the 1970s and early 1980s. In the 1990s, a 1 percent increase in global income was associated with a 2.2 percent increase in world trade.

But this tendency for trade to grow more than twice as fast as GDP ended around the turn of the century. In the 2000s, a 1 percent increase in world income has been associated with only a 1.3 percent increase in world trade. Our research confirmed that there was a statistically significant change in the trade-income relationship in the 1990s compared with before and after that period.

These results suggest that since the global financial crisis, trade has been growing more slowly not only because world income growth is lower but also because trade itself has become much less responsive to income growth. The trade slowdown has roots deeper than the cyclical factors that are affecting world GDP growth. Indeed, analysis of the long- and short-term components of trade growth shows that, in contrast to the trade collapse of 2009, the current global trade slowdown is mostly driven by structural rather than short-term factors (see Chart 3).

A drunk and his dog

Studying the relationship between global trade and income is like analyzing the behavior of a drunk and his puppy dog: neither is walking in a straight line, but we nevertheless expect them to remain fairly close to each other. After all, the world is a closed economy and the magnitude of exchanges of

goods and services must be related to the economic activity that takes place within it.

But the relationship between trade and income changes over time; a number of factors sometimes bring them closer together and sometimes push them farther apart. There are several possible explanations for the lower responsiveness of trade to income:

- changes in the *structure of trade* associated with the expansion or contraction of *global supply chains* (see “Chained Value,” *F&D*, March 2014);
- changes in the *composition of world trade*, such as the relative importance of *goods versus services*;
- changes in the *composition of world income*, such as the relative importance of *investment and consumption*; and
- changes in the *trade regime*, including the rise of *protectionism* leading to the fragmentation of the global marketplace.

Our analysis shows that the changing relationship between trade and income at the world level is driven primarily by changes in supply-chain trade in the two largest trading economies, the United States and China, rather than by protectionism or the changing composition of trade and income.

The composition of trade cannot fully explain the lower trade elasticity in the 2000s, because its components (that is, goods and services) have been remarkably stable in recent years. Similarly, the changing composition of demand is not an adequate explanation, because the long-term investment and consumption elasticity of trade are similar. And finally, the rise in protection has not been substantial, even in the aftermath of the financial crisis, suggesting that trade policies are playing a minor role in explaining the reduction in world trade elasticity.

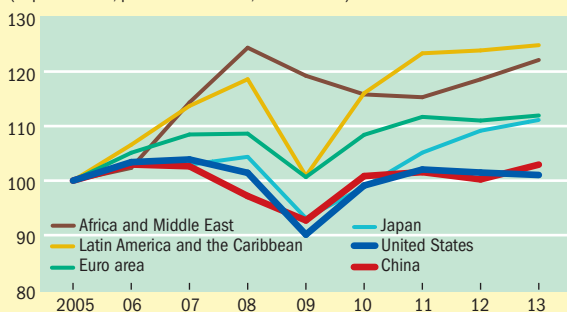
A country-level analysis reveals that the United States and China both experienced significant declines in the responsiveness of trade to growth (a drop from 3.7 to 1.0 for the United States and from 1.5 to 1.1 for China). Europe,

Chart 2

Be flat

China and the United States experienced a plateauing of growth in import shares that set in before the crisis.

(import volume, percent of real GDP, 2005 = 100)



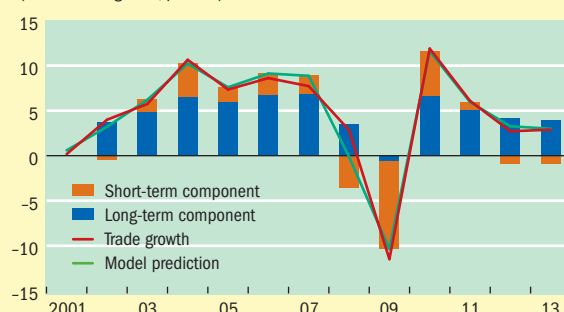
Sources: IMF, *World Economic Outlook*; and authors' calculations.

Chart 3

Here to stay

Unlike the global trade collapse in 2009, the 2012-13 slowdown was mostly driven by structural factors.

(trade rate of growth, percent)



Sources: IMF, *World Economic Outlook*; and authors' calculations.

in contrast, saw virtually no change. Other regions experienced sizable changes in trade elasticity over time, but they account for a small share of global trade and hence explain little of the change in world trade elasticity.

Variations in the trade-income relationship at the regional and country level are related to the changing structure of international trade. China offers an example of the economic forces at play.

Changing chains

The increased elasticity of trade to income in the 1990s likely reflected the growing fragmentation of production across bor-

The 2012–13 slowdown is likely to persist in the coming years.

ders (Escaith, Lindenberg, and Miroudot, 2010). The information and communication technology shock of the 1990s led to a rapid expansion of global supply chains, with an increasing number of parts and components being imported, especially by China, for processing and reexportation. The resulting increases in back-and-forth trade in components led measured trade to race ahead of national income.

Conversely, the decline in China's trade elasticity may well be a symptom of a further change in that country's role in international production. There is some evidence that China's international supply chains may have matured in the early 2000s, resulting in lower responsiveness of Chinese trade to GDP. This development is reflected in a fall in the share of Chinese imports of parts and components in total exports, which decreased from its peak of 60 percent in the mid-1990s to the current share of about 35 percent.

All these changes do not mean that China is turning its back on globalization. The lower share of imported parts and components in total exports does reflect the substitution of domestic inputs for foreign inputs by Chinese firms, a finding that is corroborated by evidence of increasing domestic value added in Chinese firms (Kee and Tang, 2014). But the increased domestic availability of inputs has been linked to foreign direct investment. There may also be a geographical dimension to these changes, with China's coastal regions beginning to source relatively more from the Chinese interior because the costs of transportation and communication with the interior have declined more sharply than those with the rest of the world. Trade integration may now be taking the form of greater internal trade than international trade, but official statistics usually capture only the latter.

The reduced responsiveness of trade to income for the United States mirrors in some ways developments in China. The United States was the primary source of the boom in Chinese and other emerging market economies' imports in parts and components and was the major destination for their exports of assembled goods. In the 1990s,

as U.S. firms increasingly relocated stages of production outside the United States, trade tended to respond more to changes in income. In recent years, even if there has been no retreat from offshoring, the pace of the international fragmentation process seems to have declined. U.S. manufacturing imports as a share of GDP have been stable at about 8 percent since the turn of the century, after nearly doubling over the preceding decade and a half.

In contrast to China and the United States, the responsiveness of trade to GDP in the euro area has remained high in the 2000s. This may be a result of the continuing expansion of supply chains to eastern and central Europe from euro area countries such as Germany.

Old and new engines

Will the global trade slowdown persist? Will it have implications for world growth and for countries seeking to use trade as an engine of growth? Our findings show that the 2012–13 slowdown was driven by a structural (and, hence, more durable) change in the trade-income relationship, indicating that the phenomenon is likely to persist in the coming years. This might affect the growth potential of the world economy because trade and income are not independent of one another.

But we must also recognize that the changing long-term relationship between trade and income underpinning the trade slowdown is a symptom of changing patterns of international production. The high responsiveness of trade to growth in the 1990s reflected the increasing fragmentation of production driven primarily by the United States and China. That particular engine appears to have exhausted its propulsive energy for now. But the scope for increasing international division of labor is still strong in Europe and could be important tomorrow for regions that have not yet made the most of global supply chains, such as south Asia, Africa, and South America. The trade agenda of the Group of Twenty advanced and emerging economies has a role to play in making sure that these opportunities are not missed. ■

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Moving on UP

Two-thirds of the world's population will live in urban areas by 2050

TODAY, over half of the world's population lives in cities. By 2050, this proportion is estimated to grow to 66 percent, according to a new report from the United Nations. Just three countries—India, China, and Nigeria—are expected to account for 37 percent of the projected growth of the world's urban population between 2014 and 2050.

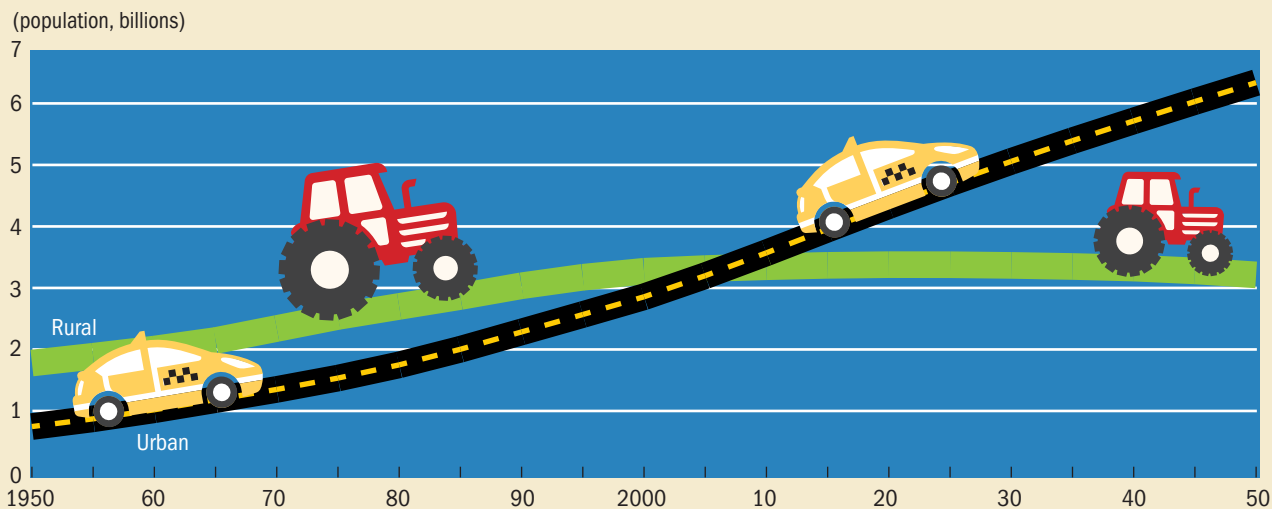
The most urbanized regions today include North America and Latin America. In contrast, Africa and Asia remain mostly rural. Over the coming decades, urbanization is expected to increase in all regions, with Africa and Asia urbanizing faster than the rest.

The report notes that there will be more than 40 megacities worldwide by 2030, each with a population of at least

10 million. Tokyo is the world's largest city, with a population of 38 million. Although its population is expected to decline slightly, Tokyo will remain the world's largest city in 2030, with 37 million people, followed closely by New Delhi with 36 million people.

As the world continues to urbanize, the most important development challenges will be concentrated in cities, especially in lower middle-income countries, where the pace of urbanization is fastest. The report stresses that cities will need to generate better income and employment opportunities, ensure equal access to services, and expand infrastructure for water and sanitation, transportation, housing, energy, and information and communications.

A MAJORITY OF THE WORLD'S POPULATION LIVES IN CITIES



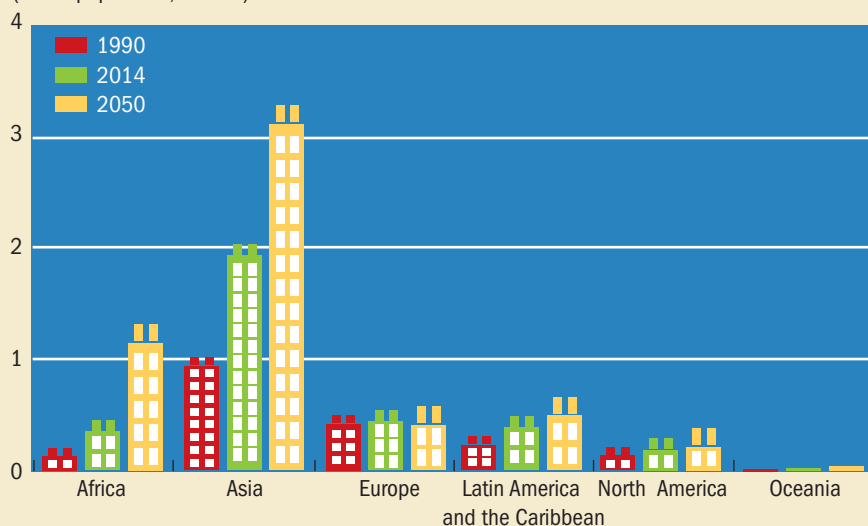
WORLD'S LARGEST CITIES IN 2014

(population, millions)



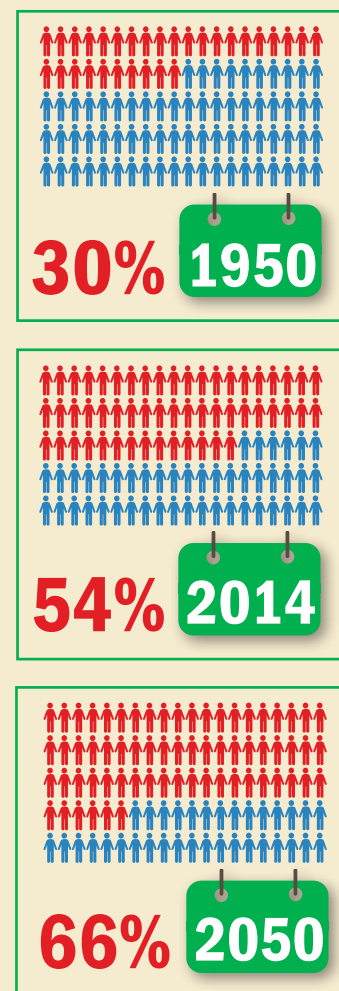
NUMBER OF URBAN RESIDENTS VARIES GREATLY BY REGION

(urban population, billions)

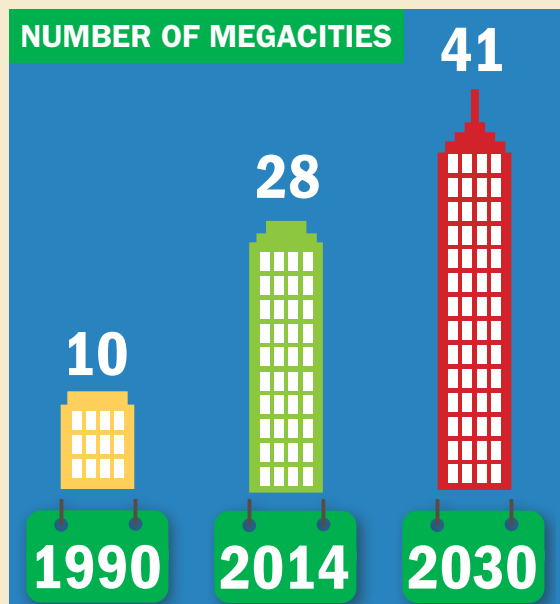


URBAN POPULATION

(share of total)



NUMBER OF MEGACITIES



2007
YEAR GLOBAL
URBAN POPULATION
SURPASSED GLOBAL
RURAL POPULATION

Prepared by Natalie Ramírez-Djumena, a Senior Editor on the staff of Finance & Development. Text and charts are based on World Urbanization Prospects: The 2014 Revision, Highlights, published by the United Nations in July 2014. The report is available at esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf



DRAGON among the IGUANAS

Anthony Elson

China's economic and financial relationship with Latin America is increasingly important to the region

DURING a visit to Latin America in July 2014, Chinese President Xi Jinping described the relationship between his country and the region as a “community of shared destiny.” But China is the one that seems to be shaping that destiny.

With the opening of China's economy following its accession to the World Trade Organization in 2001, the country has rapidly assumed a leading role in trade and foreign direct investment in the global economy. In 2012, it became the largest trading nation in the world, and in 2013 it became the second largest recipient of foreign direct investment after the United States and the third largest source of outward investment after the United States and Japan.

As part of its enormous expansion in global trade and investment activity since the turn of the century, China has significantly increased its economic and financial ties with Latin America. These initiatives by China have not been unique to Latin America; they are part of China's more general “going out” strategy to establish trade and financial links with a number of developing areas of the

south—in Africa and central and southeast Asia, as well as in Latin America.

The importance of this growing South-South relationship for China and Brazil was also manifest during Xi's 2014 visit, when new lending arrangements for developing economies by the BRICS alliance—Brazil, Russia, India, China, and South Africa—were formalized in Fortaleza, Brazil.

Closer ties

Bilateral trade between China and Latin America has grown exponentially since the early 2000s—from \$12 billion in 2000 to \$289 billion in 2013 (see chart). While there has been a growing imbalance between the two trading partners in favor of China over this period, this bilateral trade has also been asymmetrical in that China is a much more important trading partner for Latin America than the other way around. China is now the second largest source of Latin America's imports (after the United States) and the third largest destination of its exports (after the United States and the European Union).

Latin America's exports to China are almost entirely primary commodities (hydrocarbons,

copper, iron ore, soybeans). China's demand for these goods is one reason for the significant terms-of-trade gains Latin America enjoyed in the five years before the 2008–09 global financial crisis. These gains and the attendant growth in export volumes provided a significant boost to the region's real GDP and income growth over that of the preceding decade.

China's imports from Latin America reflect the country's substantial demand for raw materials to support development. Its imports from the region are highly concentrated, coming primarily from Argentina, Brazil, Chile, Peru, and Venezuela. China has become a major export partner for these countries.

Foreign direct investment from China is heavily oriented toward the expansion of natural resource exploitation in Latin America.

However, China's imports of raw materials and intermediate goods are well diversified. It also buys from African, Asian, and North American suppliers. An exception is copper, with 55 percent of its supply coming from the Latin American region (of which 30 percent is from Chile).

China's exports to Latin America, in turn, have been mainly manufactured goods, mimicking the historical pattern of interindustrial trade between countries of the north and south. There have, however, been some notable exceptions to the traditional exchange of raw materials for manufactured goods, the most important example being the recent purchase by China of jet aircraft from Brazil's Embraer Corporation.

More generally, however, China's significant administrative barriers have inhibited Latin American exports of manufactured goods to China, as have the high transportation costs compared with markets in the Western Hemisphere. In addition, the UN Economic Commission for Latin America and the Caribbean (ECLAC) has noted concern in Argentina and Brazil about possible Chinese dumping of simple manufactured exports such as steel, textiles, and domestic appliances.

Lending and investment

Financial linkages between China and Latin America have also increased significantly since the middle of the past decade, although China's lending and investment activity has been much smaller in absolute terms than its imports from the region. Since 2005, total loan commitments from the China Development Bank and the China Exim Bank to Latin America amount to nearly \$100 billion, according to the Inter-American Dialogue, based in Washington, D.C.

Lending by China in 2010 was roughly equivalent to that by the World Bank, Inter-American Bank, and Export-Import Bank of the United States combined, but it has since declined. Unlike lending from these agencies, much of the financing from China was allocated to countries such as Argentina, Ecuador, and Venezuela with limited access to other official or private funding. Venezuela, which accounts

for roughly half of the region's total borrowing from China, expects to make a substantial share of its loan repayments in kind, through oil exports. China has placed few, if any, conditions on its lending to the region, which has been allocated to a variety of infrastructure projects.

During his recent tour of Latin America, Xi announced \$35 billion in new lending facilities to finance additional infrastructure and development projects of interest to both China and recipient countries in Latin America. A new joint forum comprising China and the Community of Latin American and Caribbean States (CELAC), which was also announced during the Chinese president's visit, will manage most of this funding. The forum is intended to promote cooperation between the two partners on a wider range of issues than economic and financial ties.

One important infrastructure project under discussion among China, Brazil, and Peru is the construction of a trans-continental railway in South America, which would be the first regional project of this kind. Discussions have also taken place between a private Chinese investor and the Nicaraguan government regarding a transoceanic canal through Nicaragua.

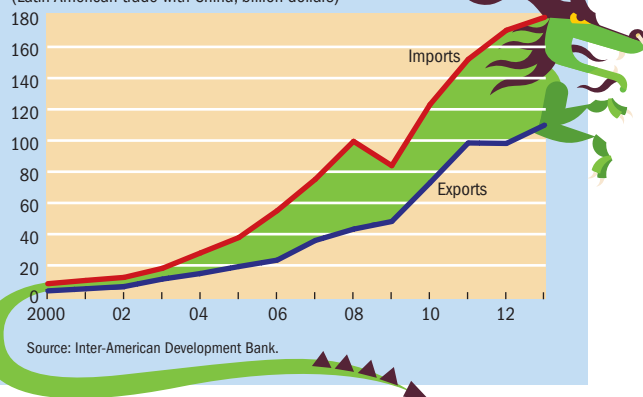
Foreign direct investment from China closely mirrors its pattern of imports and is heavily oriented toward the expansion of natural resource exploitation in Latin America (copper and iron ore mining, hydrocarbon exploration, soybean production). Argentina, Brazil, and Peru have been the largest recipients of China's foreign direct investment, which amounted to about \$32 billion during 2010–12. Chinese firms have a particularly strong pipeline of projects in Peru to develop that country's copper mining resources, amounting to \$20 billion. This exceeds investments by U.S. and Canadian firms combined, which until now have been the dominant investors in Peru's copper sector.

A substantial share of China's foreign direct investment to Latin America is channeled through the British Virgin and Cayman Islands, according to statistics from the UN Commission on Trade and Development. However, the eventual destination of these flows cannot be clearly identified. Excluding

Roaring dragon

China's bilateral trade with Latin America has increased substantially since the turn of the century, with its sales to the region outpacing its purchases.

(Latin American trade with China, billion dollars)



flows channeled through these offshore financial centers, foreign direct investment from China amounted to only about 5 to 6 percent of total inward investment to Latin America in recent years, though this share is expected to increase.

Not all good news

Latin America's economic and financial relations with China have provided significant gains for the region in recent years in the form of export expansion and foreign capital inflows. But there might be negative repercussions over the longer term.

One problem relates to the so-called recommodification of the region's exports. The share of raw materials in Latin America's exports had fallen from about 52 percent in the early 1980s to a low of 27 percent in the late 1990s, but had risen to more than 50 percent just before the global financial crisis. Latin America's historical dependence on natural resource-based exports has been a problem for the region, exposing it to terms-of-trade volatility and weakening the competitiveness of its manufacturing sector through exchange rate fluctuations.

The phenomenon of recommodification has been reinforced by the recent increase in Latin America's imports of manufactured goods from China, many of which compete directly with manufacturing in the region, which is oriented toward both domestic and regional markets. This, in turn, could dampen demand for products of other manufacturing and nonmanufacturing sectors that are upstream suppliers for these industries. Issues of dumping, noted earlier, only heighten these concerns. Given the nature of China's exports to the region, there is little or no gain from their contribution to the technological upgrading of the region's production.

Manufacturing as a share of regional GDP declined from 25 percent in 1980 to 21 percent in 2000 and to 15 percent in 2010, according to data compiled by ECLAC. Over the same period, manufacturing within the Association of Southeast Asian Nations region and in China rose to about 40 percent of GDP. One recent study concluded that China's exports of low-cost manufactures to Latin America and third markets have significantly eroded Latin America's competitiveness in those markets, which has put a major brake on the expansion of the region's industrial base (Gallagher and Porzecanski, 2010).

In addition to competition from China's manufactured exports, Latin America is contending with recent softening in its external terms of trade and weaker global demand for its commodities, partly related to China's rebalancing away from investment toward domestic consumption (see "Sino Shift" in the June 2014 issue of *F&D*). This development, in turn, has reexposed the region to the prospect of significantly lower growth, according to the IMF's recent *World Economic Outlook* forecasts.

Against these headwinds, the region faces some of the same challenges for its long-term development that hindered sustained growth before its engagement with China. One hurdle is expansion and upgrading of its transportation, shipping, and power generation infrastructure beyond what is supported by China. In recent years, Latin America has underinvested in infrastructure, with public investment of about 2 percent

of GDP a year over the past decade. This is less than half the annual rate spent by the high-growth economies of east Asia.

One important area of infrastructure development that has become a critical factor in export competitiveness is the quality of a country's trade facilitation services—customs clearance and transit procedures, communication facilities, trade finance, and arrangements for new business registration. With the growing importance of global value chains in international trade, these services are becoming indispensable. South America participates little in global value

Rebalancing of China's economy should present opportunities for growth in the region's manufactured exports.

chains—much less than east Asia, for example. The latter region has been called "factory Asia" thanks to the dense network of cross-border manufacturing linkages that underpins its export dynamism, in which China plays a key role.

A second critical area for Latin America's future development is technological innovation, which is essential for the upgrading of its manufacturing base and improvements in labor productivity. Export diversification linked to an increase in the technological sophistication of manufactured goods is a key factor in promoting high rates of economic growth. International surveys by the World Economic Forum show that private enterprise in Latin America generally falls short—compared with east Asia—in business operations' technological capability, as reflected in outlays for research and development, installed capacity for innovation, and the number of patents issued.

Along with these areas for improvement, Latin American governments should take advantage of the new joint China-CELAC Forum to seek ways to diversify the region's export trade and increase its foreign direct investment with China. The rebalancing of China's economy, noted earlier, should present opportunities for growth in the region's manufactured exports given the anticipated strengthening of the renminbi and a rise in domestic wages and consumption. Over time, such efforts should enable Latin America to benefit further from its economic and financial links with China, which has become one of its key partners in the global economy.

President Xi's 2014 visit to Latin America is tangible evidence that this development is of keen strategic interest to China as well. ■

Anthony Elson teaches at Duke and Johns Hopkins Universities and is the author of Globalization and Development: Why East Asia Surged Ahead and Latin America Fell Behind.

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The Benevolent Side of **BIG DATA**

Christopher W. Surdak and Sara Agarwal

A farmer uses a simple mobile phone to obtain crop prices and subsequently finds a buyer who will pay the most: this is the most common example of how technology can spur social and economic advancement.

But today's technology allows us to take that example up a notch. With a smartphone and simple apps, buyers can track how many farmers they see in a day, and farmers can keep tabs on how much they make in a year. With a year's worth of collected information an app can let farmers know the best day and location to sell their goods. Applications link market demand with weather patterns so farmers know the best day to plant and harvest. Such analytic tools also help farmers understand precipitation and soil conditions and how these will affect their crops. They may also alert farmers to the spread of crop diseases and how to prevent them—with the click of a button. Through the use of big data, small-scale farmers can make better decisions that lead to even greater efficiency and profitability.

Big data has often been defined as the collection, analysis, and use of vast quantities of data. But existing tools already do that; what makes big data different is the ability to discover previously undetected relationships through large and sometimes unrelated sources. We can now ask new questions and get new answers. And we can do it via shared infrastructure (such as cloud computing), so almost anyone can use it. We can learn more about human behavior than ever before, and behavior is strongly linked to problem solving.

As with all technologies, big data does have a dark side. The collection of vast quantities of data can enhance people's lives, but it can also be used to control, manipulate, and exploit. Most organizations use information with good intentions. Some do not. There is growing concern over how people are being

influenced by data, and many governments are waking up to the need for regulation.

Realizing the promise of big data in developing economies requires a revolution both in the use of technology and its application. Only significant change on both fronts will allow big data to fully aid development. Governments, along with nongovernmental organizations (NGOs) and the donors and foundations that support them, have a critical role to play.

Data analytics can be used to drive growth in the developing world



Potato farmer using smartphone, Munshigonj, Bangladesh.

Big data is rapidly becoming an exercise in asking new and better questions. Each time you use your phone or post to a social media platform, you generate data that accumulate in a broader digital sea. Analysts can harvest these data, and instead of just asking *what* happened, they can now pose the

We can now ask new questions and get new answers.

more powerful question *why*. Why do people do what they do? Why did a particular input generate a particular result? The answers to these questions can reveal a great deal.

For example, in an attempt to understand why a particular region has more fatal health problems per capita, an analyst might find that fewer people in that region see a doctor at certain times of the year. A cross-check with other data reveals a correlation between doctor's visits and lower water levels at that time of year. When water levels are low, enemies from a bordering region can cross into the area of the regional hospital. Fearing for their lives, people avoid the hospital, even if they are sick. Placing a clinic in another area would resolve this issue, answering an old problem in a new way.

Practical solutions

HP Earth Insights, a program developed jointly by Conservation International and Hewlett-Packard Company, vastly improves the collection, analysis, and sharing of data on vegetation, species, carbon stocks, and climate. Scientists used to spend weeks poring over disparate data and huge numbers of seemingly disconnected photos of animals in the wild in 17 tropical forests across 15 countries. Using big data software to integrate diverse data sets and run computations and simulations, they can now identify trends in minutes, and better understand how forest loss and climate change lead to loss of species. Conservation International can then propose timely solutions and see what works best.

Or consider Kreditech, a private company that uses big data to assess the credit record of potential borrowers through publicly available information, including social networking sites. This is relevant because few people in developing economies have a traditional credit record, limiting their ability to secure a loan at all or at reasonable interest rates. But Kreditech's alternative methods can promote the granting of unsecured loans to those previously deemed unqualified. So, for example, if an applicant's friend had borrowed successfully, that would be considered a positive factor in the applicant's own creditworthiness. So far, Kreditech's repayment rate in some markets is as high as 93 percent, suggesting their criteria are not only legitimate, they are potentially better than traditional metrics. Being able to work outside traditional credit bureaus means millions of people who do not have a credit score may soon be eligible to receive credit.

Additional examples of big data influencing development include French multinational telecommunications corporation Orange and Swedish nonprofit Flowminder Foundation, both of which are using mobile phone voice and text data to

monitor population movement so they know where Ebola treatment centers would be most effective.

Big data can improve the analysis of existing development problems, but only if bright minds tackle these questions and lead the effort to address social and economic problems. Here, contextual information is the difference between discovering facts that are interesting and those that can be acted on locally. It is not enough to import data scientists from abroad. Local people familiar with local problems and culture are better placed to analyze the data. International donors and governments therefore have a key role to play in supporting the education of local data analysts. In turn, policymakers must be willing to experiment with the creative and daring new policy solutions that big data enables.

Technology booster shot

Many people wonder whether big data can fill gaps where information from traditional government data sources is incomplete or inaccurate. We can already learn much from data available in developing countries through phones, electric meters, and satellites (for example, travel patterns or economic activity). But much more could be done with better infrastructure.

Additional data can be harvested from an upgraded version of the cell phone that most people in emerging markets already have. As more and more people trade in their cell phones for smartphones, the pool of relevant data will grow. This is because smartphones encourage more interactive behavior via apps, creating a richer trove for analysts to mine. Encouraging the adoption of smartphones to address problems in specific sectors (like health and agriculture) and locations (like certain sized towns) would mean a geometric increase in both information quantity and quality.

Donors and governments have been reluctant to invest in smartphones for people who cannot afford them, as they may be perceived as a luxury item, like a television. But, given the value to society of the data generated, governments should consider subsidizing either the cost of smartphones or the associated data plans in order to collect user data. The costs may be recovered through the ethical selling of the anonymized data to those who seek them for commercial purposes. In the data-collection world, smartphones are not a luxury; they are the last mile of critical public infrastructure.

Once more people have smartphones, additional apps will be needed to produce relevant local content. Apps that help people locate clean water close to home, warn of an outbreak of cholera or Ebola, or help them to support their local school will in turn yield more information to fuel even better data analysis—and answer questions we haven't even thought to ask. Indeed, we will not know the full extent of what can be achieved until such apps are in use.

Apps created and managed by local people who have direct knowledge of the needs of their neighbors will be essential. Local developers will be key to this effort, and their initiatives should be actively encouraged. Greater use of smartphones will lead to a market for more application developers, and governments, donors, and nongovernmental organizations

can provide training, workspace, and other modes of support. The work of software developers should be seen as an extension of official statistical office work: their role in information collection is equally vital.

Some people worry that big data will be used in emerging and developing economies to shore up authoritarian governments that might use this information to maintain power. At a minimum, violations of privacy can readily occur from the misuse of collected data. But it is what we do with any technology—not the technology itself—that determines whether or not it is good or bad.

Privacy policies and other safeguards are necessary to build confidence in data collection and ensure its appropriate use. Data collected now sit with mobile operators, governments, app providers, and social media network providers. Opening up those data in an aggregated, anonymized fashion for data analysis is critical, and governments should play a role in shaping policies to enable it (even for private providers) when there is a legitimate need.

Maximizing mosquito nets

Some will argue that big data tools and the investment they require are not as important to developing economies as, say, mosquito nets. But what if big data could better inform the timing of mosquito net distribution? Indeed it already can. aWhere's Mosquito Abatement Decision Information System combines satellite data imagery, weather models and mosquito biology to identify potential onslaughts before the

mosquitoes even hatch—ultimately giving mosquito net providers and users invaluable information about where supplies can best be used.

This example showcases how better use of data can enhance existing development efforts by ensuring the optimal use of scarce resources. Big data is not just about greater awareness or more accurate forecasts; it is also about doing more with less.

Using analytics to drive growth in the developing world requires the following steps: invest in the right technology and education, support entrepreneurs and a shift in mindset, and implement privacy and open-data policies. These efforts are best implemented simultaneously because a shortfall in any area will stifle the broader effort.

Big data can and will be relevant in developing economies, but how quickly and how effectively depends on what we do now. To realize big data's full potential, we must enable both new information sources and new thinking about how to use them. Only then can we lift up more of the world's developing economies with the use of this powerful new tool. ■

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Taxing Principles

Making the best of a necessary evil

Ruud De Mooij and Michael Keen

IT is hard to think of anything that some government, at some point, has not taxed. Playing cards, urine, fireplaces, slaves, religious minorities, and windows have all at some point attracted the attention of the tax collector. Nowadays we think of income taxes, value-added taxes, taxes on cigarettes, and the like as the key revenue instruments. But the basic principles for understanding and evaluating all taxes are much the same. In this, the first of two articles on taxation, we examine these principles. In the March 2015 issue of *F&D* we will apply them to some current controversies.

The Organisation for Economic Co-operation and Development defines a tax as a “compulsory, unrequited payment to government.” That is, you have to pay it, and you don’t get anything back—at least not directly. (You may derive some benefit from the public spending your payment helps finance, but if not—well, from the perspective of tax collection—that’s just too bad.)

Importantly, however, many policy instruments that are not in a legal sense taxes have much the same effect. Social contributions are a prime example. These are payments linked to an individual’s labor or business income that confer some entitlement to pensions or other social benefits. The personalized benefit means that these are not, strictly speaking, taxes. But the link between payments and contributions is often so far from actuarially fair, and the prospective benefits so remote, that their effect is likely to be very similar to that of an outright tax.

Efficient taxation

A tax transfers resources from the private to the public sector, and so inescapably imposes a real loss on the private sector, leaving aside any benefit from whatever the tax revenue finances. But almost all taxes will cause more harm than that because they typically drive a wedge between the price a buyer pays for something and the amount the seller receives—which may prevent some mutually beneficial trade. Taxing labor income, for instance, means that the cost to an employer of

hiring someone exceeds what the employee receives. A worker may be willing to accept a job that pays (at least) \$100 and an employer willing to pay (no more than) that, but imposing tax on the wage will prevent this trade from happening. This welfare loss from taxation over and above the loss from the direct transfer of real resources out of the private sector is known

Tax incentives to encourage particular activities, for instance, all too often provide opportunities for evasion.

as *deadweight loss* (or *excess burden*) and is what economists have in mind when they talk of tax *distortions*. (In the example above, because the worker is not hired, no tax is paid, but the deadweight loss is still positive).

Efficient tax design aims to minimize these losses, whose size depends on two main factors. First, *losses are bigger the more responsive the tax base is to taxation*. Suppose for instance that the demand for a worker’s labor is completely inelastic, meaning that an employer is willing to pay any price for the worker’s services. Then, with a 20 percent tax rate, as in the example above, the employee would receive \$100, but the employer’s cost would be \$120. The employee is hired, and there is no distortion. But when one side of the market has an alternative to the transaction being taxed, distortions arise, and the easier it is to exercise that alternative, the larger the distortion. And this is true (given a few more assumptions) whether it is decisions like hiring that are affected by the tax or decisions to avoid or evade tax. Second, *the loss increases more than proportionately with the tax rate*. Adding a distortion, the higher tax rate, is more harmful when there is a large distortion already in place.

Two prescriptions for efficient tax policy follow: tax at a higher rate things in inelastic demand or supply, and tax as many things as possible to keep rates low. Both of these principles require qualification—because in some cases following these general rules can have adverse consequences.

Taxing a good whose demand is inelastic, for instance, will have little effect on the quantity of that good demanded, but it leaves less to spend on other goods, which can lead to large changes in other markets (more on this in March).

And the injunction to seek as broad a tax base as possible must be tempered by one of the most powerful precepts in public finance: transactions between businesses should not be taxed. This is because taxes drive a wedge between buying and selling prices for intermediate inputs, which is likely to lead firms to choose different inputs than they would in the absence of the tax. As a result, firms end up producing less than they could. Broadening the tax base by including intermediate transactions can, therefore, be very bad news for efficiency. A turnover tax, for instance—charged on all transactions, including business-to-business sales—would have a much bigger base than a tax on final consumption (such as a value-added tax) and could raise the same revenue at a much lower rate. But it would also be much more distortionary.

Another set of qualifications arises from externalities—effects (good or bad) on those not involved in the underlying decisions. Environmental damage, such as climate change, is the leading example. Here a *corrective* tax may be called for. The corrective tax, also called a *Pigovian* tax (after economist Arthur C. Pigou, who proposed it), is designed to distort behavior in a desired direction, including, if need be, the actions of businesses—while of course also putting the revenue raised to good use. (See “What Are Externalities?” in the March 2010 *F&D*).

Bearing, and sharing, the burden

The person who ultimately bears the real burden of a tax may not be the one legally responsible for remitting payment. For instance, in the example above, when the demand for labor was perfectly fixed, the \$20 loss was suffered by the employer, not the worker—and that would be true regardless of which one was legally responsible for making the payment to the government. This illustrates too the general principle that the burden of a tax—its effective *incidence*—falls more heavily on the side of the transaction with the least elastic response—that is, the one that finds it more difficult to shift out of the activity being taxed.

These implications are often ignored. Take the current outrage over the small amount of corporate tax paid by many multinational corporations. Corporations are not people, and only real people—shareholders, workers, customers—can pay taxes. The debate over corporate tax makes little sense without consideration of who really gains when the effective rates are low.

Fairness in taxation is always a major issue, with two main dimensions. *Vertical equity* concerns the treatment of those with different incomes. The impact of a tax system on this

dimension depends on its *progressivity*—that is, how rapidly the share of income taken by tax increases with the level of income. *Horizontal equity* holds that those who are in all relevant respects identical should be treated the same.

Each of these concepts is less straightforward than it may seem. Clearly people have different views on the appropriate degree of progressivity. But people may also disagree, for instance, on whether progressivity should be assessed in terms of annual income—a pretty arbitrary period of measurement—or lifetime income. A consumption tax may look regressive relative to annual income but much less so relative to expenditure, which may be a better indicator of an individual's lifetime income.

And the idea of horizontal equity may not seem controversial, but what does “identical” mean for this purpose? Is it acceptable to differentiate taxes by age, by marital status, across regions, by gender, by height? And what about implicit differentiation? Is a heavy tax on aftershave lotion, overwhelmingly consumed by men, horizontally inequitable?

Collecting taxes

The dividing line between tax *evasion* (illegal) and *avoidance* (legal) is not as clear-cut as it may sound—highly paid tax lawyers spend much time testing the distinction. Both are major concerns in all countries. There are challenges here for both the design of taxes and their implementation. On the policy side, tax incentives to encourage particular activities, for instance, all too often provide opportunities for evasion.

Tax administrations are on the front line in the fight against failure to pay taxes. It helps to make things easy for those who simply want to pay whatever is due, by writing tax rules that are easy to understand (though simplicity in tax design is difficult to achieve, given the range of objectives and circumstances to be covered) and easy to find. (Roman emperor Caligula's tax rules were made public only in small type and in an awkward place.) Ultimately, the trick for tax administrations is to ensure that the probability of detecting noncompliance—and the penalties that follow—is high enough to encourage compliance while supporting and reflecting widespread willingness to follow the rules. And a good tax administration must do all that while minimizing both its own expenses (*administration costs*) and those of taxpayers (*compliance costs*).

Sometimes the various objectives discussed point in the same direction—for example, when tariffs (taxes on imports) are replaced by a consumption tax at the same rate. The switch leaves the price of imports to consumers unchanged, but increases government revenue (because the tax is now also collected on domestically sourced sales) and improves efficiency by reducing trade protectionism. But such instances are rare. The real difficulty for taxation arises when the objectives conflict—which we will examine in March. ■

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Sharing the **WEALTH**

Sanjeev Gupta, Alex Segura-Ubiergo, and Enrique Flores

Countries that enjoy a resource windfall should be prudent about distributing it all directly to their people

ANGOLA is the second largest oil producer in sub-Saharan Africa and one of the continent's richest countries. Yet more children under the age of five die there than in most places in the world.

Most resource-rich countries lack the types of institutions needed to manage natural resource wealth effectively, and past performance does not bode well for countries with a resource windfall. Many of their citizens face continued poverty with little prospect of a significant improvement in living conditions. Angola's under-five infant mortality rate is a vivid example.

In recent years, high commodity prices and new natural resource discoveries have increased many countries' resource revenues, both as a share of the budget and in percent of GDP, offering new prospects for raising the population's standard of living (see Chart 1). But few countries stand out as good examples of effective resource wealth management. Botswana, Chile, Norway, and the U.S. state of Alaska are some exceptions.

The experience of the success stories suggests that natural resource wealth management requires a commitment to three interrelated principles: fiscal transparency, a rules-based fiscal policy, and strong institutions for public financial management. For example, Norway and Alaska are models of transparency in the way they collect and budget natural resource revenue. This transparency helps people understand the use of resource wealth and holds political leaders accountable for their decisions. Chile's fiscal rules protect resource wealth from the vagaries of political pressure, and its strong institutions are able to manage public investment. This helps transform natural resource wealth into productive assets, including infrastructure and human capital.

Alaska pipeline under the glow of the aurora borealis, near Milne Point, Alaska, United States.

Some suggest that governments should give up their resource revenue and distribute it directly to the population. There are some good arguments to support this view—and strong arguments against it. Direct distribution is not a silver bullet (Gupta, Segura-Ubiergo, and Flores, 2014).

Devil's excrement

The weak track record of most resource-rich countries' use of natural resource revenue supports the view that new discoveries could be as much a curse as a blessing. Why does this happen?

A resource boom can cause a currency's real exchange rate to appreciate, which reduces the competitiveness of the country's exports and diverts resources toward sectors of the economy that don't engage in foreign trade—what is widely known as Dutch disease. Moreover, analysts have found that resource wealth is often associated with government corruption that undermines democratic accountability. These arguments are often used to suggest that natural wealth can become a “resource curse.” This idea was captured vividly by Juan Pablo Pérez Alfonso, Venezuela's former minister of mines and hydrocarbons and cofounder of the Organization of the Petroleum Exporting Countries, who described petroleum as the “devil's excrement” and warned of its potential to spawn waste, corruption, excessive consumption, and debt.

Many resource-rich countries lack both robust public finance management systems to ensure the transparency and efficiency of their budget process and the checks and balances in the decision-making process that are needed to ensure an effective use of resource wealth. Without them, they have struggled to follow the positive example of countries like Botswana, Chile, and Norway.

Building strong, stable institutions takes time. In the meantime, some scholars suggest, countries should distribute their resource revenues directly to the population, to boost economic growth and improve living standards (see “Spend or Send” in the December 2012 *F&D*).

Various arguments support this view, chiefly the claim that distribution prevents the government from misusing resource revenues and increasing its size. Some resource-rich countries arguably would welcome some form of direct distribution of revenue, but in others it could constrain the optimal provision of public goods. Moreover, even if the goal is to limit the size of the government by limiting access to resource revenue, alternatives such as reducing taxes are probably more efficient.

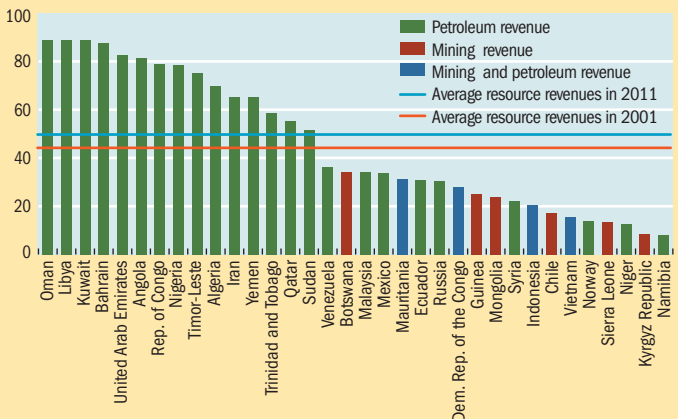
Another argument focuses on the impact of taxation on accountability (Sandbu, 2006). If resource revenues were distributed to the population and taxed to finance a portion of public goods, citizens would demand greater accountability in public spending programs. But this assumes that the gains from greater government accountability outweigh the efficiency losses associated with transferring revenues to the population and then taking some back. It also does not take

Chart 1

Big and bigger

Resource revenues are large for many countries and inching up.

(natural resource revenues, percent of total revenues, 2011)



Source: IMF staff estimates.

into account that the transfer mechanism may be afflicted by the same institutional weaknesses and corruption as those of a typical resource-rich country.

How much and to whom

Direct distribution is a way to transfer some or all resource revenue to citizens to reduce the government's discretionary authority over such resources and foster greater accountability. Discretionary authority and accountability are linked because citizens are less inclined to demand accountability if politicians can choose who is to receive resource revenues.

Views differ on *how much* of the revenues to distribute. One extreme calls for passing all natural resource revenues on to citizens, while more moderate proposals—Birdsall and Subramanian (2004) proposed for the case of Iraq distributing at least half—suggest returning only a portion of revenue or even just part of the investment income from a natural resource fund. The debate over how much to distribute centers around the economic consequences of such distribution, including the impact on work incentives, household savings, and overall macroeconomic stability.

As for *who* should receive resource revenues, distributing resources to all citizens has the appeal of eliminating political discretion over which groups should benefit. But universal transfers can have unintended consequences—such as encouraging families to have more children, which can be avoided by limiting transfers to adults. Some argue for pursuing social goals by targeting the poorest segments of the population or imposing conditions such as children's school attendance. These laudable goals could help galvanize support for such mechanisms. They could, however, also lead to tension between reducing the coverage by targeting a particular segment of the population—particularly the poor, whose political voice is usually weaker—and

increasing accountability. Moreover, the poor are not well equipped to handle income volatility, which these mechanisms would need to address.

Some argue for direct distribution outside the budget, which is subject to government corruption. This proposal would set aside resource revenue from the budgetary accounts and subject it to scrutiny, perhaps by an independent body rather than the parliament. Collection and distribution could even fall to an institution other than the national tax agency. Proponents of this idea contend that a

Large-scale direct distribution has not been tested anywhere in the world.

separate mechanism to distribute resource revenues is more credible in the eyes of the population. But however achieved, direct distribution is not a recipe for eliminating corruption. It is naive to assume that a corrupt government would agree to direct distribution to deal with the problem. And there is no guarantee that the mechanism for distribution would not suffer from similar corruption.

Speaking from experience

Alaska has implemented the best known and perhaps most successful example of a direct distribution mechanism. But it is a conservative model with a relatively small dividend amounting to only 3 to 6 percent of Alaskans' per capita income. Just a share of Alaska's oil revenue goes into the fund, and only the investment income from this fund is distributed—subject to a cap of 5 percent of the fund's total market value. The fund is managed by the Alaska Department of Revenue, and strong checks and balances within the budget make it in many ways a model of transparency. The case is widely viewed as a success, but one that was clearly achieved from a position of institutional strength and transparency, not as a solution to an institutional problem.

Given the limited number of direct distribution mechanisms worldwide, a look at related policies offers insight into what does and doesn't work. It is always risky to make inferences from related policies, but the following cases provide some lessons:

- Venezuela has established a series of social programs called *misiones*. One focuses on adult literacy and remedial high school classes for dropouts; another on universal primary health care; and yet others on the construction of new houses for the poor, retirement benefits for the poor, food at discounted prices, and scholarships for graduate studies. As highlighted by Rodríguez, Morales, and Monaldi (2012), these programs are funded directly by the state oil company and are therefore run outside the budget. As such, they give increased discretionary authority to the government. Some studies suggest that these programs suffer from as much cor-

ruption and populist pressure as the budget itself—which calls into question whether direct mechanisms outside the budget circumvent corruption.

- Experience with income support programs in advanced economies highlights the plausible negative impact of direct distribution transfers on the labor supply. These programs are meant to provide basic support to households that have little or no earnings. Some of this income support is then taxed away. Such programs have been criticized for providing insufficient incentives to low-income earners to work; earned income credit programs for which only workers are eligible are one alternative.

- The conditional cash transfer programs now popular in many developing economies can also dampen the incentive to work. These programs seek to reduce poverty by providing support—in the form of a cash transfer—subject to certain conditions, such as enrolling children in school or receiving vaccinations. The objective is to break the cycle of poverty by helping the current generation while promoting investment in the future generation. Most studies have found that the impact on the labor supply is negligible if the transfer is small and the benefits are targeted to the poorest households. Programs with larger transfers and with broader coverage—including better-off segments of the population—reduce labor participation more.

- Large energy subsidies in oil-rich countries are popular because the population expects to reap benefits from the abundance of oil resources. Pretax subsidies that allow firms and households to pay less than prevailing international prices are about 8½ percent of GDP in the Middle East and North Africa region. These generalized subsidies lead to inefficient resource allocation—which hurts growth—and disproportionately benefit those who are better off, which only worsens income inequality. Despite these drawbacks, the public supports subsidies because it sees no other way of benefiting from the abundance of natural resources.

- Worker remittances—money sent home by people working abroad—place additional resources in the hands of the household sector, as do direct distribution mechanisms. Experience suggests that most remittances are used for current consumption, and their impact on long-term growth is inconclusive. This casts doubt on the claim that direct distribution does not exacerbate Dutch-disease effects because the private sector will save when it receives a windfall just as the government does.

Lessons learned

Several lessons emerge from the Alaskan experience and that of related policies.

First, the overall design of fiscal policies could include direct distribution mechanisms, starting small to limit the impact on the labor supply. Limiting the proportion of resources directly distributed would ensure enough is available to the government for the provision of critical public services, as well as to ameliorate the impact of Dutch disease—as stressed by Hjort (2006).

Second, direct distribution is just as subject to corruption as public programs, so it should not be established outside the budget.

And, finally, it is important to remember that direct distribution of resource revenues doesn't safeguard the needs of future generations.

Before embarking on direct distribution of resource revenues, a country must prepare its fiscal framework by

- determining the level of public revenue and spending necessary to ensure domestic macroeconomic stability and sustainable external balances;
- adopting policies that mitigate the impact of volatile commodity prices on revenue;
- accounting for uncertainty in the level of natural resource production and how much revenue the economy can absorb; and
- saving resources for future generations.

Direct distribution does not obviate the need to address these issues head-on. Although some argue that shifting the burden of managing volatility to the private sector could lead to improved outcomes, there is little evidence to support such a claim. As noted earlier, evidence from remittance-receiving countries suggests that the bulk of the money received is used for consumption rather than saving. While public sector management of volatility in resource-rich countries has been far from stellar, an IMF study (2012) shows that it seems to have improved as these countries shifted from policies that reinforced changes in commodity prices between 1970 and 1999 to broadly neutral ones in the past decade.

Direct distribution can have a significant impact on income distribution. In Ghana, for example, resource revenues amount to about 5 percent of GDP. The poorest 10 percent of the population earns only 2 percent of GDP, so universal direct distribu-

tion would raise the income of that group by about 25 percent. But the distribution of resource revenues would reduce the budgetary resources available for the provision of public services, which could in turn have adverse consequences on income distribution.

Another effect of direct distribution would undoubtedly be smaller government. Shifting resources to the private sector could curtail wasteful spending in some resource-rich countries but in others it could lower public spending to the point of threatening necessary infrastructure and public goods. Total expenditure in resource-rich countries averages about 28 percent of GDP, which seems broadly in line with that in non-resource-rich economies. But there are significant differences in government size and institutional capacity across resource-rich countries (see Chart 2). The likely impact on income distribution and provision of public services only reinforces the need to start small when it comes to direct distribution.

Worth pursuing?

While the view that direct distribution leads to increased accountability is appealing, large-scale direct distribution has not been tested anywhere in the world. There is little evidence that the extreme of distributing all resource revenues to the population is effective, but a case for modest direct distribution similar to the Alaskan model could be considered.

Even judicious distribution must be implemented under an appropriate fiscal framework and on a small scale to reduce the very plausible risk that distribution will stifle the provision of critical public services, lead to a drop in labor participation, or strain the government's administrative capacity. ■

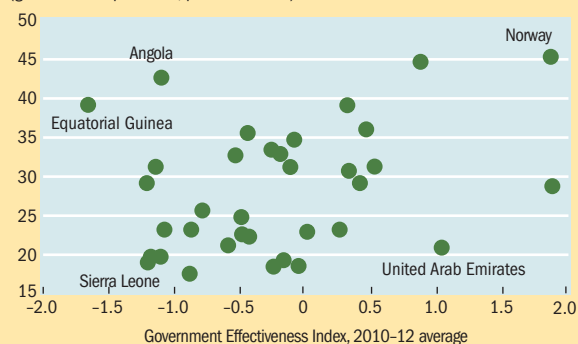
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Chart 2

Bloated or starved?

The size of the government varies across resource-rich countries but is not always related to its effectiveness.

(government expenditure, percent of GDP)



Sources: World Bank, Government Effectiveness Index; and IMF staff estimates.

Note: Government expenditure is the average for available dates for each country during 1980–2013. The index captures perceptions of the quality of public services, civil service, and degree of independence from political pressures, quality of policy formulation and implementation, and credibility of the government's commitment to such policies.

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Wisdom and Virtue

Russ Roberts

How Adam Smith Can Change Your Life

An Unexpected Guide to Human Nature and Happiness

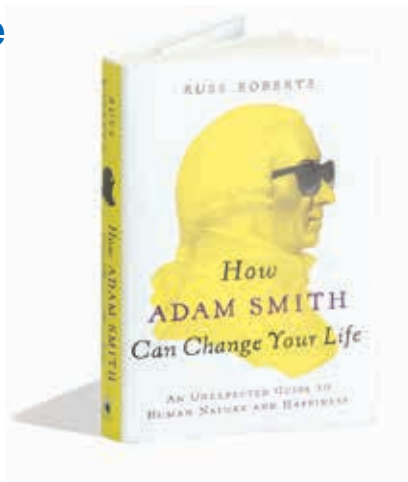
Portfolio/Penguin, New York, 2014, 272 pp., \$27.95 (cloth).

Ethics in economics seems to be back in vogue today. This is undoubtedly because of the global financial crisis, which exposed a startling degree of malfeasance and unethical behavior in the financial sector—with catastrophic consequences for the global economy and people's lives. But it also reflects a deeper dissatisfaction with the utilitarianism and narrow technocratic focus that holds sway in so much of modern economics. It is no accident that more and more people are seeking—sometimes demanding—a broader approach to the study of economics, one that incorporates key elements of philosophy, psychology, and history.

Given this zeitgeist, a book on the moral philosophy of Adam Smith is timely indeed. While Smith may be the founder of modern economics, he was first and foremost a professor of moral philosophy. Yet his major philosophical work, *The Theory of Moral Sentiments*, remains largely unknown. In his new book, Russ Roberts strives to fill the gap—to bring to light the hidden wisdom contained in a much-neglected classic.

Roberts writes with the Christmas-morning wonder of a child embarking on a new and exciting adventure. His enthusiasm is infectious as he describes his immersion in a book he simply cannot put down. The book is jam-packed with memorable stories and colorful vignettes. Altogether, it is an easy and engaging read and a good introduction to Smith's moral philosophy.

In Roberts' telling, Smith's morality boils down to simple life rules: "Seek wisdom and virtue. Behave as if an impartial spectator is watching you."



While the first part of the book is more about—to speak somewhat anachronistically—"self-improvement," the second focuses on how we interact with each other in society. Here, Roberts points to a key insight of Smith—while we may be naturally

"Behave as if an impartial spectator is watching you."

inclined to put our own happiness above that of others, it would be wrong to live life in such a manner, to hurt or exploit others out of mere self-interest. Why? Because the impartial spectator—the ultimate arbiter of Smith's morality—would not approve.

The idea of the impartial spectator as a motivator of morality is a profoundly powerful idea. Nobel Prize-winning economist Amartya Sen, for example, stresses the advantages of this simple and practical reasoning over the more dominant philosophical approach, which focuses on systems of perfect justice and perfect institutions. Yet Roberts never really teases out the full implications of this way of thinking, being too inclined to treat *Moral Sentiments* as a self-help book.

In his last chapter, Roberts does touch on the implications of Smith's ethical standpoint for the functioning of the modern economy, but this is his weakest chapter.

An enormous amount of ink has been spilled over the years over the famous "Adam Smith problem"—how to reconcile the emphasis on benevolence in *Moral Sentiments* with the emphasis on self-interest in *The Wealth of Nations*. The most obvious answer is that the latter focuses on the bare minimum conditions for beneficial market exchange, while the former focuses on the deeper underpinnings of our broader social interactions.

As Sen put it, Smith's insight was narrowly confined to exchange, ignoring equally important concepts like production and distribution. And even in pure exchange, self-interest can take us only so far and must be supplemented with shared trust and mutual confidence in the ethics of all involved. In other words, moral sentiments are never too far from the surface.

Roberts takes a different tack. He argues that Smith's two books are about different and nonoverlapping spheres of human interaction. Borrowing from economist and philosopher Friedrich Hayek, he argues that "we need to inhabit two different worlds at the same time to interact within our families and then move into the commercial sphere and interact with strangers." Thus *Moral Sentiments* is about our "personal space"—the world of friends, family, and close acquaintances—while *The Wealth of Nations* is more about interpersonal exchange in a "world of strangers." Different worlds, different norms of behavior.

Reading Smith through these Hayekian bifocals is not at all convincing. Imposing Hayek's crimped philosophical worldview on Smith does him a disservice. It narrows the scope of his contribution far too much.

Ultimately, Smith is concerned with virtue—especially benevolence, courage, temperance, justice, and prudence. Indeed, Deirdre McCloskey argued that Smith is the last of the virtue ethicists, following in a long tradition that began with Aristotle. And when we start with virtue, we are naturally inclined toward human flourish-

ing—in all aspects of life. There are no bifurcated or disembodied virtues!

Because Roberts draws such a fine line between the different spheres of life, he never really teases out the implications of Smith's moral philosophy for today's economy—what we really should care about. This is a pity, because Smith's insights would

be especially valuable right now.

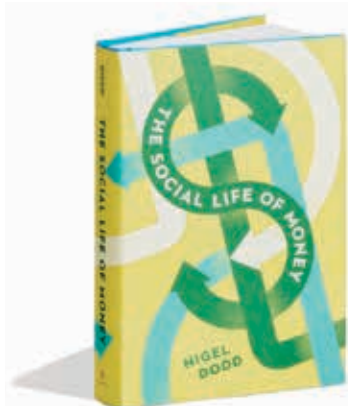
For example, what would the impartial spectator say about the behavior of the financial sector in recent years, when extreme recklessness and short-termism swamped all notions of virtue? Or more generally, what would she say about a business model that puts short-term profit

above duty to stakeholders like workers, clients, the natural environment, and society in general? These are the important questions that are not really answered in this book.

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Two Cents' Worth



Nigel Dodd

The Social Life of Money

Princeton University Press, Princeton, New Jersey, 2014, 456 pp., \$35.00 (cloth).

What is money? That is what Nigel Dodd, professor of sociology at the London School of Economics, leads us to explore in *The Social Life of Money*. Along the way we are presented ideas on money from the greats in literature, philosophy, sociology, and many other disciplines. This book is more modern art than science. It takes us out of our comfort zone—especially those of us schooled in economics—and unsettles us, and the question is, deliberately, unresolved.

The author leads us from insights into one aspect of money from people not typically considered monetary theorists, including Jorge Luis Borges, Jacques Derrida, Michel Foucault, Keith Hart, Friedrich Nietzsche, Jean-Jacques Rousseau, and Ferdinand de Saussure, to other, somewhat contradictory but equally insightful, notions. As you are trying to make sense of it

all—and this is not a light read—Dodd proposes that these ideas all have something to offer. Money is too protean to be captured by a single idea.

Dodd does not offer a new perspective; he seeks to enlighten us with many. In that sense, his message is already a sacrilege: the myth that money is driven by cast-iron laws understood by hard-nosed practitioners is shattered. Instead, the author offers a reminder that money in general, and particularly government-issued paper money, is a social construct. We do not question the \$100 printed on a bit of cotton and linen that costs 12.5 cents to produce because we trust the U.S. government will honor its liabilities, given its ability to tax its citizens and resources and its attendant military might. Even where there are plentiful resources and resourceful people, absent faith in a society, the value of money collapses—as in Venezuela today, Argentina and Brazil in 1990, and the Weimar Republic in 1923.

To say that money is a claim on society is not original, Dodd reminds us with references to Georg Simmel and others. But he is right to say it again. The traditional view still traces the origins of money to some unrecorded, primeval way to barter more efficiently. This airbrushes the plunder and bloodshed too often at the origin of society. The dawn of money has more to do with tribute from the vanquished and profits from slavery than with more efficient peaceful trade. Money does not have clean hands.

Dodd tries to probe the subject further. Social construct need not mean the state. It could be the fluid,

anarchic social networks of exchanges through which people swap their labor or even the decentralized payment system called Bitcoin.

In trying to move forward, however, the author ends up giving up ground. Sometimes, for instance, it

Money is too protean to be captured by a single idea.

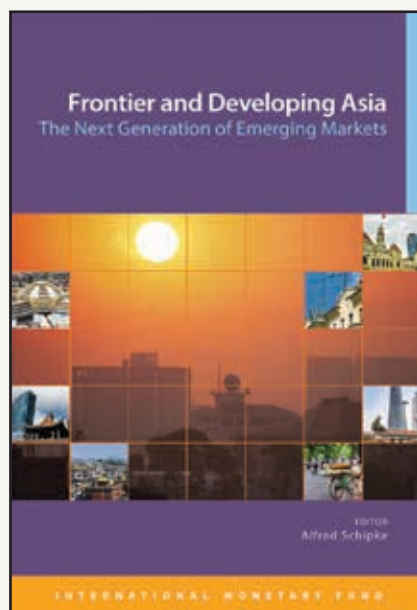
feels as if he is blaming money for the global financial crisis and other recent ills. Yet money as a social construct is a more convincing, predictive theory. The structure of society and the way power is organized within produced the incentives that drove the boom and its inevitable bust. Those incentives were cast in money, but could have been in any currency of power. The case that money has a life outside of the social construct is conceivable but is not made convincingly. Bitcoin will fail because it is not backed by the state's power of taxation and falls foul of the international anti-money-laundering rules—not because it is digital currency with no reserves.

The real insight to be teased out of this book is that form follows structure. If we want “better” money, then tinkering around with its form will have little impact unless we change the incentives that are often built in to society's structure.

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New Publications from the IMF



Frontier and Developing Asia: The Next Generation of Emerging Markets

edited by Alfred Schipke

With a combined population of more than 350 million people, frontier and developing Asia, which includes countries such as Vietnam, Cambodia, and Bangladesh, is located in the world's fastest-growing region and has favorable demographics. Despite their heterogeneity, the countries share a number of common macroeconomic, financial, and structural challenges. The book addresses issues related to economic growth and structural transformation, as well as the risk of a poverty trap and rising income inequality. The book also analyses a number of financial sector and monetary policy framework issues.

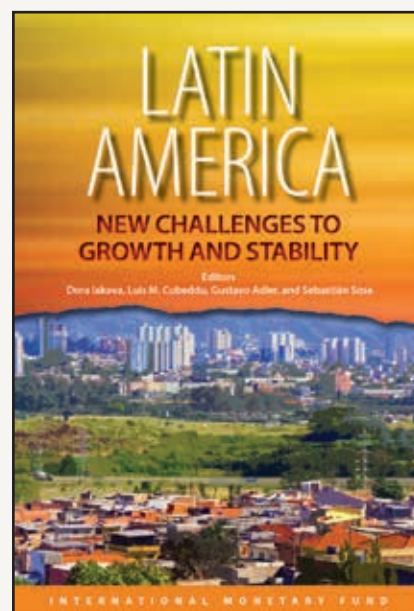
\$25. ISBN 978-1-47559-551-2. ©2014

Latin America: Sustaining Growth and Stability in a Changing Global Landscape

*by Dora Jakova, Luis M. Cubeddu,
Gustavo Adler, and Sebastian Sosa*

Over the past 15 years countries in Latin America made tremendous progress in strengthening their economies and improving living standards. Although output fell temporarily during the global financial crisis, most economies staged a rapid recovery. However, economic activity across the region has been cooling off and the region is facing a more challenging period ahead. This book argues that Latin America can rise to the challenge, and policymakers in the region are already implementing reforms in education, energy, and other sectors. More is needed, and more is possible, in Latin America's quest to continue to improve living standards.

\$25. ISBN 978-1-49832-816-6. ©2014.

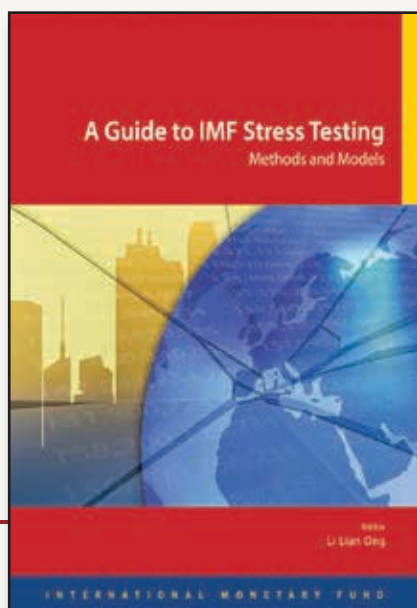


A Guide to IMF Stress Testing: Methods and Models

edited by Li Lian Ong

The global financial crisis has put a spotlight on the stress testing of individual banks and entire financial systems to see if they have sufficient capital and good enough procedures to get through hard times. The IMF has had extensive involvement in the stress testing of financial systems since the launch of its Financial Sector Assessment Program (FSAP) more than a decade ago. This book offers a suite of methods and models that can be used for the monitoring and supervision of both individual institutions and financial systems around the world. It is based on a wealth of hands-on experience with stress testing techniques and their practical application.

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