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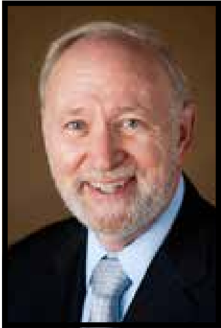
FROM THE CEO



Mens sana in corpore sano is a line from a Roman poet even we non-Latinists know the translation of: a sound mind in a healthy body. The Romans understood the importance of promoting good health – even for those devoted to the life of the mind.

At the Milken Institute, so do we. Since 1991, we've advanced medical research and public health in hundreds of reports, op-eds, books, Global Conference panels, Capitol Hill briefings, the Lake Tahoe Retreat on Bioscience Innovation, the Celebration of Science in Washington DC, the Summit on Public Health at the CDC and other events in North America, Europe and Asia.

One track of our annual Global Conference convenes prominent scientists, investors, policymakers and philanthropists to focus on health solutions. They've addressed such areas as research funding; eliminating malaria, polio and AIDS from the developing world; meeting the challenges of an aging society; fighting the global obesity epidemic; preventing flu pandemics; corporate wellness programs; the role of nutrition in a healthy society and strategies to overcome antibiotic resistance.

The transformative 2007 publication, "An Unhealthy America: The Economic Burden of Chronic Disease," is still widely cited, especially for its shocking conclusions that obesity costs the United States more than $1 trillion a year. Other Institute reports have explored innovative financing for global health R&D, feeding the world's hungry, the economic return from bioscience funding and the value of U.S. life sciences.

In March, George Washington University announced that its School of Public Health and Health Services would now be the Milken Institute School of Public Health. Washington DC is the center of global health policy, and the Milken Institute School is the leading academic public health institution in Washington. We're proud that, thanks to the Institute's support, GW will have new resources for their vital work.

In 2003, we launched FasterCures to speed removal of barriers to research. Now we're expanding our focus with the Center for Public Health, which will collaborate not only with the Milken Institute School at GW, but also with the Centers for Disease Control and Prevention, the World Health Organization and a host of for-profit and nonprofit organizations including other schools of public health. The new Center will engage leaders from industry, government, foundations, universities and philanthropy to help develop effective public health programs. We recognize that such programs are a bulwark against potential health disasters, and their devastating economic effects. Like all of our work, the Center is nonpartisan and independent of interest groups.

In coming issues, I'll update you as this work expands. From smoking to obesity to infectious disease, there are plenty of urgent targets where the solutions we help devise will improve lives around the world.

Mike Klowden

Michael Klowden, CEO

Will reading the *Milken Institute Review* make me rich,

asks longtime reader JG of Passadumkeag, Maine?

H. ARMSTRONG ROBERTS/CLASSICSTOCK

You've inspired us, JG! We'll be awarding $10,000,000.00 to the first subscriber who decodes the secret message buried in the *Review*'s masthead. Check out the clues on page 97, but don't forget to peruse the virtual gold in the issue.

Len Burman, director of the Urban-Brookings Tax Policy Center, thinks big with a proposal to reform the income tax, stabilize entitlement spending and tame budget deficits in one fell swoop. The lynchpin (or perhaps the Achilles heel): a value-added tax tied to the growth of health care costs. With both political parties opposed, "a VAT seems a non-starter," he writes. But stranger things have happened: "the Senate voted 98-0 against taxing Social Security benefits in July 1981. Just two years later, though, Congress passed the Greenspan Commission's reform package, which included a tax on Social Security benefits."

David E. Bloom, Elizabeth Cafiero-Fonseca, Mark E. McGovern and **Klaus Prettner** of Harvard and the University of Göttingen measure the dimensions of the health crisis sneaking up on China and India. "The cost of non-communicable diseases (in particular, cardiovascular diseases, cancer, chronic respiratory diseases and diabetes) will be high no matter what," they conclude. But "Unless the issue is given top priority, it will be utterly staggering. Effective action would, of course, be costly, but far less costly than the alternative."

Severin Borenstein, an economist at UC-Berkeley, responds to jeremiads mourning the consolidation of the airline industry. "That sounds like bad news for consumers, but there is some good news here as well," he writes. "Studies report a substantial decline in prices when Southwest, Jet Blue and Virgin America are present. And with low-cost carriers now vying for nearly two-thirds of all domestic traffic, the competition is very real."

Joel Mokyr, an economist at Northwestern, assays the implications of our dependence on

technology for continuing prosperity and growth. "The human species has been on a wild techno-ride for millennia," he writes, "as innovation after innovation disrupted business as usual. Bite-back is common, and in some cases disastrous. Yet, while technological progress is never riskless, the risks of stasis are far more troubling. Getting off the roller coaster midride is not an option."

Ted Gayer and **Emily Parker** of the Brookings Institution revisit the Cash for Clunkers stimulus program of 2009 and find that its impact was less than met the eye. "Judging by the numbers," they conclude, "the program can hardly be rated a success. The cost per job saved was ferociously high, requiring six times the government outlay of alternative stimulus measures. And it apparently had a negligible effect on GDP. Much the same, moreover, can be said for the impact on fuel efficiency and auto emissions."

Bob Looney, a development economist at the Naval Postgraduate School in California, argues that the kingdoms of Oman, Jordan and Morocco survived the Arab Spring because they deliver more of what their citizens crave. "These three monarchies have a real shot at pulling away from their neighbors in terms of both economic development and evolution toward true democracy," he writes. "One could even go further and speculate that all three may be on the verge of a virtuous circle in which a young and increasingly influential entrepreneurial class helps reform-willing governments to sustain the push for growth, social mobility and job creation in a part of the world not known for moderation."

Penny Prabha, **Keith Savard** and **Heather Wickramarachi** of the Milken Institute defend the role of financial derivatives in managing business risk and expanding access to capital. And they offer some hard estimates to back up their argument. All told, "derivatives expanded U.S. GDP by about $3.7 billion a quarter between 2003 and 2012," they conclude, as well as "boosted employment by about 530,000."

Ready for more? Take a gander at **Glenn Yago**'s prescription for capital market reform in Israel, sample an excerpt from *The Dollar Trap*, the new book from former IMF economist **Eswar Prasad**, scan the latest charticle by Brookings demographer **Bill Frey** and scrutinize a list of countries eager to have you as a resident (for a hefty price).

Happy reading.

— *Peter Passell*

H. ARMSTRONG ROBERTS/CLASSICSTOCK

BY SEVERIN BORENSTEIN

If you were running a U.S. airline in the mid-1990s, the future looked bright. Both the economy and demand for air travel were growing, fuel prices were falling and airlines were making their best profits since 1978, the year the industry was deregulated.

Each of the seven "legacy" carriers – the large, formerly regulated airlines that had survived the 1980s (American, Continental, Delta, Northwest, TWA, United and US Airways) – had staked out one or more hub airports where it had cornered most of the traffic. They could charge high prices for travel to or from these "fortress" hubs, and faced little risk that another airline would try to muscle onto their turf. Many in the industry thought they had finally overcome the turmoil of the transition to free markets and were now on a glide path to stable profits.

Or not. With strong demand and high profits, the last half of the 1990s did meet expectations. But airlines responded to good times by adding record numbers of aircraft to their fleets – just in time to be slammed by the harsh realities of the new millennium. First came the recession of 2000-2001; then 9/11, which shut down the industry for days and, more important, curtailed demand for years. The airlines, it seems, had gotten a lucky respite in the 1990s rather than finding a profitable modus operandi. Indeed, the domestic carriers lost more money in the first decade of this century than they had made in the previous 22 years. Even counting the past few years, in which the industry has returned to the black, net returns since 1978 are negative.

SEVERIN BORENSTEIN is the E.T. Grether Professor of Business Administration and Public Policy at the Haas School of Business at the University of California, Berkeley.

In 2000, the U.S. airline industry consisted of the seven legacies plus Southwest, America West and a handful of small fry. By 2010, all seven and America West had declared bankruptcy at least once. United, American and Delta are now the last legacies standing after swallowing Continental, USAir/America West and Northwest, respectively. (American had already absorbed TWA in 2001.) Southwest also did a bit of shopping, grabbing AirTran, the discount airline that had long fought Delta in Atlanta. The four surviving mega-carriers (including the indentured regional airlines that fill out their low-density routes) now serve 71 percent of all domestic U.S. traffic. By comparison, the market share of the top four had fluctuated around 55 percent from 1980 until as recently as 2009.

MONOPOLY POWER IN SIGHT?

From a consumer's perspective, this concentration looks worrisome. But the airlines beg to reassure. They note the national market share of low-cost carriers (LCCs) – the upstarts

that have substantially lower operating costs and usually charge lower prices (and force all on their routes to do so) – has risen steadily from 4 percent in 1980 to 19 percent in 2000 to 32 percent in 2012. Southwest, the prototype for successful LCCs, has for decades been expanding its market share based on its low-fare model, while remaining the only carrier that has reported profits every year. In 2012, 65 percent of all domestic traffic flew on a route where a LCC competed, up from 43 percent in 2000. And that's not only Southwest's doing. In the past decade, JetBlue has become a viable airline and Virgin America has gained a toehold; Spirit, Allegiant and Frontier are hanging in there, too.

Air fare trends have also been favorable to consumers since the turn of the century. Domestic fares, adjusted for inflation and average trip distance and including all taxes and fees, have fallen, while airline costs – operating costs per available seat-mile – have not. The airlines managed this feat by filling an ever-higher percentage of available seats. The average U.S. flight now leaves the ground about 83 percent full; this figure has climbed steadily from about 50 percent at the time of deregulation.

Most airline costs – fuel, crew, aircraft depreciation, landing fees – are fixed if the plane takes off, so filling more seats is pure gravy. On the other side of the ledger, of course, is the passengers' reality that flying is less fun when you are fighting for the armrest. But most travelers seem to value low fares more than comfort.

Strikingly, the biggest winners in the last few decades have been premium-fare travelers. The lowest fares have fallen a bit across the period, but the highest fares have dropped more. The 80th percentile fare on a route is 85 percent higher than the 20th percentile fare today, down from about 141 percent higher in 2000.

High-end (generally business) travelers had been paying particularly high prices at hub airports dominated by single airlines. Concentration at those airports has dipped somewhat, but the "hub premium" has fallen much more significantly. Both fare inequality and the hub premium peaked in 1996, and declined by 42 percent since then. In 1996, there were 10 airports among the top 50 where passengers paid average prices at least 20 percent above national average. By 2012, there was only one.

THE SAD HISTORY OF AIRLINE FINANCES

The airlines have shaken off their troubles and returned to profitability only in the past few years. Why can't they seem to make money for long?

Actually, they have at times, such as the mid- and late-1990s, when they were profitable even on domestic routes. (International routes have almost always been more profitable because they are less competitive.) That was a time of strong demand growth and low jet fuel prices, bottoming out at around 60 cents a gallon in 1998.

But airline profits are necessarily volatile because the two major drivers – demand and fuel prices – are subject to large shocks. Demand fluctuates more in the airline business than in nearly any other major industry. Meanwhile, jet fuel costs, which are closely linked to the price of diesel fuel, have represented as little as 10 percent of airline costs and as much as 40 percent.

Volatile demand and costs don't necessarily mean big losses, but that has been the result through much of the era of deregulation. In part, this is because airlines haven't been able to resist expansion when times were good. There have been two aircraft buying sprees since deregulation – in the last half of the 1980s and the last half of the 1990s. Each

airTran

COURTESY OF SOUTHWEST AIRLINES

ended abruptly when demand soured; the surplus aircraft spent years parked in the desert. The industry may be in the midst of another boom now, though it seems to be a more restrained one.

Why is what airline analysts call "capacity discipline" so elusive? After all, there are many industries with large fixed costs in which firms recognize the need to invest prudently so they won't get stuck with idle capacity when demand weakens. The difference in the airline industry is the perceived – and actual – competitive advantage an airline gains from expanding its route network.

The advantage doesn't come from driving down costs – there's no convincing evidence that larger route networks lead to lower costs. In fact, the carriers with the smallest networks have the lowest costs per seat-mile. Instead, the advantage is in product offerings and "loyalty" programs.

A larger network allows an airline to offer passengers a way to fly to more destinations without having to change airlines. Back in the 1980s, this didn't matter as much. Airlines played nice together in ticketing: it was possible to get a reasonably priced ticket with different flight segments on different carriers, an ability to mix and match that economists call product compatibility. By the end of the 1980s, however, some of the largest airlines had decided that compatibility wasn't in their interest. Accordingly, it became almost impossible to snag a bargain fare unless you bought the whole trip on one carrier.

No more going out on United and back on American. From 1984 to 1997, the share of round-trip nonstop tickets with different airlines providing the service in the each direction went from 13 percent to a mere 1.5 percent. And no more changing planes from Delta to Northwest in order to fly from Atlanta to Seattle. The share of one-direction trips requiring a plane change that involved more than one major airline fell from 6 percent to 1 percent. This artificial incompatibility put smaller airlines at a disadvantage and increased the value of network expansion. It

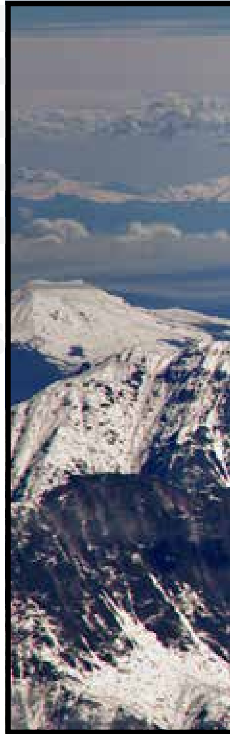
also created a potent incentive to invest in new airplanes and routes now, and worry later.

Similar forces play out with frequent-flier programs. They encourage travelers to concentrate their miles on one carrier, as much for the perks that come with being a high-status customer as for the free trips. By the same token, an airline needs a broad network to make those perks valuable to travelers.

Frequent-flier programs, incidentally, are also encouraged by tax policy. When your employer pays for the trip but you keep the miles, you are getting untaxed compensation. The IRS recognizes this – nowhere is it written that frequent flier miles are freebies. But for logistical and political reasons, the taxman has so far decided to look the other way.

Less well known, but equally important to the competitive landscape of the airlines, are loyalty programs for businesses, known as corporate discount programs, which can be tailored to leverage relative network size even more effectively than frequent-flier programs. American Airlines knows this when its sales people tell a Dallas-based corporation that they need to get 90 percent of the firm's travel to and from Dallas in order to provide the best discount. Note, moreover, a subtle difference that adds an extra competitive bite to corporate discount programs: most FFPs are based on the miles of travel on a carrier, while the corporate discounts are designed to target the *share* of the company's travel the airline gets.

Network leveraging through ticket incompatibility and loyalty programs led to alliances among otherwise competing, or potentially competing, airlines. These partnerships originally consisted of carriers from different countries, which made up for the fact that neither could fly domestically in the other's country. That coordination made a certain amount of sense to passengers as well as airlines. So did



the carriers' partnerships with commuter carriers. The commuter carriers make the short hops from hubs to hundreds of regional airports that major carriers cannot serve cost-effectively.

But by the late 1990s, when the first domestic alliances among legacy carriers were created, the genuine benefits gained in terms of access to an otherwise inaccessible market (as opposed to the ersatz benefits from ticket compatibility and loyalty programs) were hard to find. Alliances are often a substitute – and a poor one at that – for a carrier having a larger network.

So, when the economic expansion of the mid-1990s came, airlines had big incentives to increase capacity and broaden their networks. That helped keep air fares falling despite strong demand. And it also created the preconditions for the industry's free fall a few years later. After reporting positive earnings for eight straight years, the industry saw its collective profits plummet in 2001 and stay negative for five years. Then, just as the airlines were starting to look profitable in 2006, fuel prices soared and, shortly thereafter, the economy tanked. U.S. carriers didn't make money again on domestic operations until 2010.

In late 2009, after the airlines had spent

COURTESY OF AMERICAN AIRLINES

years in the red, Secretary of Transportation Ray LaHood formed the Future of Aviation Advisory Committee, a group of 20 that included airline CEOs, labor leaders, airport operators, aircraft and parts manufacturers, industry analysts, a consumer advocate and two academics (one of them, me). At the committee meetings, the carriers openly fretted about the sustainability of the U.S. airline industry. Some argued that excessive taxation and insufficient support from the public coffers, particularly for airport services and a new airline navigation system, were fundamentally undermining their viability.

In truth, it's unclear whether the high taxes on airlines and air travelers undercompensate or overcompensate for the public services provided – airports, security, air traffic control and immigration services, among others. But even if taxes exceed the benefits returned, they aren't going to destroy the industry. Rather, they are going to affect its size. Higher taxes will lead to a somewhat smaller industry and lower taxes will do the opposite.

Fuel costs were also called out as a threat, which they no doubt have been to the shareholders of U.S. carriers and some workers. But as we have seen since, after shedding some capacity and reorganizing, the industry can adapt to higher fuel prices. The problem and solutions, after all, are hardly unique to airlines. The oil production industry itself wouldn't be "nonviable" at $40 a barrel, but it would be smaller than it is today. Gasoline at $8 a gallon (where it stands in much of Europe) wouldn't kill the U.S. auto industry, but auto use (and sales) would shrink.

WILL COMPETITION CONTAIN FARES?

The bust of the 2000s was extraordinary because the biggest demand drop in the industry's deregulated history was followed by the

biggest fuel price increase and then the second-largest demand decline. Before 2001, the deregulated U.S. airline fleet had never shrunk year over year, but it did in many of the early years of the 2000s, and shrank overall between 2000 and 2009. This downsizing could be viewed as both a response to massive losses and an expression of determination on the part of the carriers to stop the vicious cycle. As a consequence, we've experienced a fundamental reorganization of the industry into fewer, larger airlines.

Now that the market has merged down to the four mega-carriers, airline executives and analysts are asking whether the industry will be able to hold the line on capacity. For their part, antitrust economists and lawyers are asking whether the industry is going to become too profitable – that is, whether the surviving behemoths will have the market power to raise fares above their long-term costs.

Two things stand in the way of the market-power scenario: competition among the existing carriers and the entry (or threat of entry) of new airlines hungry for market share. No one knows whether they'll be enough.

There is a widespread view that competition among the legacy airlines isn't very effective. When United proposed merging with Continental in 2010, the consultants whom the two carriers hired to persuade the regulators to allow the combination argued that the loss of a legacy carrier wasn't a big deal. That's because two legacy carriers on a route generally charge prices that are nearly as high as either one would if it had a monopoly.

History lends some support to the idea that the majors aren't really into competing with one another. In the early 1990s, the Justice Department charged that the airlines had been coordinating their price changes by announcing them in advance and then signaling agreement through a complex system of notes circulated through the industry's computer reservation systems. These notes were readable by other airlines, but not by customers. The Justice Department settled that antitrust suit against the legacy carriers (the LCCs Southwest and America West were not accused) in 1994 with an injunction ending pre-announcements of proposed price changes and the use of the reservation systems for coded communication.

COURTESY OF DELTA AIRLINES

The airlines responded with real-time announcements of price increases as required by the settlement, but made the announcements on weekends when fewer tickets (particularly business tickets) are booked. If other airlines in the relevant markets didn't match the increase by Sunday night, the price in-

creases were rolled back. It's a more awkward mechanism system for collusion, but quite possibly as effective.

Note, too, that when the Justice Department settled its lawsuit with the legacy airlines in 1994, there were seven big carriers. Now there are three – and that surely reduces the communication needed to act in unison.

Besides, there seems to be less need for coordination because the incentive for price cutting among the three has fallen. The point of a price cut is to steal competitors' customers, gaining more revenue from the extra fliers than you lose from lowering prices on the ones you would have gotten anyway. Since the 1990s, however, loyalty programs have grown larger and more sophisticated, reducing customers' inclination to switch airlines in response to price changes.

My own research shows that on a route with multiple carriers, customers show a strong bias toward flying on the airline that dominates their home airport, even after controlling for price, schedule convenience and airline amenities. The price premiums at hubs have fallen, but this home-carrier bias has remained and even strengthened slightly over the years, particularly on business routes. Price wars may thus be a thing of the past.

That sounds like bad news for consumers, but there is some good news here as well. Even the studies that don't find much impact of competition among the legacy carriers on fares still report a substantial decline in prices when Southwest, JetBlue, Virgin America or one of the other LCCs is present. And with LCCs now competing for nearly two-thirds of all domestic traffic, the competition is very real. Indeed, the expansion of LCCs is probably the single most important factor that has kept fares falling even when demand was strong and oil prices were on the rise.

Can the existing LCCs continue to expand and remain profitable? Will they keep their costs down and their prices low? And will new entrants still be able to get a foothold against the large network carriers? Industry leaders and consumer advocates often assert that they know the answers to these questions, but no one really does. Here's what we do know:

• Without the LCCs, consumers would be in big trouble.

• The primary advantage of the legacies is their networks. That advantage is here to stay.

• An LCC entering a new route is trading off a big cost advantage against a big marketing disadvantage. In the last decade, however, the cost advantage has shrunk as legacies emerged from bankruptcy reorganizations with lower wages and streamlined work rules. Moreover, the marketing disadvantage has widened as legacy mergers have expanded networks – and their value to customers. So

COURTESY OF UNITED AIRLINES

the rate of growth shown by LCCs over the last decade is unlikely to continue, at least at the pace we have seen.

• New airlines will surely continue to be formed, if only because there always seems to be a maverick entrepreneur who believes he or she can come up with a new business model that will be profitable in spite of the incumbents' advantage. But Virgin America, which first flew in 2007, is the last new large-jet carrier to get a foothold. Strictly by count of startups, new entry is on the decline. The real test will be the next few years, as demand expands with the economy.

GOOD NEWS, BAD NEWS

For most of the deregulation period, legacy airlines have been trying to use network advantages, real and artificial, to offset their cost disadvantage vis-à-vis the LCCs. Until the last few years, the legacy strategy had been failing, resulting in massive losses and ubiquitous bankruptcies. But the cost-cutting associated with Chapter 11 reorganizations and the mergers that extended their networks are turning that around.

The legacies are better positioned than ever before to handle the demand volatility and oil price shocks that will surely continue. And they are also better positioned to compete with LCCs. Airlines will almost certainly perform better in the next decade than they did in the last, and customers will almost certainly see higher prices.

In my view, that's OK. For consumers, the 2000s were a honeymoon that couldn't last. We are now seeing the pendulum swing back to more normal prices and more normal profits for the airlines. The $64 billion question is whether the increased concentration and the growing strength of loyalty programs will push the pendulum past a competitive balance between consumer and producer benefits. Stay tuned. M

BY WILLIAM H. FREY

Those of us who grew up in the 1950s and 1960s can recall grandparents and elderly neighbors whose first languages were those of the "the old country" – everything from German to Italian to Yiddish. These languages faded from everyday use, as subsequent generations increasingly viewed second languages just as a way to ease the rigors of travel or to get ahead in business.

Fast forward to the present, with its fresh cohorts of immigrants from a different array of countries. According to new Census data, some 60 million U.S. residents – a fifth of the population – speak a language other than English at home. This is an increase of 29 percent since 2000, and 163 percent since 1980. And while a good part of that rise can be attributed to Spanish speakers (now 37 million strong), nearly 400 languages were reported. Among the fastest growing: Vietnamese, Chinese, Korean and Tagalog, as well as Russian and Arabic.

The largest numbers of foreign-language speakers reside in traditional gateway states (California, Texas, New York) and in a handful of "global metropolises," including Los Angeles and New York City. However, the new data show a spread to other parts of the country, following the dispersion paths of new minorities.

In Nevada, North Carolina, Georgia, Arkansas, Delaware, Tennessee and Virginia, foreign-language speakers have grown by more than half since 2000. In fact, the portion of residents whose first language is not English now exceeds 10 percent in 29 states, compared with 21 states in 2000. And they comprise at least one of five residents in 35 of the 100 largest metros.

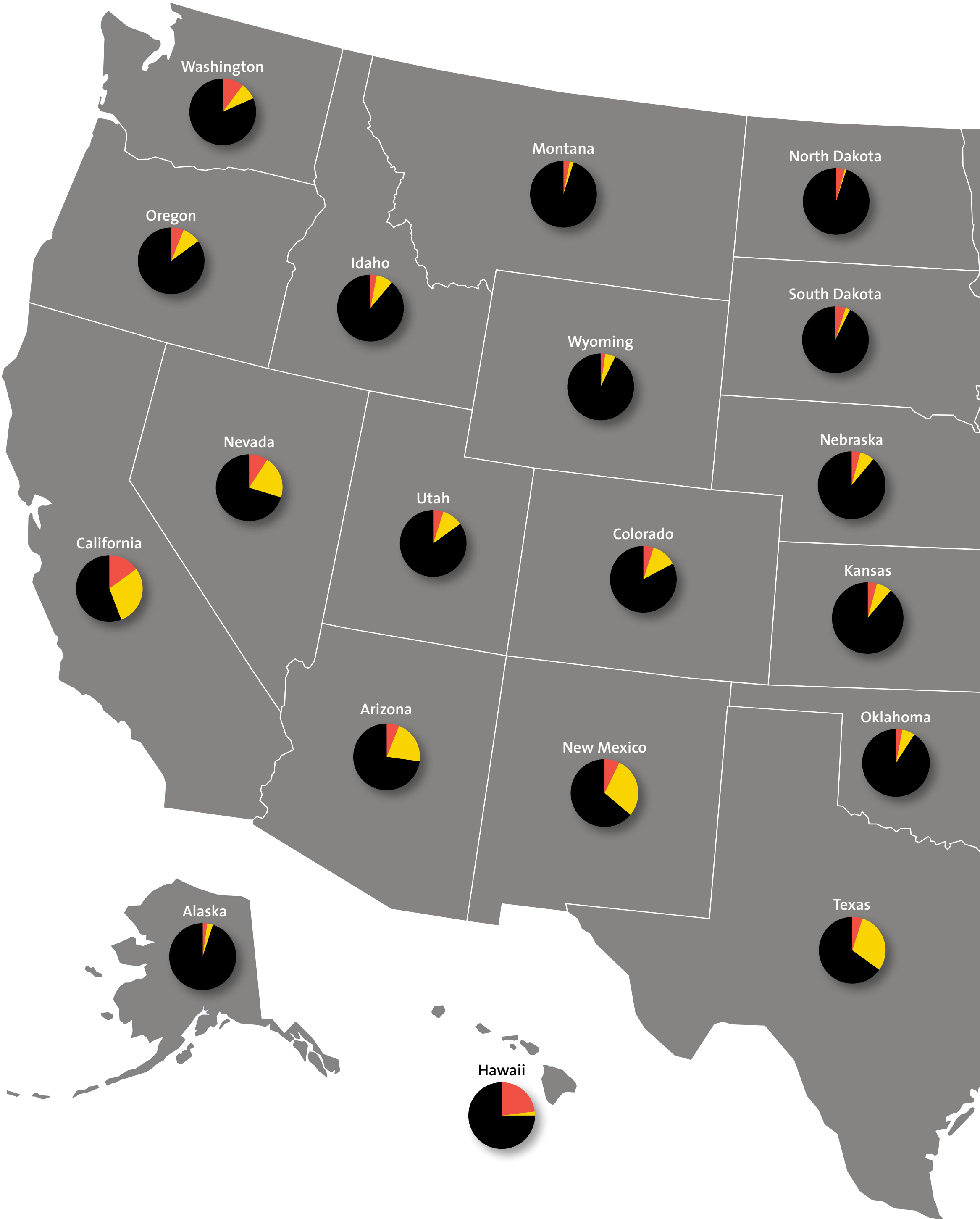
Spanish remains the dominant foreign language nationally. Yet in 20 states, including swaths of the Great Plains, industrial Midwest, New England and the eastern seaboard, other foreign languages are ahead. Even in California, where Spanish does dominate, Asian language speakers outnumber them in metro San Francisco and San Jose.

Note another aspect of the new language wave: this time around, the young rather than the old are leading the trend. Moreover, about three-quarters of school age children who speak Spanish or an Asian language at home are also proficient in English. Indeed, a remarkable 17 percent of all school-age children in America are bilingual, a number that is likely to grow. And in an increasingly globalized economy, this is bound to prove a big asset.

BILL FREY, a senior fellow at both the Milken Institute and the Brookings Institution, specializes in demography.

ISTOCKPHOTO

POPULATION BY LANGUAGE SPOKEN AT HOME



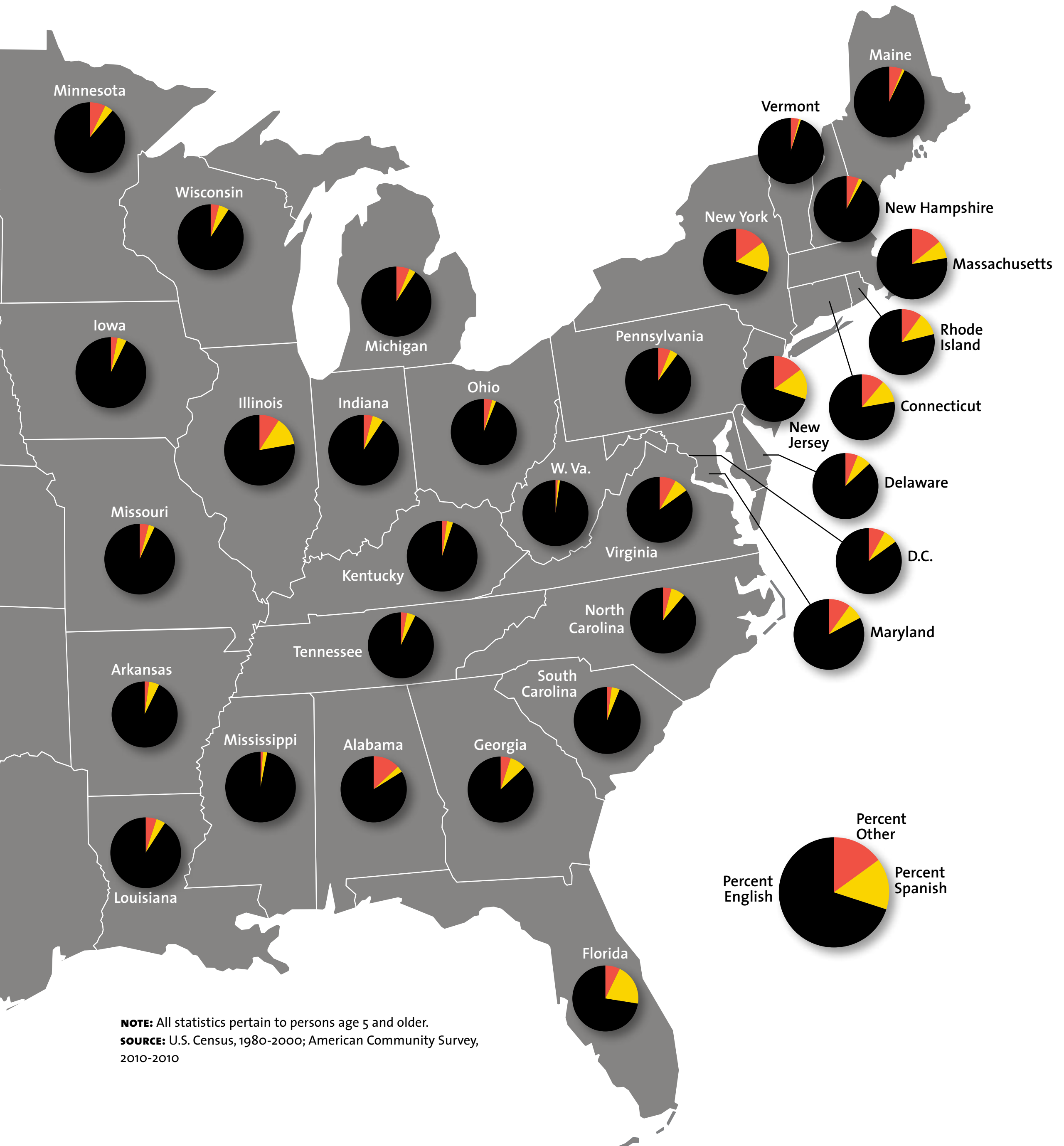
LARGE METRO RANKINGS, THOUSANDS OF PEOPLE

MOST SPANISH AT HOME SPEAKERS

Rank	Metro	Thousands
1.	Los Angeles	4,420
2.	New York	3,534
3.	Miami	2,135
4.	Houston	1,626
5.	Chicago	1,517
6.	Dallas	1,374
7.	Riverside	1,335
8.	Phoenix	802
9.	San Diego	732
10.	San Antonio	719
11.	San Francisco	679
12.	Washington DC	634

MOST ASIAN LANGUAGE AT HOME SPEAKERS

Rank	Metro	Thousands
1.	Los Angeles	1,409
2.	New York	1,106
3.	San Francisco	689
4.	San Jose	395
5.	Washington DC	311
6.	Seattle	296
7.	Chicago	294
8.	Houston	245
9.	San Diego	235
10.	Honolulu	219
11.	Dallas	214
12.	Boston	205

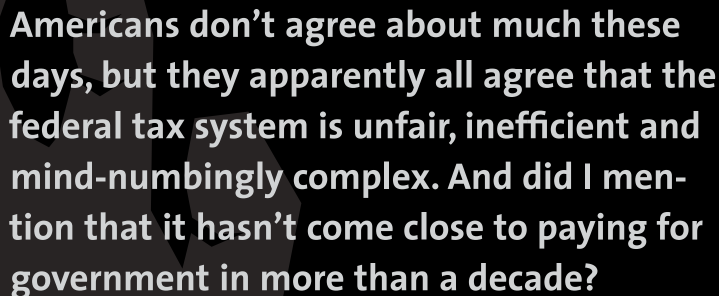


NOTE: All statistics pertain to persons age 5 and older.
SOURCE: U.S. Census, 1980-2000; American Community Survey, 2010-2010

The tax reform that just won't die

[And shouldn't]

BY LEONARD E. BURMAN



Americans don't agree about much these days, but they apparently all agree that the federal tax system is unfair, inefficient and mind-numbingly complex. And did I mention that it hasn't come close to paying for government in more than a decade?

If the NSA were tracking tax-reform chatter, the spooks might conclude that an overhaul is imminent. Presidents Obama and Bush both ordered reform studies, which were duly prepared. A host of bipartisan groups, including the National Commission on Fiscal

JASON SEILER

Responsibility and Reform (a.k.a. Bowles-Simpson), have proposed broad cuts in subsidies that are now delivered in the form of deductions, credits and exclusions in exchange for cuts in tax rates and some deficit reduction. Then, too, the chairmen of the congressional tax-writing committees – Democrat Max Baucus in the Senate and Republican Dave Camp in the House – launched an odd-couple public relations tour aimed at building support for tax reform complete with a "Max & Dave" twitter handle, @simplertaxes.

But it's proved to be sound and fury, signifying almost nothing. The commission reports might as well have been delivered by Snapchat – here today, gone today. The Republican leadership put the kibosh on Dave's road show because it wanted to keep attention focused on the rocky launch of Obamacare. President Obama, for his part, tapped Max to be his next ambassador to China, presaging an early exit from the Senate and the tax-reform crusade. Max & Dave stopped tweeting last September. When Dave did deliver a plan, Senate Minority Leader Mitch McConnell wasted no time in pronouncing it dead on arrival.

The fact is, fixing our flawed tax code would be really hard, since any fiscally responsible reform would create losers as well as winners. And if reform is also to make a dent in future deficits this time around, it would have to create a whole lot of the former.

Politicians, of course, do not want to focus on the people whose taxes would go up. They prefer to talk about closing loopholes, as if there were a long list of wasteful tax subsidies that almost everyone wanted to kill. After all, to voters accustomed to absorbing policy wisdom in 30-second bites, broadening the tax base as part of tax reform is just a matter of cutting waste, fraud and abuse. But that's not where the big bucks dwell. And in any event, more often than not, my bridge to nowhere turns out to be your revitalizing-infrastructure plan.

The real gold lies in subsidies like the mortgage-interest deduction, tax-free health insurance, tax-deferred retirement accounts and charitable deductions. Support for reform wanes quickly when the discussion turns to cutting tax incentives to housing or health care or philanthropy.

Some policy strategists think that overall limits on tax breaks would work better than picking them off one at a time. President Obama, for example, proposed to limit the value of core deductions and exclusions to 28 percent of income. And during the 2012 presidential campaign, Mitt Romney floated the idea of limiting the overall value of tax breaks to somewhere between $17,000 and $50,000 per return (the number changed from speech to speech). That would be an even tighter constraint on the rich than Obama's limit, since deductions and credits would offer no additional tax relief once the earner reached the fixed-dollar threshold.

It's possible such backdoor limits could be the secret to success. But they haven't exactly attracted the sort of grass-roots support that could neutralize the financial free speech of the very rich. Indeed, actual proposals to come out of Congress, notably one offered by Sen. Ron Wyden (D-Ore.), would trim tax breaks surgically rather than slip in the overall limits favored by party leaders.

One overall limit does, by the way, have a champion in Congress. The Buffett rule (as suggested by Warren Buffett in lamenting the

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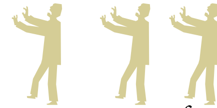
fact that he paid a smaller percentage of his income in taxes than his secretary did) would require big earners to pay a 30 percent tax on their income before deductions. Sen. Sheldon Whitehouse (D-R.I.) wrote it up as a bill, and the president said he more or less supported it. But the Buffett rule sounds suspiciously like the alternative minimum tax – scourge of the upper middle class and the poster child for byzantine complexity in the tax code. An optimist would have to hope that policymakers could do better than that.

THE SIREN SONG OF 1986

Tax reform is not quite impossible. The century-old income tax has been successfully overhauled exactly once, and those who want to try again look to the Tax Reform Act of 1986 for inspiration. But in their book *Showdown at Gucci Gulch*, Jeff Birnbaum and Alan Murray explained that the reform escaped more perils than Pauline. Indeed, the '86 Act's success rested on three fragile legs.

First, there was White House leadership. President Reagan may have backed tax reform in 1984 because of political miscalculation – he reportedly thought that his opponent, Walter Mondale, was about to announce a tax overhaul plan and wanted to beat him to the podium. But once the idea gained momentum, Reagan was there to make a good speech or a strategic phone call when needed. He also didn't micro-manage. He set one overarching goal – a significant cut in tax rates (which had topped out at more than 90 percent back when Reagan was starring in the movie *Bedtime for Bonzo*) – and left the details to the negotiators.

Second, the effort was bipartisan. Reagan, a Republican icon, worked well with two old-



school New Deal Democrats, Tip O'Neill, the House majority leader, and Dan Rostenkowski, chairman of the House Ways and Means Committee. The bill's Senate champion, Bill Bradley (a New Jersey Democrat who had been in the 70 percent-plus tax bracket when he played forward for the New York Knicks) worked closely with the Republican Finance Committee chairman, Robert Packwood.

Tax reform must be bipartisan because it makes proponents sitting ducks in general elections. The Affordable Care Act, which passed without a single Republican vote, provides a cautionary lesson. And tax reform would be even easier for demagogues to pillory than health care.

Third, there was a potential source of revenue to sweeten the pot – a big increase in corporate income tax revenues, primarily gained through repeal of the investment-tax credit and scaling back of accelerated depreciation. Voters looked with favor on closing those perceived loopholes because they didn't understand that a good chunk of corporate taxes is ultimately passed on to workers in the form of lower wages. Arguably more important, the chief executives of large companies lined up to support the plan even though their companies' after-tax profits were at risk – probably because they stood to gain so much from the simultaneous cut in personal income tax rates.

While there is a remote chance of some kind of corporate tax reform, individual income tax reform is out of the question, at least for now. Along with all the usual obstacles, reform ranks low among President Obama's priorities. But "now" isn't a synonym for "never." There will be a new president in 2016, who, like Reagan, might find it expedient to support tax reform during the election campaign and then follow through once the nameplate on the Oval Office is changed.

Bipartisan support seems more of a stretch. But the right kind of plan might just appeal to both sides of the aisle. There's been talk for several years about a "grand compromise" – entitlement reform in exchange for more revenues to adequately fund the discretionary spending programs (like education) favored by Democrats. And tax reform could synergize entitlement reform, as I will explain.

Another good omen is that Senator Wyden, who replaced Senator Baucus as chair of the Senate Finance Committee, has made bipartisanship his modus operandi. Among other accomplishments, he has worked well on Medicare reform with Paul Ryan, who is likely to be the next chair of the House Ways and Means Committee.

The third element of the 1986 package, a fiscal honey pot to sweeten the deal, would be harder to find. There is no investment tax credit or highly accelerated depreciation provision to repeal or scale back; if anything, there is pressure to reduce corporate tax burdens. It might be possible, however – and here's where I'm going out on a limb – to introduce a brand new revenue source that is relatively palatable: the value-added tax.

JUST CLEVER ENOUGH BY HALF

Lawrence Summers, the former Treasury secretary, has joked that Republicans oppose a VAT – a national sales tax – because it's a money machine, while Democrats loath it because it is regressive. We'll get a VAT, he suggested, when Republicans figure out that it is regressive and Democrats discover that it is a money machine.

Summers has a point. Most economists believe that taxes on consumption, like the VAT, are growth-friendlier than income taxes because they don't reduce the incentive to save. That very advantage is what makes the VAT regressive – poor people can't afford to save. Nonetheless, VATs are ubiquitous in Western

Europe (and pretty much everywhere else) because they make it possible to raise a lot of revenue without generating much popular wrath.

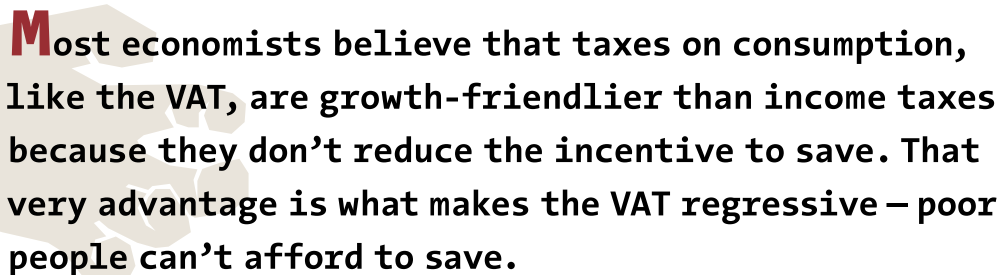
I would argue, moreover, that a VAT carefully earmarked to pay for government health care (Medicare, Medicaid, the Children's Health Insurance Program) would not fuel growth in government. Indeed, by putting a price tag for all to see on the fastest-growing component of government spending, it would have the opposite effect.

The idea would be to use VAT revenues to cover federal expenditures for medical care that exceeded the payroll-tax revenues and insurance premiums already dedicated to those programs. (I would not include the subsidies built into the Affordable Care Act, because, among other things, the Congressional Budget Office estimates the law is self-financing.) I would also eliminate the tax-free status of employer-sponsored health insurance – admittedly, no easy sell – raising $300 billion annually in income and payroll taxes, and adding the money to the health care pot. Then I would specify – by statute – that the VAT should be adjusted periodically to cover the remaining deficits of the federal health care federal programs.

Actually, earmarking a VAT to pay for health care is not a new idea. Henry Aaron, the Brookings Institution health guru, suggested an earmarked VAT as one way to finance universal coverage way back in 1991.

I think there are several advantages to this approach. As noted above, a consumption tax does not distort the trade-off between current and future consumption (the fruits of savings), as an income tax does. And the inherently regressive nature of a VAT could be easily offset with refundable tax credits to those with low incomes – as earlier proposed by Prof. Michael Graetz of Columbia Law School.

Several years ago, the Tax Policy Center estimated that a 6.5 percent VAT as part of a sweeping tax-reform plan could allow a cut in the current top individual income tax rate from 39.6 percent to 27 percent and leave some revenue left over for deficit reduction. A VAT closer to 15 percent would allow much more significant cuts in income tax rates (or more concessions on tax subsidies to build a winning political coalition).



Second, as noted earlier, dedicating a revenue source to pay for health care programs guarantees a revenue stream tied to the component of spending that is most difficult to control. This would reassure credit markets that are growing uneasy with chronic deficits – not to mention the government of China, which owns some $1.3 trillion in U.S. Treasury securities.

Third, earmarked taxes are better tolerated by the public. Though payroll taxes represent a larger burden on most working-age Americans than the income tax, the payroll levy enjoys broad support because most voters favor

what it pays for (Social Security and Medicare). That tax was reduced for two years in an effort to boost private spending in the recession-bound economy. But the reduction expired at the end of 2012. And in sharp contrast to the pushback for resuming the Bush-era income tax cuts that expired at the same time, there was little protest about reversing the payroll tax cut. A dedicated VAT thus might be more sustainable politically than the alternatives.

It's also worth remembering that a VAT is basically a sales tax – albeit one that is easier to collect, which is why it is the norm in the rest of the world. And surveys suggest that most Americans prefer sales taxes to income taxes.

The dedicated VAT might also restrain spending. A key problem with controlling health care costs is that most people think that someone else pays for it – employers, insurers, or the government. But a tax that rose with the cost of care would create a visible metric of the effectiveness of containment efforts, translating into higher prices for goods and services if those efforts are inadequate.

Voters in this tax-averse country could thus be expected to pressure lawmakers to limit spending in order to avoid tax creep. Indeed, I would dare to hope that the very visible linkage would create the conditions necessary to support a bipartisan consensus on controlling Medicare and Medicaid spending that has so far proved elusive.

Finally, tying a VAT to health care finance would be a humane way to address the concern expressed by some conservatives that al-

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most half of voters do not have skin in the game when it comes to federal spending. A dedicated VAT would mean everyone would see a connection between their own taxes and the main driver of federal spending. And that could be done while preserving the income tax credits that have lifted millions of low-income working families out of poverty.

AMERICA'S ALLERGY TO THE VAT

Despite its prevalence in the rest of the world – every other high-income industrialized country has a VAT – the United States has never come close to enacting one. Al Ullman, the chairman of the powerful House Ways and Means Committee, proposed a VAT in 1979 and was promptly voted out of office. While other factors played a role (he disliked meeting with constituents and was widely seen as arrogant and aloof), Ullman's advocacy of the VAT while sitting in a position where he might have made it happen was perceived as an element in his undoing.

One reason we don't have a VAT is that tax aversion is part of the United States' creation myth. (Recall the Boston Tea Party.) The idea of adding a new tax that could raise hundreds of billions of dollars per year just doesn't sit well with a nation of self-perceived rugged individualists. Some also worry that a VAT would be too efficient in the sense that it could enable expansion in government. They point to evidence from Europe that increases in VAT revenues are followed by increases in government spending.

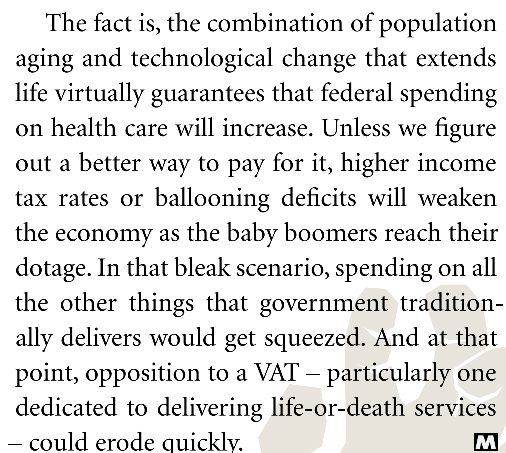
This doesn't prove that the revenues led to freer spending. It's likely that social democracies adopt the VAT *because* they want to spend more, not vice versa. But VAT critics are convinced that the tax would fuel an explosion in government spending. As the anti-tax lobbyist Grover Norquist likes to put it, "VAT is French for 'big government.'"

Not surprisingly, there is considerable resistance to a VAT in Congress. In response to reports that Paul Volcker, the chairman of President Obama's tax-reform panel, was considering a VAT, John McCain sponsored a Senate resolution opposing a VAT in 2010. It passed by a vote of 85-13, and there's no sign the opposition has slackened since. The Republican Party's 2012 platform stated, "In any restructuring of federal taxation, to guard against hyper-taxation of the American people, any value-added tax or national sales tax must be tied to the simultaneous repeal of the 16th Amendment, which established the federal income tax." Fat chance.

So a VAT seems a non-starter. But other impossible dreams have become law. Alan Viard, an analyst at the conservative American Enterprise Institute and a consumption-tax supporter, points out that the Senate voted 98-0 against taxing Social Security benefits in July 1981 when it got word that Ronald Reagan was considering that step to shore up the program's finances. Just two years later, though, Congress passed the Greenspan Commission's reform package, which included a tax on Social Security benefits.

* * *

The fact is, the combination of population aging and technological change that extends life virtually guarantees that federal spending on health care will increase. Unless we figure out a better way to pay for it, higher income tax rates or ballooning deficits will weaken the economy as the baby boomers reach their dotage. In that bleak scenario, spending on all the other things that government traditionally delivers would get squeezed. And at that point, opposition to a VAT – particularly one dedicated to delivering life-or-death services – could erode quickly. M



Killing Themselves Slowly

China and India's Descent into Chronic Disease

BY DAVID E. BLOOM, ELIZABETH CAFIERO-FONSECA, MARK E. MCGOVERN AND KLAUS PRETTNER

The world has experienced a public-health miracle in the past half century, as cleaner water, new health technologies, better diet and a host of other improvements have sharply reduced mortality and extended life expectancy in poor countries by as much as 20 years. A substantial portion of those gains has been realized through improvements in infant and child survival. However, the increase in income that was both a cause and effect of this miracle brought with it a new and ironic threat: a steep rise in non-communicable diseases (NCDs) like heart ailments and cancer.

These diseases, linked to aging populations and greater affluence, have replaced infectious diseases and malnutrition as the dominant causes of ill health and death in much of the world. As urbanization and population aging progress in low- and middle-income countries, NCDs will increasingly come to the forefront, causing incalculable misery, straining government budgets and undermining productivity.

China and India, home to more than a third of the world's population, are, by virtue of sheer size and pace of growth, leaders in this transition. If NCDs are not addressed head-on, they could materially impinge on economic growth and undermine these countries' prospects for achieving Western levels of prosperity.

FIRST, SOME FACTS

NCDs are typically chronic in nature and develop over long periods. Four of them – cardiovascular diseases, cancer, chronic respiratory diseases and diabetes – are the main targets for global action. One big reason is that they

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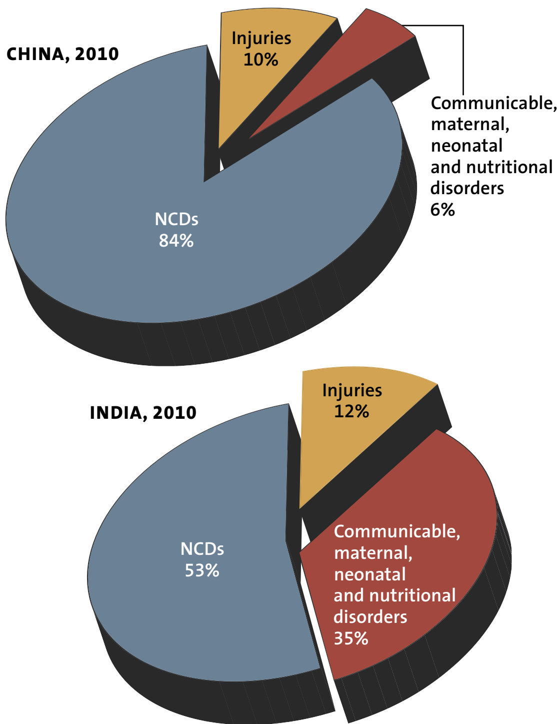
share a set of modifiable risk factors: unhealthy diet, physical inactivity, smoking, excessive use of alcohol and failure to detect and control intermediate risk factors like high blood pressure, high cholesterol, high blood sugar and excess weight. The big four already account for 78 percent of all deaths in China and 42 percent of all deaths in India. Arguably more important (since everybody dies of something), they cause 44 percent and



SOURCE: Institute for Health Metrics and Evaluation

22 percent of disability-adjusted life-years in China and India, respectively. DALYs – the combination of years lived with serious illness and those lost due to premature death – are a standard measure of the direct health burden of a disease.

It is worth noting, too, that other chronic health conditions also take a hefty toll in both countries; musculoskeletal disorders such as arthritis, as well as serious mental disorders are major contributors to disability. Indeed, in 2010, musculoskeletal conditions represented four of the top 10 causes of disability in China (as measured by years lived with disability) and accounted for more DALYs than diabetes or cancer in India. In that same year, mental health conditions accounted for seven of the top 20 causes of disability in China and six of the top 20 in India.

Some NCDs lead to others and create clusters of co-morbid conditions. (For example, diabetes can lead to kidney failure and blindness.) Mental health conditions are often comorbid with each other (anxiety and depression, for instance), as well as with other NCDs (like cancer and diabetes).

Taken as a whole, NCDs already account for a significant share of deaths and more DALYs in India than do communicable diseases. And in China, which has reduced the number of deaths from diarrhea, pneumonia and bronchitis in children under age 5 by 90 percent since 1990 and cut deaths from tuberculosis and meningitis by 73 percent and 76 percent, respectively, NCDs are responsible for seven times more DALYs than are communicable diseases.

The strides that India has made against infectious diseases has initiated its epidemiological transition. However, malnutrition and a lack of commitment to improving the health of women and children help sustain India's "triple burden" of disease. That is, India must contend with a rising burden of NCDs without having resolved major challenges in infectious disease or injuries. More than 70 percent of the country's women and children suffer from malnutrition. This is occurring at the same time that NCDs are affecting women of all ages. Just one example: the age-adjusted incidence of cervical cancer in India, at 22 cases per 100,000 women, far

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exceeds the global average of 14. India, with 17 percent of the world's population, registers nearly 30 percent of cervical-cancer deaths.

To be sure, China is hardly perfect on this score, especially when it comes to girls' health. Indeed, for most of this century, China and India were the only large countries in the world where, among children under 5, girls were more likely to die than boys. Cultural preference for male children in China and India has led to female infanticide, as well as a host of other discriminatory practices affecting the girls who are allowed to survive – everything from poorer nutrition to poorer access to health care. Recent data indicate improvements in China. Still, its rate of female child deaths – at 13.1 deaths per 1,000 live births – is more than twice the rate in high-income countries.

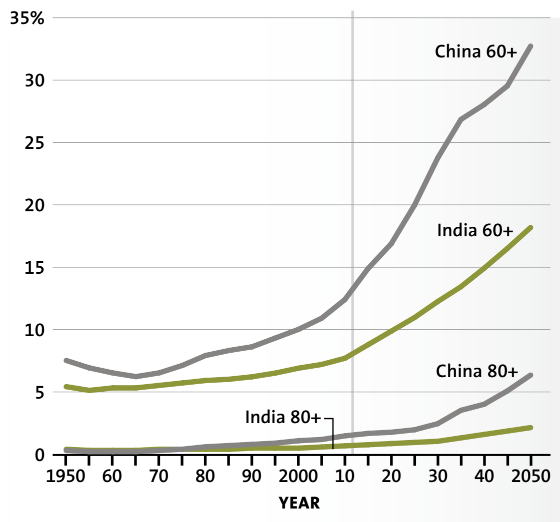
The consequences of neglecting *in utero* and early-childhood health are bound to dog both countries for many decades to come. The Barker Hypothesis – that adverse experiences during gestation and early life set an individual up for a variety of health problems including cardiovascular disease and diabetes – is particularly important in this context. The threat of NCDs thus looms even larger in China and India than one would project from the experience of the advanced industrialized countries, where early-childhood development has been a priority for policymakers.

UNDERSTANDING THE DRIVERS

Both modifiable and non-modifiable factors are driving health in China and India. The primary non-modifiable risk factor in both is aging – a reality that certainly seems better than the alternative. The primary modifiable risk factors in these countries are changes in what people eat, the extent to which they are physically active, and their consumption of alcohol and tobacco. Meanwhile, urbanization, while not a direct driver of NCDs, is spurring riskier lifestyles.

SHARE OF THE POPULATION OLDER THAN 60 AND 80 IN CHINA AND INDIA

PERCENT OF TOTAL POPULATION



SOURCE: United Nations

• AGING

In China, reductions in births per female and health-driven increases in longevity have led to rapid aging of the overall population. India is on a similar path, although it is about two decades behind in the demographic cycle.

Life expectancy in China is currently 75 years, and is projected to rise to 80 by 2050. Life expectancy in India is 66 years, and likely to reach 73 by 2050. Fertility has dropped by about two-thirds in China since 1950, and by half in India in the same period. As a result, the share of individuals 60 or older is projected to increase substantially by mid-century, from approximately 15 percent in China today (200 million people) to 33 percent in 2050 (about 450 million people), and from about 8 percent in India (roughly 100 million people) to over 18 percent (290 million people). Meanwhile, the number of people who are very old (and thus very expensive to treat when they fall ill)

PORTION OF POPULATION WITH NCD RISK FACTORS IN INDIA AND CHINA, 2011

RISK FACTORS	CHINA			INDIA		
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
Daily tobacco smoking	49.3%	2.1%	26.3%	25.1%	2.0%	13.9%
Smokeless tobacco use	0.7	0.0	0.4	32.9	18.4	25.9
Overweight (BMI>25kg/m²)	25.5	25.4	25.4	9.9	12.2	11.0
Obese (BMI>30kg/m²)	4.7	6.7	5.7	1.3	2.4	1.9
Physical inactivity	29.3	32.0	30.6	10.8	17.3	14.0
Raised cholesterol	31.8	35.3	33.5	25.8	28.3	27.1
Raised blood glucose	9.5	9.3	9.4	10.0	10.0	10.0
Harmful use of alcohol	6.9	0.2	3.8	3.5	0.4	2.0
Raised blood pressure	40.1	36.2	38.2	33.2	31.7	32.5

SOURCE: World Health Organization; Global Adult Tobacco Survey 2008-2010

will rise accordingly. The share of people 80 or older will triple (to 7 percent) in China and double (to 2 percent) in India.

While aging alone increases the risk of NCDs, it is important to note that China and India are also experiencing a substantial and rising burden of early-age NCD deaths. Around 60 percent of NCD deaths in India and 35 percent in China involve people under the age of 70, in contrast to fewer than 30 percent in much of Western Europe. In addition, 23 percent of male NCD deaths in China and 38 percent in India are of men younger than 60. For women, these figures are 17 percent and 32 percent, respectively.

• BEHAVIORAL CHANGES

Tobacco use, harmful alcohol use, poor diet and sedentary lifestyles and occupations have all risen steadily over the past 30 years in both China and India.

Overall, India fares better than China in terms of modifiable NCD risk factors, partly because India's population is younger and poorer than China's. India has a lower prevalence of most risk behaviors, particularly smoking and physical inactivity, as well as a lower prevalence of biomarkers for future disease such as high blood pressure and cholesterol. Tobacco is used at alarming rates in both countries, however. China is home to the world's largest number of smokers, while India is home to the world's largest number of smokeless (chewing) tobacco users.

Tobacco, of course, causes serious health problems, ranging from respiratory diseases to cancer. In fact, smoking is the third largest cause of ill health (as measured by DALYs) in both China and India. While cigarette consumption rose sharply among Chinese men from 1952 to 1996, it has since stabilized (albeit, at a high rate). But many of the consequences – cancer and chronic respiratory diseases – do not show up for many years; hence the incidence of smoking-related NCDs is on a slow (but certain) fuse in China.

In India, tobacco consumption takes many forms. Beedi smoking accounts for about half of Indian tobacco consumption. A beedi (sometimes spelled bidi) is tobacco, often flavored, rolled in a leaf and smoked without a filter. Beedis may be more harmful than conventional cigarettes, because they deliver more nicotine, carbon monoxide and tar. Indians consume tobacco in other forms as well, including flavored chewing tobacco called gutkha. Data from India's National Family Health Survey show that among those aged 15 to 49, 57 percent of men and 11 percent of

women use tobacco in some form.

Excessive alcohol consumption, sharply on the rise in China, has been linked to cardiovascular diseases, cancer, mental disorders and diseases of the liver. Chinese adults drink 12 times as much as they did in 1952, while close to 7 percent of men exhibit alcohol-linked risk factors for NCDs. The comparable number for India is 3.5 percent. (Use by women remains relatively low in both countries.)

As we know all too well, lack of physical activity and unbalanced, high-calorie diets promote weight gain. In China, the big culprits on the diet front are increased consumption of meat and oil; in India, the belt-busting honor goes to sugar and dairy fat. Roughly 25 percent of both men and women in China are overweight or obese, while 15 percent of women and 12 percent of men in India are. Obesity is, of course, a risk factor for cardiovascular disease and diabetes and can exacerbate symptoms of chronic obstructive pulmonary disease, like emphysema and bronchitis.

• URBANIZATION

The aforementioned behavioral changes are related to two major societal changes: increased income and urbanization. Urbanization, in particular, plays an important role in the rise of NCDs. First, the availability of high-calorie processed foods is greater in urban areas than in rural ones, contributing to the greater burden of obesity and diabetes in cities. Urbanization has also ushered in a dramatic shift in physical activity. The transition from work that requires heavy physical labor, like agricultural jobs, to work that requires less energy expenditure (like desk-based jobs in customer-service call centers) has contributed to declines in physical activity.

Data from the China Health and Nutrition Survey show that changes in occupation are the greatest sources of overall declines in physical activity for Chinese men in the past two decades. Furthermore, the urban population relies on motorized transport much more than the rural population does. In cities, rapid growth and lack of planning have resulted in a dearth of secure sidewalks and green spaces, and economic growth in cities has made technology – and, by extension, sedentary recreation such as television viewing and video game playing – more accessible. In both countries, air pollution (indoor and outdoor) is also a significant risk factor for NCDs.

DEATHS IN CHINA AND INDIA ATTRIBUTED TO SELECTED RISK FACTORS, 1990 AND 2010

RISK FACTORS	CHINA 1990	CHINA 2010	INDIA 1990	INDIA 2010
Tobacco smoking	12.75%	16.44%	7.65%	10.14%
Alcohol use	4.44	4.62	2.54	3.52
High blood pressure	16.60	24.60	6.85	10.79
High BMI	1.67	4.37	0.50	1.53
High sodium	7.06	10.18	2.43	3.84
Physical inactivity	*Not measured*	5.97	*Not measured*	4.39

SOURCE: Institute for Health Metrics and Evaluation

India, somewhat behind China in this regard, is poised to experience significant urban growth over the coming decades. This suggests that more individuals will encounter urban risk factors, compounding the NCD burden and related economic losses.

• THE NCD-DEVELOPMENT NEXUS

NCDs are not just a personal (and familial) burden, but also a societal one. The relationship between health and economic growth is well established. While the traditional view has always been that countries get healthier as they grow richer, research conducted over the past two decades has elucidated the pathway that runs the other way – from health to economic development.

According to the Disease Control Priorities Project, reductions in adult mortality were responsible for approximately 11 percent of economic growth in low- and middle-income

NOAH SEELAM/AFP/GETTY IMAGES

countries from 1970 to 2000. This reflects the higher productivity of healthier workers, higher savings rates in healthier populations and the fact that healthy populations are magnets for foreign direct investment along with the trade and technology that go with it. In emerging economies, this relationship is especially important, as the countries are seeking to sustain rapid economic development against the headwinds of NCDs.

NCDs affect growth in multiple ways. Most obviously, they reduce the supply of labor and redirect resources from productive investments to health care consumption, draining public and private budgets while shrinking the tax base. Moreover, chronic disease reduces the productivity of workers on the job, raising business costs and reducing competitiveness. In surveys, executives around the world have expressed concern that one or more NCDs would affect their businesses in the next five years. Indeed, the concerns of Chinese and Indian executives about NCDs are greater than their worries about HIV, tuberculosis and malaria.

ADDING UP THE BILL

There are three main techniques for estimating the economic impact of disease. The cost-of-illness (human-capital) approach combines direct costs like medical care and travel costs with indirect ones like the value of production lost from reduced work hours. The value-of-statistical-life approach is based on the application of "willingness-to-pay" methods, in which the estimate follows from how much people would be willing to pay – say, by installing smoke alarms – to avoid the chance of dying.

Value-of-statistical-life models thus complement cost-of-illness estimates, because they capture the value of non-market production and consumption, non-labor income, leisure time and any premiums attached to

the avoidance of pain and suffering – although they do not include health care costs that are paid by the government. The third approach is to construct a macroeconomic growth model that incorporates health alongside technology and other factors of production, like physical capital and labor.

We use the World Health Organization's EPIC model, a macroeconomic model introduced by the economists Dele Abegunde and Anderson Stanciole, to estimate the economic burden of NCDs in China and India. This model takes account of two channels through which health affects the level and growth of income. The first estimates the consequences of the diversion of savings from investment to NCD treatment, while the second estimates the reduction in labor supply due to premature NCD mortality. Our calculations put the potential cumulative losses to China's and India's economies from 2012 to 2030 at $28 trillion and $6 trillion respectively.

In both countries, cardiovascular diseases and mental health conditions present the greatest economic threats, followed by respiratory diseases and cancer. China's losses far exceed those of India's because the impact of lost labor and physical capital is larger in higher-income countries.

APPORTIONING THE PAIN

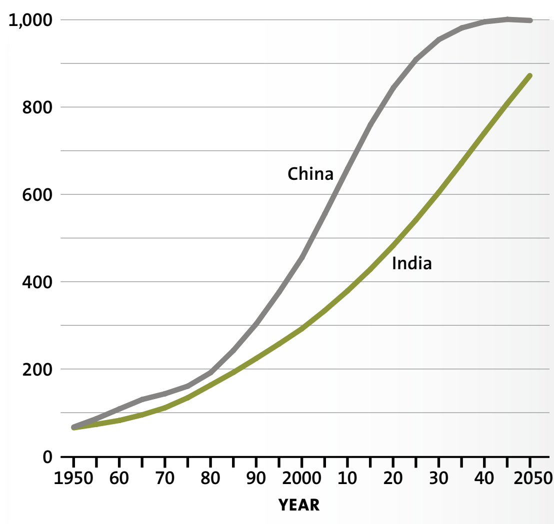
The EPIC model permits estimates of the aggregate cost of NCDs, but does not explain how the burden is divided. The best evidence available suggests that most of it falls on the ill and their families. Michael M. Engelgau of the National Center for Chronic Disease Prevention and Health Promotion at the Centers for Disease Control and Prevention and his co-authors looked at household spending patterns in India, tracking the proportion of out-of-pocket spending attributable to NCDs in 1995 and 1996, and again in 2004. They found that the share of out-of-pocket spending rose from 32 percent to 47 percent, with richer households allocating a larger portion to NCD care than poorer households did, probably because wealthier households seek more or better care.

Engelgau and his co-authors also found that hospitalizations for NCDs were more likely to lead to catastrophic expenditures and put households at greater odds of falling into poverty than were hospitalizations for communicable diseases. This impoverishing power of chronic disease was seen across households of different income. Ye Li of Harbin Medical University and several colleagues report similar patterns in China. In spite of a higher rate of health insurance coverage in China than in India, out-of-pocket payments remain a barrier to care for many in China.

Recent data from the Longitudinal Aging Study of India shed further light on the relationship between aging and NCDs. Fully 87 percent of respondents reported getting

GROWTH OF URBAN POPULATION IN CHINA AND INDIA

URBAN POPULATION IN MILLIONS



SOURCE: United Nations

money from family members to pay for medical treatment; this holds true across demographic groups and disease types. Since the older adults in the study were mostly dependent on kin networks to provide financial support, it is likely that at least some individuals' ability to pay for treatment is tenuous and turned on family circumstances. An aging India, whose population is growing more susceptible to NCDs, is thus likely to put added economic stress on households, extended family networks and health care delivery systems.

Evidence from China suggests that in spite of the country's efforts to reign in health care expenses and expand insurance coverage in recent years, personal finances are an impediment to adequate care for NCDs for many. One study concluded that rural patients discontinued treatment for NCDs at twice the rate of urban patients, due to the high cost of treatment.

TURNING THE TIDE

In May 2012, the member states of the World Health Organization agreed to seek a 25 percent reduction in mortality from NCDs among people aged 30 and 70 by 2025. WHO has also proposed actions that countries can take to achieve that goal. They range from policy changes (such as higher tobacco taxation) to health system efficiencies, such as screening for cervical cancer and increased access to essential medicines and technologies. WHO has also identified a set of "best buys" for NCD prevention and control – low-cost, high-impact actions to address NCD prevention, early detection and care in low- and middle-income countries.

• PREVENTION

From better maternal and neonatal health all the way to promoting healthy aging, there is ample opportunity for China and India to make strides against NCDs. Curbing tobacco tops the list. China, alas, has made little progress in promoting smoke-free environments to protect against secondary exposure. The only smoke-free spaces are on public transport; workplaces, restaurants and even health care facilities remain unprotected. In addition, smoking-cessation aids (like nicotine-replacement therapy) are not covered by health insurance. India has made some progress in the arena of smoke-free spaces, but enforcement is lax. And the country has yet to use higher taxation on beedis and smokeless tobacco as a deterrent to consumption.

On other fronts, China and India need to focus on expanding access to the human papillomavirus (HPV) vaccine and on improving diet. As China and India continue to grow and urbanize, they need to pay attention to providing environments for people to safely engage in physical activity – sidewalks and green spaces are just two of the possibilities. Finally, with terrible air quality in cities, China and India need to address sources ranging from vehicle emissions to industrial pollution.

• EARLY DETECTION

Early detection could make a significant difference. For example, the International Diabetes Federation estimates that, in 2013, about half of China's approximately 98 million cases of Type 2 diabetes and India's 65 million cases went undiagnosed, making eventual treatment more expensive and prognosis more guarded. Pap smears can prevent cervical cancer at low cost. Likewise, early detection of hypertension and diabetes and treatment with lifestyle changes and cheap drugs can prevent strokes, heart attacks, kidney failure and blindness.

Of course, detection only matters if it leads to treatment and/or lifestyle changes. But preliminary results from a community-level intervention in India suggest that it does, indeed,

make a significant difference, most importantly by preventing the onset of renal failure.

• **TREATMENT**

For those who already have NCDs, access to treatment is crucial for minimizing the associated economic and personal costs. There are some straightforward, highly cost-effective options available, including aspirin for people who have had heart attacks. Access to essential medicines, including insulin, chemotherapy and other life-saving drugs, should also be expanded. Mental health care is an essential piece of the puzzle and both China and India have recently passed laws governing aspects of mental health. China's law is aimed at expanding access to mental health services, while India's is meant to protect the rights of those with mental illness and to integrate mental health care into general care at all levels.

THE COST OF NCDS IN CHINA AND INDIA

ESTIMATED LOSS, 2012–30, $2010, TRILLIONS

	CHINA	INDIA
Diabetes	$0.49	$0.15
Cardiovascular disease	8.25	2.25
Respiratory disease	5.71	1.17
Cancer	3.97	0.31
Mental health	9.43	2.28
Total	**27.84**	**6.15**

SOURCE: NBER Working Paper No. 19335

• **INFRASTRUCTURE**

Institutional capacity is a crucial part of both preventing and controlling NCDs. And it is unclear whether either country has the capacity (measured by organization, personnel and budgets) to deliver – a problem that will become more pressing as their populations age. Health care professionals will not only have to integrate NCDs into their practices, but the system will also have to deal with issues such as dementia and visual-acuity problems at levels never before seen in these countries.

A WORK IN PROGRESS

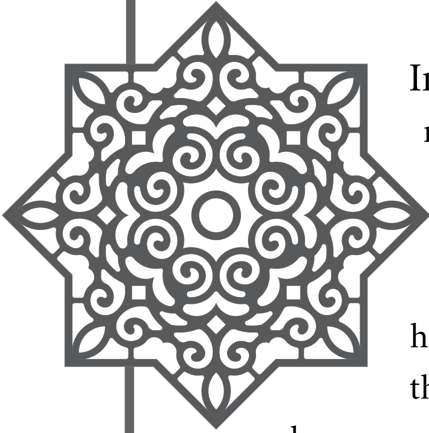
While China and India have made notable headway in health over the past half century, they are facing daunting new demographic and epidemiological realities. Both have substantially lessened premature mortality from infectious diseases. But urbanization and greater affluence have led to NCD-inducing behavior in abundance. Risky activities are on the rise, even as air pollution is compounding the burden of chronic respiratory disease.

That said, minimizing the cost of NCDs through prevention and treatment is easier prescribed than applied. It has proved an uphill battle even in advanced industrialized countries, which acknowledged the issues earlier and have far greater resources at their disposal. Tackling NCDs in China and India will thus require a wide range of stakeholders to work together productively – government agencies and nonprofit organizations, of course, but also private interests. In fact, the cooperation of the private sector will be critical to dissemination of technologies to prevent, diagnose and treat NCDs, to market healthier products and to guide people toward food choices that are simultaneously healthy and palatable.

But with great challenges go great prizes. Thanks to societal aging, the cost of NCDs will be high no matter what; unless the issue is given top priority, it will be utterly staggering. The EPIC model predicts cumulative losses in output between 2012 and 2030 equal to twice the current GDP of China, and close to one-and-a-half times that of India. China and India – currently home to more than 2.5 billion people – simply cannot afford to sit back and watch that happen. Effective action would, of course, be costly, but far less costly than the alternative. M

How Oman, Jordan and Morocco Survived the Arab Spring

BY ROBERT LOONEY



In early 2011, a Tunisian fruit vendor named Muhammad Bouazizi set himself on fire to protest the harassment he had apparently received from corrupt municipal bureaucrats. The match he lighted ignited popular uprisings across the Arab-speaking world that became known as the Arab Spring. One by one, authoritarian regimes in Tunisia, Egypt, Libya and Yemen were swept away, as younger citizens turned out en masse to vent their anger at the barriers they faced in securing education, finding jobs, starting small businesses, participating in civil society – and, in some cases, establishing Islamic fundamentalism.

Yet, while republican governments toppled, the region's monarchies proved to be made of sterner stuff. Absolutist domains, including Saudi Arabia, Kuwait,

Cairo, January 2011

REUTERS/GORAN TOMASEVIC

Sanaa, Yemen, December 2011 – rally to commemorate the death of Mohamed Bouazizi

Qatar and the United Arab Emirates, managed to buy off opposition by using their abundant oil revenues to create jobs and to sweeten consumer subsidies.

This tactic, however, fails to account for the survival of the monarchies in Jordan and Morocco, which have little wealth to spread on troubled waters. And it isn't entirely convincing in the case of Oman, where the government did throw some money at the problem but where protests were never as serious as in the major Arab Spring countries.

By the same token, while financial and military assistance from Saudi Arabia almost certainly saved a fourth Mideast monarchy, Bahrain, from regime change, there is scant evidence that foreign aid made a substantial difference in Oman, Jordan or Morocco. On closer examination, it appears that, rather than money or armed might, the three king-

Libya, February 2011 - Mummar Gaddafi's crackdown

TOP: REUTERS/KHALED ABDULLAH
BOTTOM: REUTERS/SUHAIB SALEM

ROBERT LOONEY teaches economics at the Naval Postgraduate School in California.

Algeria, March 2011

REUTERS/LOUAFI LARBI

doms' ongoing enlightened domestic policy choices – particularly as they related to economic freedom, corruption and governance – shielded them from the tsunami.

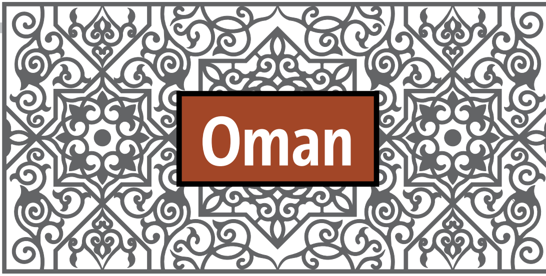
In 2011, the year of the uprisings, Oman (57), Jordan (61) and Morocco (43) all scored decently on the World Bank Governance Index' ranking on control of corruption, where a score of 100 is best. Meanwhile, many of the regimes destabilized by the Arab Spring – Libya (5), Iran (19), Syria (16) and Yemen (9) – certainly did not. Similarly, Oman (69), Jordan (69) and Morocco (60) did well in comparison with Libya (60), Iran (42), Syria (51) and Yemen (54) on the Heritage/WSJ Index of Economic Freedom that same year. (In this index, a high score means more freedom.)

To be sure, Tunisia and Egypt don't fit cleanly into this simple matrix. And, with hindsight, there are plenty of reasons to treat them as unique. Both, for example, had large middle classes alienated by rapidly widening income inequality and conspicuous consumption by the newly rich. Both, moreover, had cities teeming with unskilled and often unemployed workers displaced from the countryside. I'll focus here on the three little monarchies that have largely been left out of the Arab Spring conversation and managed to beat the odds.

AT A GLANCE

	OMAN	JORDAN	MOROCCO
GDP ($ billions, 2012, PPP)	$92	39	174
GDP Growth (2012)	5%	2.8%	3%
GDP/Capita (2012, PPP)	$29,600	6,100	5,400
Population (millions, 2013)	3.2	6.5	32.6
Population Growth (2013)	2.08%	0.14%	1.04%
Total Fertility Rate (2013)	2.86	3.32	2.17
Oil Production (barrels/day, 2012)	900,000	165,000	680,000
Infant Mortality (deaths/1,000, 2012)	14	15	25
Life Expectancy at Birth (2012)	75	80	76

SOURCE: CIA World Factbook



The impact of good governance in general and good policy choices in particular is clear in the case of Oman, the lightly populated, largely Arab sultanate on the Indian Ocean side of the strategic Strait of Hormuz. It has consistently achieved growth rates above those of its oil-producing counterparts in the Gulf. Indeed, it has grown from poverty to high-income status in the last half century, and now has a per capita income of close to $30,000 in purchasing-power terms – a shade less than that of New Zealand.

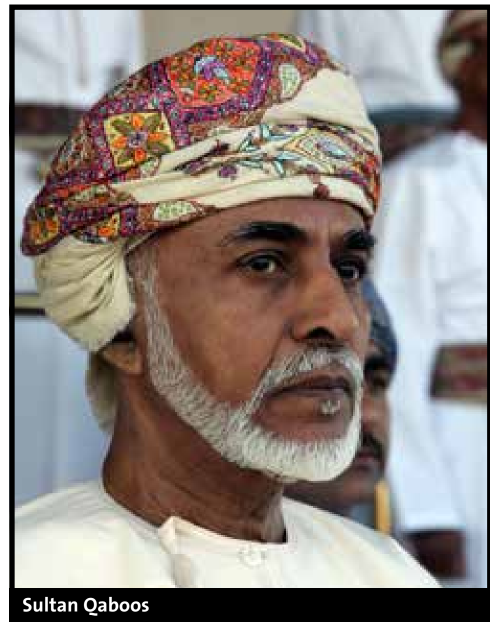
Oman began its development efforts in the early 1970s under Sultan Qaboos, who eschewed doctrinaire rigidity in an era marked by the ideological contest between socialism and capitalism. (And later, between Iran and its Sunni neighbors; Oman has solid relations with both Saudi Arabia and Iran.)

Central to Oman's growth strategy has been the paradoxical role of oil. Since the discovery of oil in the mid-1960s, Oman's monarchs have decreed that petroleum revenue was to be invested for the benefit of future generations. Thus, on the one hand, Oman has attempted to maximize the impact of oil revenues through effective resource development and allocation policies. On the other, the government has long been conscious that, because of its relatively modest reserves, the sultanate is under the gun to reduce the economy's dependence on oil by developing new sources of income.

When the country's state-led growth began to stall in the 1990s, the sultan responded favorably to IMF and World Bank pressure for market and trade liberalization. The new strategy, Vision 2020, called for opening the economy, with a much greater emphasis on private development. To accomplish this, controls on foreign investment were lifted and expanded contacts were sought with international organizations, including the WTO and regional economic blocs.

Unfortunately, the country's development efforts have been accompanied by breakneck population growth. The total fertility rate approached an astounding eight children per woman in the 1980s, even as infant mortality was collapsing and life was being extended by better health care and sanitation. The number of citizens grew from fewer than 500,000 in 1970 to nearly two million today. And while the total fertility rate is now below three, the demographic elephant has yet to be fully digested by the proverbial python.

Oman's youth unemployment is estimated at around 30 percent, with nearly 100,000 additional youths leaving secondary school each year. Speedy population growth and limits on petroleum revenues to finance industrializa-


Sultan Qaboos

MOHAMMED MAHJOUB/AFP/GETTY IMAGES

Oman's fertility rate pushed the population from fewer than 500,000 in 1970 to nearly two million today

©CHRISTINE OSBORNE PICTURES/ALAMY

tion are certainly exacerbating the problem. But at the heart of Oman's unemployment problem – a problem shared with all the Persian Gulf petro-states – is its continued reliance on foreigners to fill jobs ranging from middle management to manual labor.

To combat this dependence, an "Omanization" initiative encouraging Omanis to find alternatives to public employment by shifting the emphasis of education toward technical and vocational skills has been imposed. Oman also introduced several programs to encourage entrepreneurship. The Fund for Development of Youth Projects, started in 1999, bankrolls Omanis willing to start small- and medium-size enterprises; likewise, the 2001 SANAD Program aims to speed up Omanization through self-employment.

A third program, the Sharakah Fund for Development of Youth Projects, provides financing options for young Omanis starting or expanding businesses with total project costs of less than one million Omani rials (about $2.6 million). The fund offers entrepreneurs more flexibility than privately raised equity, encouraging business owners to buy back the fund's equity share within six years. The idea is to ensure that young entrepreneurs have the short-term financing they need without repayment deadlines, as well as the long-term option of regaining complete ownership of their enterprises.

But in spite of efforts at Omanization, dependence on expatriate workers in Oman, once one of the lowest among the Gulf Cooperation Council states, jumped from 24 percent in 2003 to about 44 percent in 2013. As in the other oil-rich Gulf countries, poor work habits, unrealistically high minimum wages and a pervasive sense of entitlement make employers loath to hire locals.

Only time will tell if policy changes will reverse the trend. The creation of a more robust small- and medium-size enterprise sector could have far-reaching effects by contributing to job creation and diversification, while generating more innovation and stronger competition among businesses.

Jordan

Jordan's situation is the most precarious of the monarchies. The country is resource-poor and situated where many of the region's problems are actively playing out – Jordan borders Israel, Syria, Iraq and the West Bank, and is a stone's throw across the Gulf of Aqaba from Egypt. What's more, it is home to 1.5 million Palestinians displaced by conflict with Israel, who in the past have challenged the political dominance of ethnic Hashemite Arabs. Despite its many problems, though, the kingdom withstood the stresses of the Arab Spring with no sign of cracking.

That achievement is in part attributable to ongoing economic and political reforms. Two years after regime change in Tunisia, King Abdullah II seems committed to an ambitious agenda for giving Jordanians a greater voice in government and raising living standards. His plans include a series of initiatives to directly address many of the country's longstanding impediments to prosperity.

King Abdullah II

REUTERS/RAY STUBBLEBINE

Jordan has experienced relatively strong growth in the last decade: the rate has been as high as 10 percent and never slipped below 2 percent during the global financial crisis. Nonetheless, the official unemployment rate has hovered at 13 percent and the unofficial rate is closer to 30 percent. Indeed, to absorb all the entrants into the labor force each year would require real GDP growth of around 9 percent annually, far above the rate that Jordan – or any other country outside Southeast Asia – has been able to sustain.

Job creation is further complicated by the tightening fiscal constraints facing the government. The Jordanian economy was certainly buffeted by the shock waves of the Arab Spring coming from multiple directions. First, supplies of natural gas from Egypt (purchased below market price) were disrupted by sabotage, costing the kingdom billions to replace. Then, tourism was hit, as fears of unrest kept visitors away. Next, the Syrian conflict dislocated Jordan's trade with Turkey, adding significant transport costs to many of Jordan's key exports. Finally, an influx of more than 400,000 refugees from the Syrian civil war strained the government's financial resources, which were already stretched to meet the needs of long-term Palestinian refugees and the remnants of the Iraqi diaspora from the war.

Why, then, did Jordan escape the Arab Spring with aplomb? Sara Tobin, an anthropologist at Northeastern University, argues that the emergent middle class in Amman, with its sense of "aspiring cosmopolitanism," has reoriented critical groups of Jordanians away from ethnic strife and radical politics. Despite the very real divide between economically and culturally globalized West Amman and working-class Palestinians concentrated in East Amman, the separation is blurring as increasing numbers of the latter are crossing into West Amman for work and leisure.

Most development economists argue that

Young entrepreneurs work on their laptops at the Amman-based Oasis 500, a seed investment firm

REUTERS/MUHAMMAD HAMED

growth promotes political stability only if it nourishes social mobility. And by no coincidence, Jordan's development policy emphasizes the encouragement of small- and medium-size enterprises. Modest-scale businesses in Jordan are already a crucial part of the economy, with SMEs accounting for around 40 percent of GDP and 70 percent of employment. Like Oman, Jordan has laid a solid foundation for private-sector activity, with a steady improvement in governance and investment in social cohesion that would appear to support bottom-up expansion.

However, Jordanian SMEs have traditionally faced a number of hurdles – it still ranks just 119th out of 189 countries on the World Bank's Ease of Doing Business Index. This applies particularly to obtaining financial support. Jordanian banks have been reluctant to lend to SMEs, which are typically unable or unwilling to provide the financial transparency that the banks require. That increases dependence on extended family and friends, as well as personal savings, for capital.

Note, too, that SMEs often engage in unregistered economic activities that, thanks in part to a blizzard of government regulation, business owners are reluctant to formalize via the kind of reporting a bank would require. Thus in 2012, SMEs received only around one-tenth of all the loans extended by financial institutions.

To free up financing for smaller enterprises, a new fund was established by the Ministry of Planning and International Cooperation and the Jordan Loan Guarantee Corporation (JLGC) in August 2012. Under this scheme, the JLGC will guarantee up to 70 percent of loans taken by firms participating in the scheme, up to a maximum of 100,000 Jordanian dinars (about $140,000). A separate track facilitates loans of a maximum 15,000 dinars to microbusiness.

Meanwhile, foreign donors – notably, USAID and OPIC – are also working to increase access to lending. The NGO Global Communities operates an initiative called the Jordan Loan Guarantee Facility, which guarantees up to 70 percent of loans from commercial banks to SMEs and gives banks technical support to improve their capacity for assessing risk in the sector.

Morocco's King Mohammed VI

EPA/MAP

Morocco's pre-Arab Spring position resembled that of Jordan in a number of ways. Both were constitutional monarchies that gave the king effective control of public policy. Both had pursued very gradual paths toward true parliamentary democracy. And both escaped the season of discontent without violence or true regime change. But their politics and economics are quite distinct.

In June 2011, a popular referendum in Morocco approved a new constitution under which the king was no longer to be called "sacred;" moreover, he must appoint a prime minister from the party with the most parliamentary seats. And the following November, voters for the first time favored the avowedly Islamist Party of Justice and Development (PJD). This important change, which took place without violence, inspired speculation that Morocco had managed a "third way" – incremental Islamic democratization. Maybe, they say, Morocco could be a model for other Mideast monarchies.

Perhaps. But it is important to bear in mind that the PJD hardly resembles the conservative Islamist parties vying for power in Egypt and Tunisia, or the fundamentalist groups that have risen to prominence in Gaza and Syria. It followed, rather than led, the protests in the wake of upheaval in Tunisia and Egypt. And it was quick to accept a compromise with the monarch that transferred relatively little power to the parliament. Arguably most important – and in contrast to other Islamic parties – the JPD has espoused a neo-liberal, market-oriented approach to economic reform.

Indeed, it turns out that the policies espoused by the JPD are fairly consistent with Morocco's existing growth strategy. That strategy can be loosely characterized as "inclusive growth," with a focus on job creation, economic mobility, equal access to government services and a reduction in poverty.

This may sound like the boilerplate served up by any number of incumbent regimes seeking popular support without accepting radical reform. But to the surprise of cynics, Morocco has achieved some successes. GDP per capita (measured in today's purchasing power) rose from $3,200 in 2003 to $4,500 a decade later. And the rising tide has carried a lot of boats: the portion of the population that fell beneath the national poverty line decreased from about 16 percent in 1999 to less than 9 percent in 2008. A word of caution is in order, though: high income inequality persists and has even increased slightly in both urban and rural areas.

After the outbreak of Moroccan protests and Arab Spring uprisings in neighboring countries, the king announced the acceleration of the already existing decentralization

Prime Minister Abdelilah Benkirane

Post-election celebration, November 2011

LEFT: EPA/LINO ARRIGO AZZOPARDI. RIGHT: REUTERS/STRINGER

of development planning and management. This approach, which devolves control to local authorities, reflects the government's stated desire to build democratic capitalism from the bottom up. The rationale is that development projects designed by local citizens have a greater chance of follow-though and a smaller chance of regression.

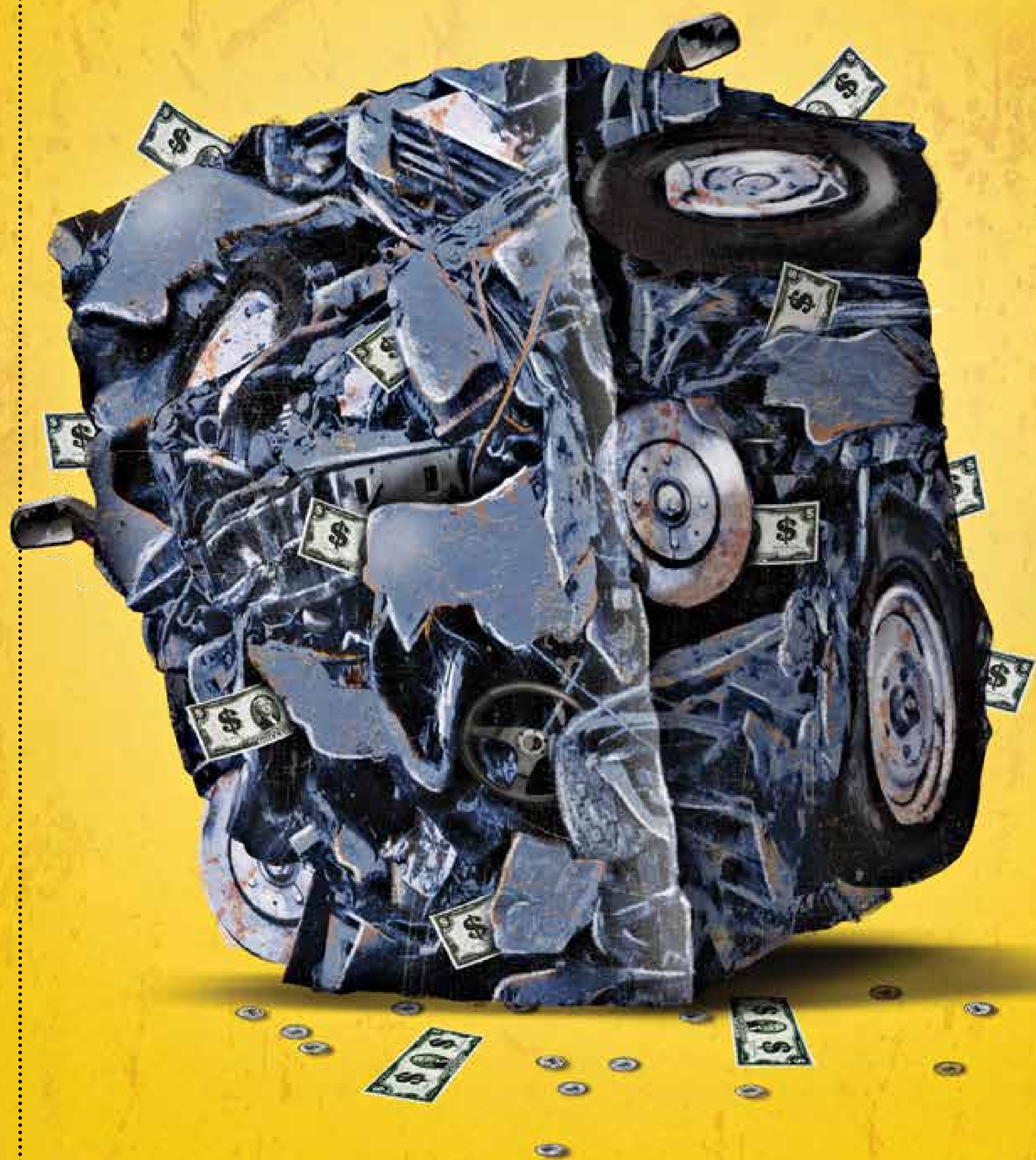
The Moroccan model seems to fit the region in the sense that it focuses on increasing social cohesion by reducing poverty while identifying with the Islamic concepts of *shura* (participation and mutual consultation regarding all matters involving the whole community), *umma* (a decentralized yet integrated worldwide Muslim community that brings about human rights and social justice) and *ijma* (consensus building).

WHAT NEXT?

Forecasting events in the Middle East is probably a fool's errand. That said, I would argue that these three monarchies have a real shot at pulling away from their neighbors in terms of both economic development and progress toward true democracy. They have laid a more solid foundation for sustaining prosperity. Moreover, their rulers have not alienated a great majority of citizens – strikingly, Arab Spring protestors did not demand the abdication of the monarch in any of them. One could go even further and speculate that all three may be on the verge of a virtuous circle in which a young and increasingly influential entrepreneurial class helps reform-willing governments to sustain the push for growth, social mobility and job creation in a part of the world not known for paths of moderation.

Still, these countries face daunting obstacles. At a time of heightened economic expectations but limited government resources, they all face a youth bulge that is far too large for the public sector to absorb in make-work jobs. With education systems hard-pressed to provide skills needed by productive, export-oriented industries and limited political leeway for labor market reform, youth unemployment will present one of the greatest challenges to the each country's stability.

If private-sector jobs are not created at the breakneck pace of labor market entry, each may find itself overwhelmed by restless populations and political interests peddling religious or statist fixes. In this regard, the one sure thing each monarchy has in its favor is the fact that their populations have witnessed the doleful consequences of alternative paths taken in Egypt and Syria. M



CA$H FOR CLUNKERS ...NOT SO CLEVER

BY TED GAYER AND EMILY PARKER

Remember the Car Allowance Rebate System? Of course you don't: the formal name and the acronym, CARS, didn't stick outside the Beltway. But you probably can recall the program by its moniker, "Cash for Clunkers," a stimulus program in 2009 that was crafted to appeal to everybody from automakers to environmentalists to owners of aging gas-guzzlers – not to mention policymakers eager to inject purchasing power into the economy in a timely fashion.

MAXWELL BURROUGHS

CARS was extremely popular. Who could resist a program designed to counter the post-bubble economic contraction even as it created bargains for car shoppers, increased fuel efficiency and helped to clean up the exhausts of America's 250 million-plus fleet of cars and light trucks? That said, it's still important to know how much bang the program got for a taxpayer buck in terms of jobs, economic activity and emissions reductions. We offer estimates implying that the hype exceeded the benefits.

But this, by definition, is hindsight. Although no one is proposing CARS II, the more elusive issue here is whether broader lessons can be drawn from the disappointing outcome to an emergency program offered in the midst of a global crisis.

JUST THE FACTS

The idea of giving owners a limited-time-only financial incentive to trade old cars in for new ones received widespread attention in the United States when Alan Blinder, the Princeton economist and former vice chairman of the Fed, proposed it in a *New York Times* article in July 2008. At the time, the U.S. economy was struggling, to say the least, as the Great Recession took hold. In the third quarter of 2008, GDP growth declined 2 percent, followed by another 8.3 percent drop in the final quarter of the year. The unemployment rate, 5.8 percent in July, was rising rapidly and would break into double digits 15 months later. Hence Blinder was pushing on a door already opened by policymakers eager to offset falling demand without awakening conservative opposition.

Cash for Clunkers was introduced as a bill in the Senate in January 2009 and in the House two months later. President Obama added his imprimatur in June after it was tacked onto a supplemental appropriations bill, which largely financed the ongoing Afghan and Iraq wars. The initial financing was set at $1 billion, and the money was to be available between July 1 and November 1. But by July 30, the kitty was almost empty because consumers rushed to take advantage of the offer in unexpected numbers.

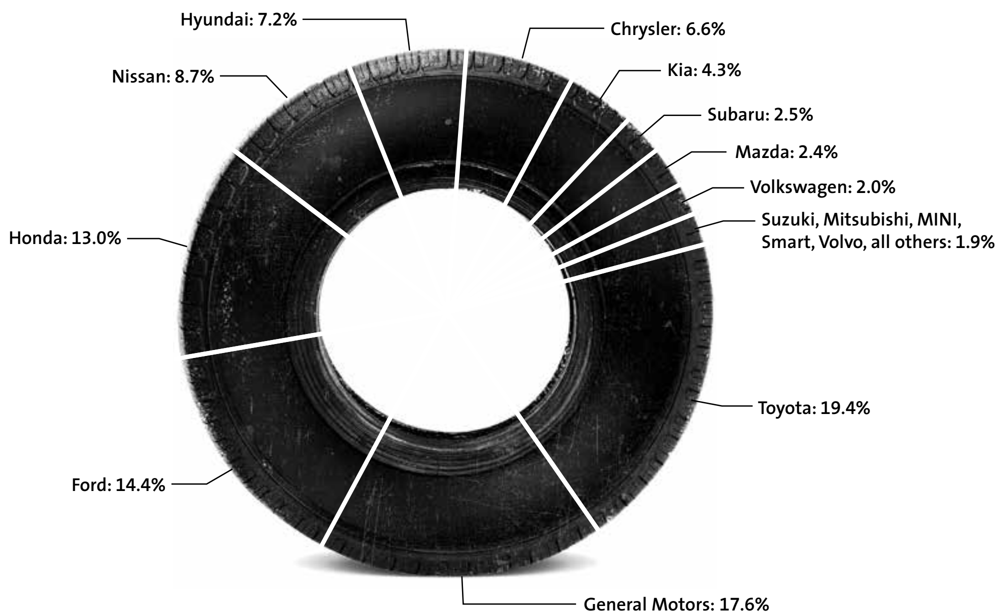
Program administrators at the National Highway Traffic Safety Administration estimated dealer requests for payment would average approximately 3,000 per day. However, in the first 10 days, NHTSA received some 224,000 applications for rebates. And in the following week, Congress added $2 billion to the appropriation.

Yet even with the additional funds, the program exhausted its money two months before the Nov. 1 deadline. Indeed, NHTSA was overwhelmed. It had to move over 7,000 employees from other federal agencies and government contractors to process the requests. On Aug. 25, when the program ended, NHTSA had nearly 650,000 dealer payment requests pending.

Under CARS, the incentive was tied to the difference in fuel economy between the trade-in vehicle and the new one. If the difference between the two was between 4 and 9 miles per gallon, and the new one had a fuel economy rating of at least 22 miles per gallon, the buyer received a voucher for $3,500. If the difference was at least 10 miles per gallon – and, again, the new passenger car had a fuel economy rating of at least 22 miles per gallon – the buyer received $4,500. The minimum

TED GAYER directs the economic-studies program at the Brookings Institution. EMILY PARKER is a research assistant at Brookings. Their more-detailed analysis of Cash for Clunkers can be downloaded from the Brookings Web site. Note, too, that the *Review* published a prescient article on this subject soon after the program was completed (Abrams and Parsons, *Milken Institute Review*, 1st Quarter 2010).

DIVIDING THE CARS SALES



SOURCE: NHTSA (2009)

mileage differential for trucks weighing less than 14,000 pounds was far less onerous.

When buyers brought clunkers into dealerships to trade in, they received vouchers to be applied toward the purchase (or long-term lease) of new vehicles. The dealer then destroyed the clunker's engine by running a sodium silicate solution through it and sent it to either a salvage auction or a disposal plant. The dealer got the cost of the voucher back after the government verified the vehicle's demise.

All owners were eligible regardless of income, provided their clunkers were less than 25 years old, in drivable condition and had been registered in the owner's name for at least a year. Some effort was made to prevent a windfall for the wealthy, however: only new cars with sticker prices below $45,000 were eligible.

The statute set a 30-day deadline for the National Highway Traffic Safety Administration to establish the program and to begin administering it, which led to some sloppiness. For example, even though dealers were required to ask whether the voucher recipients would have purchased a new vehicle in the absence of the CARS program, compliance with the survey was just 21 percent.

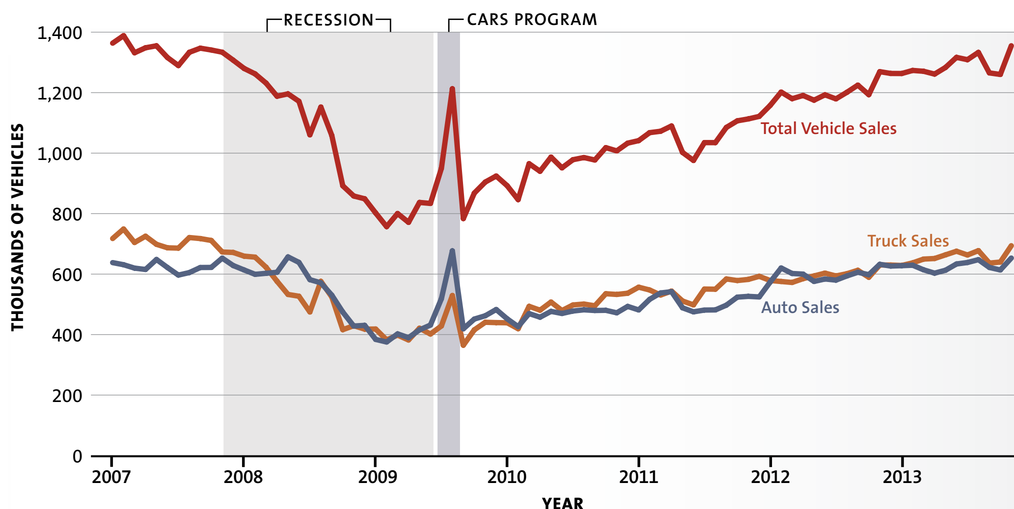
WHAT HAPPENED

A total of 677,842 vehicles were junked under CARS, resulting in $2.85 billion in rebates, or about $4,200 per vehicle. (The full $3 billion appropriation was not spent because the program's end date was set at what proved to be a conservative estimate of when funds would be exhausted.) The new vehicles purchased under the program averaged 24.9 miles per gallon (by official EPA ratings), compared to the 15.8 miles per gallon averaged by the trade-in vehicles. Eighty-four percent of the clunkers were SUVs, small trucks and minivans. By contrast, 59 percent of the vehicles purchased were passenger cars.

The figure above shows how individual

MAXWELL BURROUGHS

AUTOMOTIVE RETAIL SALES



SOURCE: Bureau of Economic Analysis; Haver Analytics

manufacturers fared. Toyota, General Motors, Ford, Honda, Nissan and Hyundai accounted for more than 80 percent of the new vehicles purchased under the program – no surprise since those five garnered a 70 percent market share in 2013 as well.

Since a primary goal of CARS was to offset the recession-related decline in demand, a key issue is how the program changed the number of cars sold and the timing of the sales. Throughout the recession, which lasted from November 2007 to June 2009, sales of passenger vehicles dropped 38 percent. During the brief window of CARS rebates, vehicle sales spiked to near pre-recession levels. The jolt was more pronounced for passenger cars than for trucks. But sales reverted to pre-program levels immediately after its expiration. In the following months, car and truck sales gradually trended up as the economy (slowly) recovered. Only recently have sales reached the range seen prior to the recession.

The impact of CARS was also evident in other indicators. There was a 15 percent increase in new auto loans during the third quarter of 2009, followed by a 6 percent decline in the fourth quarter. Personal expenditures on motor vehicles and parts rose by 11 percent the third quarter of 2009, followed by a 10 percent decline in the fourth quarter.

Both the number of vehicles built and the number of employees in the auto industry increased during CARS. Happily, they did not decline after the program's expiration.

Financial markets react to expectations. From the introduction of the legislation in the Senate in mid-January through the expiration of the program in late August 2009, Ford stock jumped 253 percent, Honda stock rose 44 percent, and Toyota stock rose 30 percent.

While the patterns of all these indicators suggest that CARS affected the market, they cannot clearly indicate the effect's magnitude or duration. Doing so requires a credible sense of the "counterfactual" – of what would have happened absent the program.

THE CARS UPTICK

A key justification for CARS was the need for temporary economic stimulus to an industry –

and economy – reeling from recession. There were nearly 700,000 participants in the 55 days of the program, which represented 31.4 percent of total vehicle sales during that period. However, the relevant question is how many of those sales would have occurred without the incentive. The other dimension here is timing: how many CARS sales were borrowed from sales that would have occurred anyway in the months following the program expiration?

Early research on the effect of CARS relied on aggregate sales data and consumer surveys to estimate the pattern of sales that would have occurred absent the program. Using these methods, the President's Council of Economic Advisers estimated that the program induced 440,000 additional vehicle sales; for its part, the Department of Transportation put the figure at just under 600,000. However, the volatility of sales in the months preceding the program makes the use of national aggregate data problematic. Later studies also had the advantage of data for the period following the program.

Writing in the *Quarterly Journal of Economics*, the economists Atif Mian at Princeton and Amir Sufi at the University of Chicago instead relied on variation among cities in exposure to CARS, as measured by the number of clunkers in each city as of summer 2008. They estimated that the program induced the purchase of an additional 370,000 vehicles during the treatment period (55 percent of total vehicle sales).

Three other economists, Shanjun Li and Joshua Linn at Resources for the Future and Elisheba Spiller at Duke, used Canadian sales patterns as the counterfactual. Canada's market is similar to that of the United States. And while Canada did institute a more modest Retire Your Ride program, clunker trade-in incentives were not widespread at the time. Their estimate of the net gain (in the United States), some 390,000 vehicles, is close to that of Mian and Sufi.

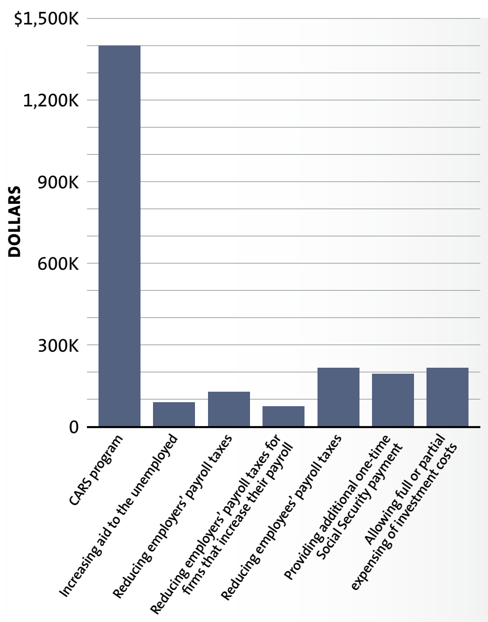
CARS was designed to provide a short-term stimulus, but the question arises of just how short the term was. The program surely induced additional vehicle sales during its existence, but some of those sales were simply pulled forward – that is, they would have occurred in the future in the absence of the program. This pull-forward effect can be seen in aggregate sales data, which show that vehicle sales dropped by approximately 38 percent in September (the month after the expiration of the program) compared to August.

CARS was designed to provide a short-term stimulus, but the question arises of just how short the term was.

Mian and Sufi found that in the months after the program expired, there were far fewer new vehicles bought in the "treatment" cities (those that had a large stock of eligible clunkers before the program) than in the "control" cities (those that had a small stock of eligible clunkers before the program). Ten months after the program ended, the cumulative purchases of the high- and low-clunker cities from July 2009 to June 2010 were nearly the same. Other studies corroborate this finding.

The degree to which pulling forward led to a short-term boost in GDP and employment during the existence of the program depended more on the impact on production than on sales. If the industry primarily relied on reducing inventory to meet the higher demand during the short period of the program (which it could subsequently replenish during the low-demand post-program months), there would have been a muted impact on

COST PER JOB CREATED



NOTE: The estimates for alternative policies are an average of the high and low estimates provided by CBO (2010).
SOURCE: CBO (2010)

employment and GDP. Adam Copeland and James Kahn of the New York Fed found that the increase in production during the program was less than half of the induced increase in sales and that this additional production was shifted forward from the subsequent two quarters. The net result was a negligible increase in GDP, shifting roughly $2 billion into the third quarter of 2009 from the subsequent two quarters.

Similarly, Li, Linn and Spiller found a minimal increase in employment due to CARS. They estimate an additional 3,676 job-years from June through December 2009, split between the assembly and parts industries. (The employment impact on the new car marketing and distribution chain was not measured.) Over the longer term, through May 2010, they found a net increase of only 2,050 job-years.

Using Li, Linn, and Spiller's long-term jobs estimate, the program spent $1.4 million per job-year created. This suggests that CARS was far less cost-effective than other fiscal-stimulus programs, such as increasing unemployment aid, reducing payroll taxes, providing an additional Social Security payment or allowing investment costs to be deducted immediately, rather than depreciated.

The average price for vehicles purchased under the CARS program was $22,592 (minus the value of the voucher), which is a big purchase even if buyers spread the outlay over a long period. And that raises the issue of whether consumers bought less of other goods and services because they bought more vehicles, thereby undermining the stimulus.

Using household consumption data from census surveys, we found that in the third quarter of 2009, the participants in CARS spent almost as much of their before-tax income on non-auto consumption (11.8 percent) as did all non-participants in the program (13 percent), non-participants who purchased a new vehicle (11.1 percent) and non-participants who purchased a new or used vehicle (12.7 percent). This suggests that the substitution issue is a bit of a red herring. The data sample was small, however, so too much shouldn't be read into the conclusion.

WHO BENEFITED?

Using the consumer expenditure survey, we can compare the socio-demographic characteristics of households that were likely participants in the CARS program with those of other households. Based on this refined but limited sample, the households we identify as likely participants in the CARS program had a median income of about $69,000. Compared to households that purchased a new vehicle in 2009 but likely did not receive the CARS voucher, program participants had lower incomes, were less likely to be homeowners,

more likely to have high school degrees, more likely to be white and more likely to be older. Further complicating the distributional impact, the program destroyed a lot of clunkers that would otherwise have remained on the road. That may have been a good thing in environmental terms (see below). But it did represent the destruction of capital which would have generated value for some (presumably low-income) households.

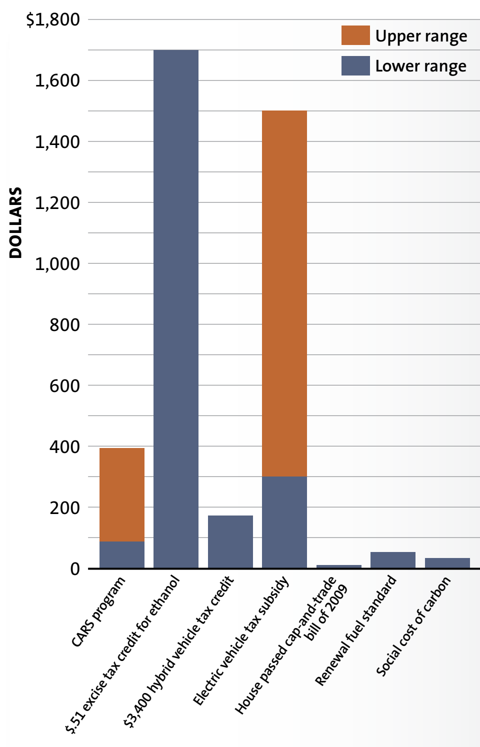
ENVIRONMENTAL EFFECTS

One would not expect a substantial reduction in carbon emissions (or other tailpipe emissions), given that the nearly 700,000 vehicles purchased under the program accounted for less than 1 vehicle in 300 on the road. Moreover, as discussed earlier, only about 55 percent of these purchases were due to the program, and those vehicles would have been purchased anyway within a few more months.

The savings in fuel economy and reduction in emissions therefore apply to relatively few vehicles. Moreover, the required differential in fuel economy under the program was modest. For example, more than 8,200 owners traded old Ford F-150 pickup trucks for new F-150s, making it the most common swap of the program. A 1990 four-wheel drive F-150 gets 14 miles per gallon and a 2010 one gets 16 miles per gallon. But because the F-150 is considered a category 2 (relatively heavy) truck – and perhaps because Congress had a soft spot for truck users – this trade was nonetheless eligible for a $4,500 voucher. Overall, the average fuel economy of the vehicles traded under CARS was 15.7 miles per gallon and that of new vehicles purchased under the program was 24.9 miles per gallon.

Li, Linn and Spiller estimated that the program would reduce fuel consumption by between 884 million and 2.9 billion gallons during the lifetime of the vehicles affected, which

COST PER TON OF CARBON DIOXIDE REDUCED



SOURCE: Li, Linn, Spiller (2012); Congressional Budget Office (2012); Holland et al. (2011); Knittel (2012); Interagency Working Group on Social Cost of Carbon (2013)

is equivalent to 2.4-7.9 days' worth of current U.S. gasoline consumption. They also estimated that the program would result in a reduction of carbon dioxide emissions of 8.58 to 28.28 million tons (depending on a variety of assumptions) – at most, 1.5 percent of transportation emissions in 2009.

This implies that the emissions reductions (including the co-benefit reduction in carbon monoxide, volatile organic compounds, nitrogen oxides and exhaust particulates) cost between $91 and $301 per ton – a lot more than most estimates of the societal cost of carbon emissions. And while it is less than the sky-high cost of reducing emissions through the electric car subsidy and the ethanol tax subsidy (which expired two years ago), it is

more than the cost of the renewable fuel standard. Equally relevant, it is far higher than the $15 per ton cost envisioned in the cap-and-trade bill passed by the House in 2009.

WORTH THE BOTHER (AND MONEY)?

Judging by these numbers, the CARS program can hardly be rated a success. It generated modest amounts of revenue (and, presumably, operating profits) for the auto industry and did save some jobs. But the cost per job was ferociously high, requiring six times the government outlay of alternative stimulus measures ranging from payroll tax cuts to beefed-up unemployment benefits. And it apparently had a negligible effect on GDP, mostly shifting output from one quarter to another.

Much the same can be said for the impact on fuel efficiency and auto emissions. CARS did raise the average mileage per gallon of the auto fleet a bit and marginally reduced emissions. But again, the cost of the approach in terms of federal outlays was very high per ton of emissions saved – far more than most estimates of the societal benefits and far more than lawmakers contemplated when they almost passed a cap-and-trade climate bill in 2009.

In retrospect, there are some lessons here. First, while providing countercyclical stimulus and addressing environmental externalities are both worthy policy goals, the attempt to achieve both within a single program muddied the waters. Indeed, with CARS, the two goals were somewhat competing. If a consumer was going to trade in a clunker anyway within a short time frame, but the voucher provided an incentive to purchase a more fuel-efficient vehicle than otherwise, then the program achieved environmental improvement – but not stimulus. If a consumer had no intention of trading in a clunker absent the voucher, then the program provided stimulus but had an indeterminate effect on the environment since the improvement in fuel economy was offset to some degree by the greater energy use from additional production and disposal of the old vehicle. At least in the abstract, then, it would have made more sense to design separate policies to manage countercyclical stimulus and emissions reductions.

Second, CARS's focus on boosting GDP obscured the very real issue of the loss of capital implied by the destruction of useful (if dirty) gas-guzzlers.

That said, some perspective is needed here. With the economy running far below full capacity, the cost of stimulus was less than the government outlay. It fairly arbitrarily shuffled some wealth among car buyers, auto companies and workers and future taxpayers, which presumably had a negative impact on total societal welfare. But because it occurred in an economy operating below its potential, it created some income gains that otherwise would not have occurred.

An important dimension in evaluating CARS, then, is to compare it to the alternatives. In the best of worlds, it makes sense to label policies that don't get the maximum bang for their buck as falling short. And in this case, it is clear that a mix of, say, payroll tax cuts, grants to keep teachers on the job and market-friendly climate change measures would have been far more efficient.

But it is not self-evident that nixing CARS would have led to an equivalent alternative injection of stimulus cash or a more efficient approach to climate containment. CARS drove past the opposition because it brought together a potent coalition of disparate interests. In the end, then, one must have a good sense of what else would have been possible before deciding whether CARS left the proverbial water glass three-quarters empty or one-quarter full. M

Derivatives

WMD or Insurance?

BY
APANARD (PENNY) PRABHA,
KEITH SAVARD
AND HEATHER
WICKRAMARACHI

Far from the financial weapons of mass destruction that Warren Buffett imagined, and contrary to the common narrative that blamed them in part for the Great Recession, derivatives have been a boon to the U.S. economy. Indeed, by our estimate, derivatives boosted GDP by over one percent from 2003 to 2012. We'll flesh that out below.

But first, some terminology. Yes, a bit of a bore. But you can't tell the players without a scorecard.

Derivatives, broadly defined, are contracts to engage in a transaction in the future. The value of the contract is derived from the price of an underlying asset (a stock, or perhaps a commodity) or a market variable (interest rate, currency exchange rate, stock index, credit risk). The notional amount of a derivative contract refers to the principal value of the underlying asset – say, the $10 million face value of a bond insured by a credit default swap derivative. Counterparty risk is the chance that the enterprise on the other side of the contract won't honor its obligations.

Derivatives-exchange markets trade standardized contracts, interposing a clearinghouse that insures each party honors its obligations. Derivatives traded "over the counter" are privately negotiated and customized to the specifications of the parties involved. They are executed bilaterally, in most cases through dealers (such as commercial and investment banks) that either find a counterparty for the other side of the contract or serve as the counterparty themselves.

PENNY PRABHA is an economist at the Milken Institute. **KEITH SAVARD** is senior managing economist at the Institute and **HEATHER WICKRAMARACHI** is a senior research analyst there. This is a nontechnical adaptation of a more comprehensive report by the authors, which is available to download at milkeninstitute.org. The research was supported by the CME Group, which owns and operates derivatives exchanges. However, the views expressed are those of the Milken Institute.

The new federal Dodd-Frank law generally requires, in contrast to past practice, that OTC derivatives be cleared by a derivatives-clearing organization and that the transactions trade on swap-execution facilities or designated contract markets. European regulators and some Asian nations are taking a similar approach. However, it is unclear whether all of the G-20 will concur.

The four main types of derivatives contracts are forwards, futures, options and swaps. Differences among them include some of the functions and features of the contracts and the markets where they are traded. Forwards and futures contracts are agreements to complete a financial transaction at a specified price and quantity at a future (forward) date. Forwards, unlike futures, are customized through negotiation. Since such contracts are bilateral, the participants are exposed to counterparty risk – that is, no third party stands between them to guarantee performance of the contract.

Futures are traded on organized exchanges. Risk to parties (and the clearinghouse) is minimized because collateral is required from both sides.

An option is a contract that grants owners the right, but not the obligation, to purchase (call) or sell (put) an asset for a specific price by a specific date. The purchaser/owner pays the seller/writer an option premium for the right. The purchaser's potential loss is limited to the amount of the premium, curbing the downside. In contrast, the seller of an option

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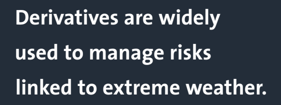
Derivatives are widely
used to manage risks
linked to extreme weather.

receives the premium in return for risk exposure. Options are traded on organized exchanges and OTC derivatives markets, though standardized options are traded solely on organized exchanges.

A swap is a contract to exchange a set of payments one party owns for a set of payments owned by the other. The type most commonly traded is the interest-rate swap, which has increased in importance as financial institutions seek to manage interest-rate risk. Swaps, like forwards, are traded on the OTC market and are subject to counterparty risk. However, under the new Dodd-Frank rules, most swaps are now required to be cleared by a derivatives clearing organization and executed on a swap-execution facility.

WHERE THEY CAME FROM

Enough of definitions. Now for some history, ancient and modern. In the wake of the battle over who (or what) caused the financial crisis, readers may be forgiven for assuming that derivatives were invented while Bill Clinton or George Bush was president. In fact, the first known use of derivatives dates to about 2000 B.C., when merchants in the Persian Gulf region engaged in consignment transactions for goods destined for India. The use of derivatives to manage risk in trade and currency exchange flowered in the Renaissance, with much of the activity taking place in Italy. Markets became specialized to respond to the trading needs of varied merchant groups. For their part, derivatives largely remained, in today's terminology, over the counter – but with the counters closely aligned with the individual markets.

By 1600, forward and options contracts on commodities, shipments and securities were being traded in Amsterdam. This was followed a few decades later by forward contracting on tulip bulbs during the infamous Tulip Mania. A standardized futures contract for rice was being used in Osaka, Japan around 1650, although it is not known whether the contracts were regularly marked to market (that is, regularly revalued to reflect market conditions) or included credit guarantees, or both.

The first formally regulated exchange for derivatives was the Royal Exchange in London, founded in 1565. England got a jump on the continent because English law recognized the transferability and negotiability of bills of exchange. Settlement was also facilitated through contracts for difference, in which a losing party could compensate the winning party for the difference between the delivery price and the spot price at the termination of the agreement.

The trading of derivatives in 18th century England also brought us the term "bubble." When the South Sea joint stock company was established in 1711, its exclusive trade with Spain's South American colonies was widely expected to generate enormous profits. This led to the formation of ancillary companies called bubbles. But in 1720, Parliament passed the Bubble Act, prohibiting all joint stock companies not authorized by royal charter. The law triggered turmoil in financial markets, resulting in a crash. According to a subsequent investigation, the breakdown was attributed to those who dealt in options – mainly call options known as refusals. Parliament

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subsequently banned both options in shares and the practice of short-selling.

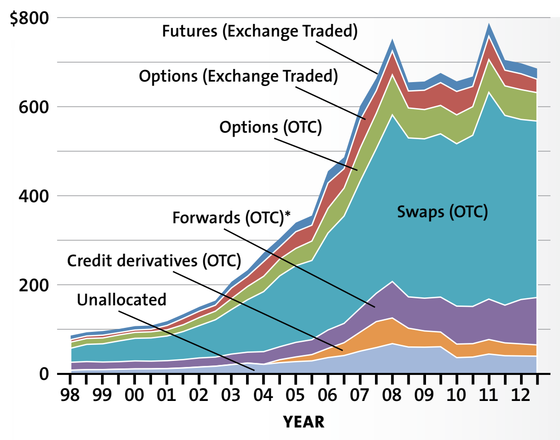
The first formal commodities exchange, the Chicago Board of Trade, was established in 1848 to provide a centralized location for negotiating forward contracts. Under its aegis, the first exchange-traded derivatives contracts were listed in 1865, and in 1925 the first futures clearinghouse was formed. (In 2007, the Chicago Board of Trade merged with the Chicago Mercantile Exchange to become the CME Group.)

The recent history of derivatives is characterized by their broad integration across commerce and finance, with trading in everything from sulfur-emissions-containment credits (for utilities) to heating-degree days (a weather variable). In the final decades of the 20th century, there was derivatives trading on currencies, bond and interest-rate futures and even options on securities indexes. The first currency futures were launched in 1970 at the International Commercial Exchange in New York, when fixed-exchange-rate regimes still dominated.

Five years later, the interest-rate futures contract based on Ginnie Mae mortgages was traded for the first time on the Chicago Board of Trade. This was followed in 1977 by the U.S. Treasury bond futures contract, which quickly became the highest-volume contract traded. The flurry of activity continued with the creation of the Chicago Mercantile Exchange's Eurodollar contract in 1982 and of the first stock-index futures contract by the Kansas City Board of Trade. The Chicago Mercantile Exchange quickly followed with its contract on the S&P 500 index.

The 1980s ushered in the beginning of the era of swaps and other over-the-counter derivatives. With the arrival of a new generation of corporate financial managers well-versed in risk-management techniques, these instruments became the go-to ones for hedging interest-rate, exchange-rate and commodity-price changes. By 1991, the notional amount of OTC derivatives outstanding had surpassed that of exchange-traded derivatives.

NOTIONAL AMOUNTS, BY INSTRUMENT
$ TRILLIONS



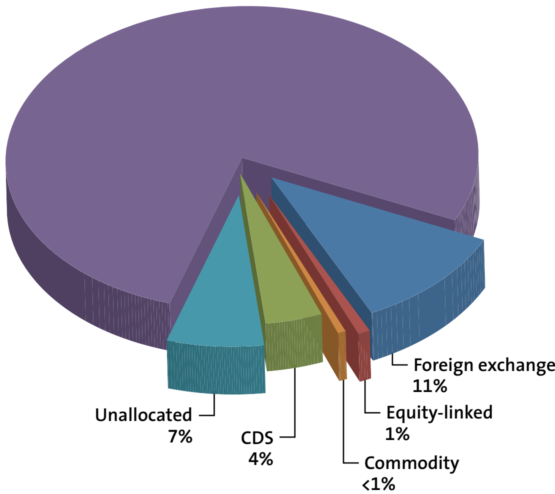
*Includes forex swaps, equity-linked swaps, and commodity swaps. The amounts outstanding for these categories are small and BIS reports their data with forwards.
SOURCE: Bank for International Settlements, June 2013

The rapid growth in OTC derivatives was fueled in part by the emergence of credit derivatives in the mid-1990s. The first credit default swaps – effectively, insurance contracts on loans – were created by the J.P. Morgan investment bank (now JPMorgan Chase), which led the industry away from relationship banking toward credit trading.

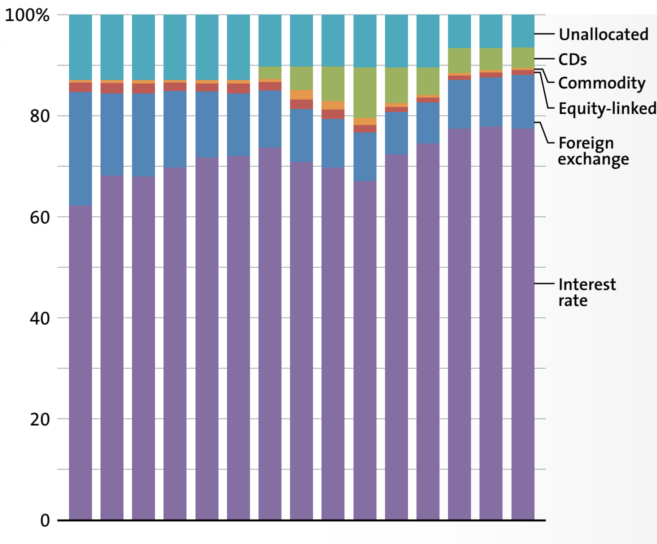
THE PARTY – AND THE MORNING AFTER

Despite all the positives associated with derivatives in the 1990s, a number of high-profile events raised concerns. In 1994, firms with deep financial experience, such as Procter & Gamble and Metallgesellschaft (a giant German industrial conglomerate), suffered large losses on derivatives trading – primarily using swaps. Orange County, in California, one of

OTC DERIVATIVES
$633 TRILLION (2012)



OTC DERIVATIVES BY RISK CATEGORY



SOURCE: BIS; Milken Institute

the wealthiest counties in the United States, declared bankruptcy, due partly to losses on derivatives trading involving leveraged repurchase agreements. The following year, Britain's Barings Bank declared bankruptcy after losing billions through speculation on futures by a rogue trader in its Singapore office.

These events led to minor changes in the way derivatives were regulated, but for the most part firms remained responsible for tightening controls internally.

Following the 1998 collapse of Long-Term Capital Management, a giant hedge fund, the report of the President's Working Group on Financial Markets recommended that the SEC, the Commodities Futures Trading Commission and the U.S. Treasury be given expanded authority to regulate derivatives. The proposal would have required counterparties in OTC transactions to provide credit-risk information and keep records on concentrations, trading strategies and risk models. But the Fed's chairman, Alan Greenspan, declined to endorse those proposals, deferring to regulators who had existing supervisory authority – and who ignored the recommendation.

Then, in late 2000, Congress passed the Commodity Futures Modernization Act. The law removed OTC derivatives transactions from all requirements of exchange trading and clearing, so long as counterparties to swaps met minimum standards. Except for issues related to fraud, the SEC was barred from OTC derivatives oversight. Moreover, the new law expressly preempted state gambling and anti-bucket-shop laws, which would have barred the otherwise unregulated speculative activity granted under the Act.

In the aftermath of the law's passage, derivatives growth skyrocketed. Although this boom was generally viewed as a positive step in helping to mitigate business risk, regulators and swap dealers themselves expressed reservations about operational shortcomings of

OTC markets. In 2005, Timothy Geithner, then the president of the powerful Federal Reserve Bank of New York, assembled representatives of the world's 14 largest banks to discuss his concern about substantial backlogs in the documentation of credit derivatives. He requested that banks clear up 80 percent of the backlog within a year and asked them to form a clearinghouse for complex derivatives contracts.

For critics of OTC derivatives, and credit derivatives in particular, the global financial crisis beginning in 2008 was seen as validation of their views, while presenting an opportunity for reform. The belief that derivatives were indeed Warren Buffett's financial weapons of mass destruction added to the momentum for change. The final report of the National Commission on the Causes of the Financial and Economic Crisis in the United States took a more nuanced view. While acknowledging that OTC derivatives contributed "significantly to this crisis," the report cited them as just one of eight major factors involved.

The Dodd-Frank act, which was signed into law in July 2010 (five months before the release of the Financial Crisis Inquiry Report), reflected negative public sentiment toward derivatives. Title VII of the act granted the Commodities Futures Trading Commission and the SEC authority to regulate swap derivatives, with the SEC assigned power over securities-based swaps. Other parts of the law addressed broader issues of interconnectedness among market-making firms and concentrations of risk in derivatives markets.

It's too early to judge whether Dodd-Frank's remedies will work. Many of the measures linked to changes to OTC derivatives and the requirement to use swap-execution facilities have been put in place only recently. But there's little doubt that derivatives will continue to play a pivotal role in financial markets.

The belief that derivatives were indeed Warren Buffett's financial weapons of mass destruction added to the momentum for change.

VOLATILITY AND TECHNOLOGY

While the derivatives markets were small until the 1970s, rising volatility in stocks, interest rates and exchange rates since then, along with the globalization of the capital markets, has spurred demand for instruments to hedge risk. Supply factors, notably the rise of financial engineering built on a platform of cheap, rapid digital computation and the Black-Scholes option-pricing formula, also played a major part.

The size of the global market for OTC derivatives, as measured by the notional amount outstanding (more on that concept later), grew from $80 trillion in 1998 to $633 trillion in 2012. The exchange-traded market expanded considerably as well over that period, from $14 trillion to $54 trillion.

Among the four types of derivatives, swaps are the largest market by notional amount, with forwards in the runner-up position. Both are traded over the counter, while futures and standardized options are traded on organized exchanges. Comparing notional amounts outstanding between exchanges and OTC derivatives markets can be misleading, however. OTC trading data capture gross positions, while exchange data represent net positions. Therefore, the growth of derivative types is better compared within the markets in which the instruments are traded.

TYPES OF DERIVATIVES USED IN THE U.S. BANKING SYSTEM
TOTAL NOTIONAL AMOUNT (BILLIONS)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Interest rate	$61,876	$75,533	$84,530	$107,435	$129,491	$175,895	$181,455	$193,399	$187,866	$181,463
Forex	7,185	8,607	9,289	11,900	16,614	16,224	16,555	20,990	25,436	27,781
Credit	1,052	1,396	1,807	3,164	3,590	3,268	2,664	2,559	2,928	3,757
Other	1,001	2,347	5,822	9,020	15,863	16,029	20,716	31,658	14,759	13,998
Total	**71,113**	**87,878**	**101,449**	**131,519**	**165,559**	**211,416**	**221,390**	**248,606**	**230,990**	**226,999**

*Banks may use more than one type. Equity and commodity contracts are among the other categories. The 2012 data are as of the third quarter.
SOURCES: FDIC; Milken Institute

Interest-rate derivatives are the most widely traded, accounting for three-quarters of notional amounts outstanding. They became popular in the late 1970s and early 1980s, when corporations – banks, in particular – were grappling with wide rate fluctuations and sought financial instruments to reduce the associated risk.

Foreign-exchange derivatives, at 11 percent of the notional amount of the global OTC total, are the second-largest category. In recent decades, foreign financial markets have become more accessible and international trade more open as technology reduced informational and other costs associated with cross-border transactions. The foreign-exchange-derivatives market expanded accordingly, from the notional amount of $18 trillion in 1998 to $67 trillion in 2012. Activity in equity-linked and commodity derivatives is relatively small, with each accounting for about 1 percent of the broader market.

The credit default swap is the predominant form of credit derivative. With such a swap, a buyer seeking insurance against an adverse event – a ratings downgrade on the issuer's debt, for example – makes periodic payments to a protection seller. If an event occurs, the seller is obligated to make the buyer whole. The primary buyers and sellers of credit default swaps are financial institutions.

Over the past 10 years, the credit default swap market has grown at an astounding pace. The notional amount outstanding peaked at $58 trillion at year-end 2007, a nine-fold growth since 2004. However, when compared to some other types of derivatives – for example, interest-rate swaps – the credit default swap market is relatively small.

One reason for such swaps' rapid growth was the heated activity in the housing market and the expansion of mortgage-backed securities. Many financial institutions that invested in mortgage-backed securities purchased credit default swap contracts to protect against default. The market for such swaps declined amid the financial crisis, and has not returned to previous levels.

EXCHANGE-TRADED VS. OTC

Last year, 21.2 billion derivatives contracts were traded on organized exchanges worldwide, close to triple the volume of just a decade ago. Europe and North America dominate exchange-traded derivatives, with 90 percent of the action. Although the major derivatives exchanges (for example, CME Group, Deutsche Börse AG, ICE/NYSE) are located in mature economies, demand for such products is rising in emerging economies. Derivatives exchanges in Brazil, China, India, South Korea and Russia have shown remarkable growth

Using Derivatives to Manage Risk in the Airline Industry

Fuel is often an airline's largest operating expense. Hence the ability to manage volatile fuel costs is widely viewed as the key to stabilizing net cash flow. United Airlines calculated that a $1 increase in the price per barrel of jet fuel increased its operating expenses by $95 million in 2011.

That year, six of the seven major U.S. airlines used fuel derivatives in various forms to manage risk. However, this practice rarely involves jet fuel itself, because of the illiquid nature of that market. Instead, airlines hedge other fuels with high price correlations, such as heating and crude oil.

The airlines use both exchange-traded and OTC-traded derivatives. And in 2011, a year in which jet fuel prices rose from $2 per gallon to more than $3, it paid off big-time. United, Delta and American saved a total of $1.2 billion.

DANIELSBFOTO/123RF STOCK PHOTO

and are now ranked among the busiest.

The scale of the notional amount of outstanding derivatives contracts at the end of 2012 – $633 trillion, or 10 times world GDP – seems alarming on its face. However, notional amounts outstanding don't contain much information about what's inherently alarming here – the risk to counterparties.

For example, suppose an investor buys a derivative contract from a bank to hedge the credit risk of holding $1 million in IBM bonds. Assume further that the investor pays an annual premium of $1,000 in exchange for reimbursement of the bond's par value, were IBM to default. In that case, the notional amount is $1 million. The $1,000 premium, or cash-flow obligation of the investor, is the fair value of the contract and the amount at risk for the bank. Moreover, a bank can mitigate the risk of not being paid the premium

by an investor by entering into a new contract with that same investor (for example, by buying a new contract on IBM bonds). The sum of the fair values of the outstanding contracts between the parties is known as gross market value. And in 2012, gross market value worldwide was $24.7 trillion, or just 3.9 percent of the notional amount.

More than 90 percent of total notional amounts are held for trading (rather than hedging) purposes, and are thus a major source of fee income.

In the United States, banks can benefit from netting and posting collateral from a master netting agreement in accordance with generally accepted accounting principles. Based on the IBM example, the bank has a positive fair value from the first contract and a negative fair value in the second contract. The sum of positive and negative fair values between the counterparties (i.e., the bank and the investor) after bilateral netting is known as gross credit exposure. And the gross credit exposure of global derivatives was $3.6 trillion at the end of 2012, just 0.57 percent of the notional amount outstanding. Moreover, collateralization further reduces counterparty risk exposure to 0.17 percent of the notional amount – real money, but not the stuff of global-catastrophe scenarios.

Exchanges offer the advantage of pre-trade price discovery for potential participants and a high level of transparency. Moreover, they use a clearinghouse to clear and settle trades and to assume counterparty risk. In a traditional bilateral OTC transaction, by contrast, the contract participants bear the risk of each other's default. Note that the risk can become systemic, because losses from defaults can spread to parties who entered into contracts with the counterparties of the defaulted contracts, which explains why Washington intervened to save counterparties in the collapse of AIG, and why reformers want to force OTC derivatives to be cleared by a well-financed third party.

But the swift growth of the OTC derivatives market before the crisis does reflect some real advantages of this platform. In particular, enterprises can trade customized, complex or illiquid products, giving them the flexibility to tailor derivatives to the hedge risks of specific assets in their portfolios.

MANAGING RISK

First consider banks, which hedge with derivatives, but also make markets in these instruments to generate fees. Banks' assets (such as mortgage and commercial loans) are typically long-term, while their liabilities – notably, demand deposits – typically have much shorter terms. The resulting maturity mismatch between assets and liabilities subjects banks to interest-rate risk. That is, a change in relative interest rates impacts banks' earnings, because much of their profit comes from the difference between interest received on loans and interest paid on deposits. To reduce their exposure, banks use interest-rate derivatives. That, of course, serves the banks by reducing the risk of failure and may also reduce the risk of systemic financial market failure. But it also reduces the cost of lending, increasing the efficiency of capital markets.

Most banks thus depend heavily on interest-rate derivatives. In fact, those derivatives account for 80 percent of total derivative notional amounts. Banks also use derivatives to

Derivatives protect shippers from highly volatile shipping rates

WANG CHUN/IMAGINECHINA

hedge against foreign-exchange-rate and commodity-price volatility and to insure against loan defaults. But more than 90 percent of total notional amounts are held for trading (rather than hedging) purposes, and are thus a major source of fee income.

Note that derivatives activity in U.S. banking is highly concentrated. Fully 93 percent, measured in total notional amounts, is held by just four banks: JPMorgan Chase, Citibank, Bank of America and Goldman Sachs. Research suggests that the main reasons for this concentration are economies of scale in hedging and market participants' strong preference for trading with highly rated, large dealer banks that presumably pose less counterparty risk.

Nonfinancial firms are also major participants in the derivatives market. Cash-flow volatility, which can arise from adverse changes in interest rates, foreign exchange rates and commodities prices, can rob firms of the liquidity needed to meet fixed costs. Hedging can reduce the likelihood and costs of financial distress. Furthermore, hedging the volatility of cash flow and profits reduces the cost of borrowing and can be used to reduce tax liability.

OTHER VIRTUES

At least one study has found that option prices on individual equities reflect market conditions more quickly and accurately than the stocks themselves do. Similarly, the research suggests similar conditions in credit and commodity markets.

Moreover, the addition of derivatives to an underlying market brings in additional players

who use derivatives as a leveraged substitute for trading the underlying asset. By the same token, derivatives may cut transaction costs through narrower bid-ask spreads. Consequently, spot markets with parallel derivatives markets typically are more liquid and have lower transaction costs than markets without them. One clear example: an investor who wants exposure to the S&P 500 but hopes to avoid the expense of purchasing all the underlying securities can trade index options and futures for the same exposure, at far lower cost.

REUTERS/ANDREW BURTON

ECONOMIC IMPACT, BY THE NUMBERS

To fully appreciate this study's empirical findings, it is important to understand how they were arrived at. The use of derivatives by banks and nonfinancial firms has an indirect impact on economic growth via a variety of channels. To capture the overall impact, the analysis is divided into two steps.

First, we estimate the influence of banks' use of derivatives on lending and the effects of nonfinancial firms' use of them on firm value. Our statistical analysis demonstrates that banks' derivatives use allows for a larger volume of commercial and industrial loans (holding other factors constant), thereby increasing business investment. Additionally, it confirms that investors assign higher valuations to nonfinancial firms using derivative products, and those valuations boost firms' incentives and ability to expand operations.

In estimating the broad macroeconomic effect, we used two alternate approaches. One is based on a pure measure of statistical association that uses current and past values of variables in a system to determine their relationships. A key advantage is that a limited number of variables is necessary to perform the estimation. The second approach uses a structural model of the economy. This provides a separate estimate of the resulting changes in real GDP growth and includes further detail on investment, industrial production, employment, wages and incomes, and consumption, in addition to many other variables. Nevertheless, the approaches yield consistent results, warranting a high level of confidence.

The technical complete analysis is spelled out in the full report, which can be downloaded from the Milken Institute Web site. Here, we offer the key findings:

• Banks' use of derivatives, by permitting greater extension of credit to the private sector, increased U.S. quarterly real GDP by about $2.7 billion each quarter from the first quarter of 2003 to the third quarter of 2012.

• Derivatives use by nonfinancial firms increased U.S. quarterly real GDP by about $1 billion during the same period by improving their ability to undertake capital investments.

(Over this period, U.S. real GDP grew by $66 billion per quarter on average.)

• Combined, derivatives expanded U.S. real GDP by about $3.7 billion each quarter. The total increase in economic activity was 1.1 percent ($149.5 billion) between 2003 and 2012.

• Between 2003 and 2013, derivatives' use boosted employment by 530,400 (0.6 percent) and industrial production by 2.1 percent.

We separately examined the benefits of exchange-traded derivatives. The use of futures contracts has a positive association in all statistical formulations, suggesting that they help both banks and nonfinancial firms manage risk and thereby enable banks to extend more loans and firms to invest more capital. In the full sample period 2003 to 2012, we estimate that futures use is associated with a $1.5 billion quarterly increase in real U.S. GDP. Note, however, that this estimate does not refer to the benefit of futures over other derivatives types, since firms that hedge with futures often use more than one type of risk-management tool at a time.

Bankers are warning that as swaps trading volume through clearinghouses ramps up, counterparty risk will actually increase because the clearinghouses lack adequate capital.

DOWN THE ROAD

It's possible that the spectacular pace of growth in derivatives creation before the financial crisis will resume once users understand the market's ongoing transformation. By the same token, it's possible that derivatives will migrate to exchanges as the advantages become more apparent and regulation reduces the flexibility of OTC operations. This could prove the best of all possible worlds, as exchange trading will adequately meet business demand for risk management without the systemic risk posed by OTC trading.

But it is premature to predict that rosy scenario. For one thing, cross-border, margin and Basel III regulations are not fully in place, creating uncertainty about how regulation will affect the derivatives market. For another, chief financial officers have not had the time to evaluate the new regulations, and some are concerned that the push toward standardization will narrow their choices about how to hedge.

The primary aim of the new regulatory structure created by Dodd-Frank – one that will have much more bite on the OTC market – is to reduce counterparty risk (and thus systemic risk). Henceforth, all standardized swaps must be executed through a swap-execution facility or a designated contract market. Moreover, the agreements will need to be cleared at a derivatives-clearing organization and reported publicly via a swap-data repository.

Industry experts project that 60 percent or more of over-the-counter derivatives trading volume will be centrally cleared. The actual percentage will depend in part on how banks, as liquidity providers, rethink product distribution to clients. Bankers are warning that as swaps trading volume through clearinghouses ramps up, counterparty risk will actually increase because the clearinghouses lack adequate capital – a worry, by the way, that clearinghouse executives vehemently dispute.

In addition to the issue of capital adequacy, there is concern that new regulations will reduce the efficiency of the derivatives market by tilting toward exchange trading and against cleared swaps. In particular, because the Commodity Futures Trading Commission delayed issuing regulations for swap execution facilities, the exchanges had head starts in establishing their businesses. The commission also issued rules that favor futures. With block trades, exchanges can set size limits on their own, whereas swap-execution facilities must follow a formula established by the commission Moreover, under the new rules, market participants are currently required to post significantly more collateral to clear a swap transaction than a similar future.

Prior to Dodd-Frank, the lack of regulated margin (collateral) requirements was a major driver of the growth of swaps markets. The imposition of such requirements on both cleared and un-cleared swaps will have a noticeable impact on the cost of hedging. The issue of margin requirements is made all the more acute by the impact of deleveraging, which has been ongoing since the financial crisis. According to industry sources, the total margin shortfall under the new market structure could range from $800 billion to more than $2.5 trillion. However, although these estimates appear large, advances in financial engineering are likely to dampen their impact.

It remains to be seen whether the cost of meeting margin requirements will spur the migration of OTC derivatives activity to exchanges. Whatever the outcome, there is little doubt that a great deal of exotic-derivatives activity will cease in the face of margin requirements and the additional charges likely to be imposed by clearinghouses on these less-liquid bilateral trades. According to a study by the Tabb Group, more than $130 trillion in derivatives' notional value might not be clearable.

Dodd-Frank has not only created a seismic shift in non-exchange-traded derivatives markets in the United States, but has also sent tremors through overseas markets. The big issue: whether U.S. regulators would require non-U.S. entities (including foreign branches of American banks) that are engaged in swap trading with a U.S. entity to comply with U.S. rules. Foreign regulators, particularly those in Europe, have strenuously objected to such an approach. For their part, U.S. banks have objected to extraterritoriality, believing they would be placed at a competitive disadvantage.

In July 2013, the Commodities Futures Trading Commission agreed to phase in new rules and to create a process that could ultimately allow foreign banks to comply with home-country rules rather than the commission's. With luck, this will allow for the smooth operation of global derivatives markets going forward. Much, however, will depend on whether the regulations are sufficiently synchronized across jurisdictions to limit opportunities for regulatory arbitrage.

EU-related derivatives activity is also undergoing change – albeit at a slower pace – through the Review of the Markets in Financial Instruments Directive and the European Market Infrastructure Regulation. Europe's choice of reforms will have an important bearing on the future of non-exchange-traded derivatives, since nearly two-thirds of such global transactions have taken place there. The success of all derivatives in contributing to economic growth will depend greatly on the ability of regulators and policymakers to foster more-transparent, liquid markets that can withstand stress. For end users, the litmus test will be their ability to generate competitive returns while effectively hedging risks. M

The Dollar Trap

BY ESWAR PRASAD

Eswar Prasad, the author of *The Dollar Trap*,* which is excerpted in the following pages, possesses one of those résumés that would make a mom proud. He's been chief of the financial studies division of the IMF's research department and, before that, headed the IMF's China division. Currently, he occupies distinguished chairs at both Cornell and the Brookings Institution. ¶ Probably most relevant here, Prasad is the rare economist with a sophisticated understanding of how the world (as opposed to the mathematical models of the world) really works. And he writes about it in ways that folks lacking PhDs can understand. We've excerpted Prasad's thoughts about the future role of China's currency in global finance and (a not unrelated issue) the prospects for a major dive by the U.S. dollar. His conclusions, I suspect, will surprise even readers who are well-versed in international finance. — *Peter Passell*

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Promoting the Chinese currency's international role is tied up with many complex domestic and geopolitical considerations. As with all of its policies, China is working toward multiple objectives.

Although there may not be a grand strategic plan guiding specific actions taken by the government to promote the renminbi's prominence, remarkably, the component parts all point to a slow but consistent degree of progress on each objective.

Chinese government officials have been far less prone to unbridled enthusiasm about the renminbi's prospects than are many commentators outside China. These officials recognize that the currency's increasingly prominent role is a mixed blessing. In the short run, it could increase the demand for the renminbi and intensify appreciation pressures on the currency. Although these pressures would be unwelcome, there is a broader but subtler motivation behind the concept of making the renminbi a global reserve currency. In an article published in *The Wall Street Journal* in February 2012, I wrote:

> An intriguing possibility is that we are seeing a Trojan horse strategy in play – reform-minded policymakers using the goal of making the yuan [aka the renminbi] a global currency to promote much-needed domestic reforms to improve the balance and sustainability of China's growth. Uniting the country's citizens behind this nationalistic objective would build popular support for reforms needed to make it a reality – a better banking system, broader financial markets, a more flexible currency and other reforms.

The idea that a great economic power should have a currency to match its clout in other economic dimensions is certainly an appealing one. A convergence of popular sentiment within China around this idea could have beneficial effects for the broader agenda that reform-minded officials have sought to push forward. Conversations with reformers in the Chinese government indicate that they clearly understand the domestic dynamics at play, but are careful not to overexpose or overplay their hand, preferring to nudge rather than aggressively push forward the renminbi's internationalization.

The renminbi's prospects as a global currency will ultimately be shaped by broader domestic policies, especially those related to financial market development, exchange rate flexibility and capital account liberalization. Capital account liberalization could have broader benefits. For instance, an open capital account would catalyze progress toward China's objective of making Shanghai an international financial center. The various policy reforms that are needed to support the international role of the renminbi could thus create significant changes in China's economy and the patterns of its capital inflows and outflows.

To support its broader international ambitions without waiting for domestic policy to

catch up, China will continue promoting the international use of the renminbi by employing Hong Kong as a platform. Hong Kong's fear is that its fate may be that of a discarded lover when Beijing determines that its own financial markets are finally strong enough to allow for a more open capital account. Promotion of Shanghai as an international financial center would then take precedence and could hurt Hong Kong, especially if the territory has become highly dependent on renminbi business by then.

While using Hong Kong as the main staging ground for the internationalization of the renminbi, the Chinese government is also working to promote competition among financial centers eager to do renminbi business. Regional and international financial centers from Bangkok to Singapore to London to Tokyo are all being baited with small doses of opportunities to engage in renminbi transactions. This competition is useful for Beijing to be able to continue its program of internationalizing the renminbi without the usual prerequisite of opening its capital account and providing more renminbi liquidity. What keeps the various financial centers in Beijing's thrall is, of course, the possibility that renminbi business will expand sharply one day, when China finally opens its capital account. Every one of these financial centers wants to be well positioned when that day comes.

The approach Beijing has taken toward capital account liberalization fits in with the government's broader objectives. Rather than ceding too much ground to the private sector, the government continues to play an important role in capital outflows, through its sovereign wealth fund, state-owned banks and state enterprises. Their investments are consistent with China's broader economic and geopolitical goals, including acquiring advanced technology and increasing the country's sphere of influence around the world – especially in developing economies.

Given its size and clout, China is adopting a unique approach to the renminbi's role in the global monetary system. As with virtually all other major reforms, China is striking out on its own path to a more open capital account. This strategy is likely to involve removing explicit controls while retaining "soft"

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control over inflows and outflows through administrative measures, such as registration and reporting requirements. Within the next few years, China will have a far more open capital account than it does today, but one with numerous administrative controls and regulations still in place. This approach will allow the renminbi to play an increasingly significant role in global trade and finance, but in a manner that allows the government to retain some control over capital flows.

An interesting issue is whether there is a policy goal short of full capital account convertibility that provides a better benefit/risk trade-off. Joseph Yam, the former head of the Hong Kong Monetary Authority, has been actively engaged in advising the Chinese government on these issues. In an influential paper, Yam argued that the long-term objective for China ought to be full convertibility, which he defines as relaxation of capital controls, but with some administrative controls for regulatory purposes. He draws a careful distinction between this regime and one with entirely unfettered capital flows, referred to as "free capital account convertibility." This is a subtle but important distinction that has resonated well with the Chinese leadership, given that full convertibility by this definition provides a path to an open capital account without entirely ceding control to market forces.

THE IMPACT ON THE WORLD

Yi Gang, the deputy governor of the People's Bank of China [the central bank], has clearly articulated how China sees the renminbi internationalization project as a gradual process that is tied to other aspects of China's own development:

> Whether the pace of the internationalization is a little bit quicker or slower, it is always and completely the choice of the market. I would be actually pleased to see people have more confidence in the renminbi and choose it over other currencies thanks to a more sophisticated market, better implementation of China's monetary policy, China's macroeconomic stability and social stability, and stronger rule of law.

In other words, China is in no hurry and will make progress on the internationalization of the renminbi at a pace and manner of its choosing. Yi's carefully chosen words also signal a clear understanding that internationalization is not an end in itself and must proceed in tandem with other aspects of domestic financial and institutional development.

Even with only gradual financial market development, my prediction is that the renminbi will be included in the basket of currencies that constitute the IMF's SDR [special drawing rights, a sort of supermoney used to settle accounts among central banks] basket within the next three to five years. The IMF needs China a lot more than China needs the IMF and the prospect of the renminbi's inclusion in the SDR basket could be seen as a way for the IMF – and the international community that it represents – to exercise leverage over China in internalizing the global repercussions of its domestic policies.

The idea is that this leverage would come from a sense of moral obligation among China's leadership to pay more heed to the interests of the rest of the world if the elevation of the renminbi to the SDR basket signified the acceptance of China as a great economic power. Perhaps fear of this leverage is why, after putting the subject on the table, Chinese officials have been rather more circumspect in pushing for an expansion of the SDR basket and have tried to bring other emerging-market currencies into the discussion as well.

Although China's rapidly growing economy and its dynamism are enormous advantages that will help promote the international

use of its currency, China's low level of financial market development is a major constraint on the likelihood of the renminbi attaining reserve currency status. Moreover, in the absence of an open capital account and convertibility of the currency, it is unlikely that the renminbi will become a prominent reserve currency, let alone challenge the dollar's status as the leading one. A huge gulf still exists between China and the U.S. in the availability of safe and liquid assets, such as government bonds. The depth, breadth and liquidity of U.S. financial markets will serve as a potent buffer against threats to the dollar's preeminent status. I anticipate that the renminbi will become a competitive reserve currency within the next decade, eroding but not displacing the dollar's dominance.

Could the dollar hit a tipping point and sink?

In 1987, Per Bak, Chao Tang and Kurt Wiesenfeld published a paper in *Physical Review Letters* on self-organized criticality in nature. In their model, a system is spontaneously attracted to its critical state and, once it reaches this state, the effects of small changes become unpredictable. A good example is a sand pile on which grains of sand are being sprinkled in no specific order. Once it has reached its critical state, one more grain of sand either has no effect or causes large avalanches that could lead to the collapse of the entire pile.

The principle is quite different from that of phase transitions, where the critical point is attained by precisely tuning a particular parameter. For instance, there are specific combinations of pressure and temperature points at which water turns into ice or into steam. These are big but predictable changes, and to some extent can be controlled. The insight in the pathbreaking paper was the discovery of a mechanism by which complexity could emerge spontaneously from simple local interactions, without requiring careful fine-tuning of any parameters of the system.

To an ant on the sand pile, the system looks as stable after it has reached its critical state, even just before the pile collapses. The challenging question for those of us on the sand pile that is the global monetary system is whether it is already in a critical state, vulnerable to collapse at the slightest tremor.

There are some ominous signs. The macroeconomic data paint a sobering picture of worsening public debt dynamics and a sharply rising public debt burden in advanced economies, along with a high level of dependence on foreign investors in search of a safe haven in the case of the U.S. These economies have had the benefit of being able to issue sovereign debt in their own currencies, in effect allowing them to transfer currency risk to the foreign purchasers of their sovereign debt.

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Advanced economies have not been subject to "original sin" (being able to issue debt only in foreign currencies), but their accumulated sins might eventually catch up with them. With low levels of population growth, rapidly aging populations and rising costs of health care and other entitlement programs, the U.S. and other advanced economies could be in far worse shape beyond this decade if they do not bring their public finances under control.

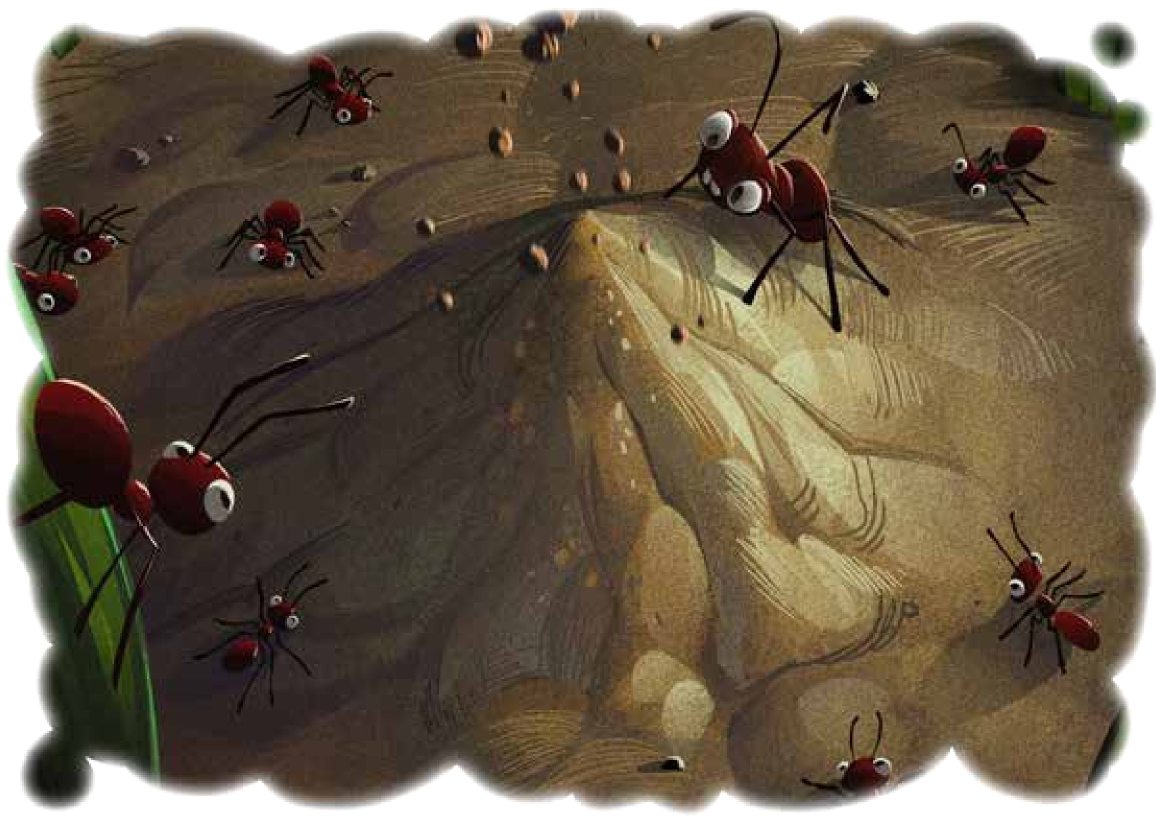
High and rising public debt levels among advanced economies pose serious risks to global stability. At present, there is strong demand for government bonds of the reserve currency economies, but this is a fragile equilibrium. As demonstrated by recent events in the euro zone, bond investors – both domestic and foreign – can quickly turn against a weak country with high debt levels, leaving the country little breathing room on fiscal tightening and eventually precipitating a crisis.

The U.S. is large, special and central to global finance, but the tolerance of bond investors may have its limits. If so, where are the limits?

RESEARCH ON TIPPING POINTS: HANDLE WITH CARE

Based on their extensive research on debt crises, Carmen Reinhart and Kenneth Rogoff of Harvard University suggest that once public debt exceeds 90 percent of GDP, additional accumulation is associated with lower growth. Gross public debt in the U.S. is now over 100 percent of GDP, which puts the U.S. in the growth danger zone based on this criterion.

In their academic writings, Reinhart and Rogoff were careful to point out that they had only detected a correlation, not a causal relationship between high debt and growth. But these subtleties became blurred in translation to the world of public policy. The research



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proved influential during the fiscal austerity debates in the U.S. and Europe. It has subsequently come under fire, partly on account of some conceptual and data issues, and partly because some policymakers and technocrats have used these findings to argue for fiscal austerity on the grounds that high debt levels cause lower growth. Still, these findings cannot entirely be dismissed, as other researchers have also found that high levels of government debt are associated with lower growth.

But even taken at face value, this research does not support the notion of a tipping point for the level of debt, beyond which bond markets would force the borrowing costs on public debt to increase sharply and threaten a country's solvency. Other recent research that directly tackles the question of whether there is such a tipping point suggests that countries with public debt above 80 percent of GDP and persistent current account deficits are vulnerable. This could happen if investors get nervous about the level of debt, pushing up interest rates and making the debt problems more severe.

It certainly has not been a problem for the U.S., even though all the danger signs identified by such researchers are flashing red. Whether this benign outcome is simply an artifact of the unconventional monetary policy actions of the Federal Reserve, which have included directly purchasing large quantities of government bonds and holding down long-term interest rates, remains to be seen.

The high level of U.S. debt, implying a large pool of debt securities, as well as the stability and liquidity of its government bond markets, give the U.S. a tremendous advantage. But a tipping point could come if investors lose faith in the ability of the U.S. to honor its debt obligations without resorting to inflation. This does not mean that the U.S. will actually have to pay off its stock of outstanding debt, but the ability to roll over that debt will shrink as the level of debt rises.

For now, foreign investors are locked into U.S. debt, but that could change as other economies' financial markets, especially those of emerging market economies, develop and offer a broader range of "safe assets." That nothing catastrophic has happened in U.S. debt markets so far despite rising debt levels is not, or ought not to be, much cause for complacency.

Although this logic is compelling, the reality appears quite different. The available evidence, in fact, suggests that there are more reasons to be sanguine than concerned. It is also possible that the research showing a correlation between higher levels of public debt and lower growth is less relevant for the U.S. than other economies, given the strong demand for safe assets and large official capital outflows from emerging markets.

So, is the dollar immune from a precipitous fall? History tells us that crises have a way of sneaking up on financial markets. One important lesson from past crises is that if something looks too good or too strange to last, it probably won't. More often than not, the longer the inevitable is postponed, the greater the likelihood that there will be an explosive burst rather than a painful but smaller pop.

What could trigger a tipping point that sends U.S. bond prices tumbling? There are many wild cards, with most of them seen as low probability events. However, the global financial crisis should have made it clear that "black swans" are not just figments of the imagination but represent real risks of ignoring very low probability but extremely disruptive events.

A RED WILD CARD

Take one potential tipping factor: China. Among foreign purchasers of U.S. Treasury bonds, China has been a force to reckon with.

Its reported purchases of U.S. Treasuries over the period 2008-12 amounted to about $750 billion, nearly a quarter of overall foreign investors' purchases of $3.2 trillion. During this period, rumors that China might be taking steps to increase the currency diversification of its foreign exchange reserves and shift away from the dollar were enough to cause tremors in currency markets. Even before that, the pronouncements of Chinese officials were being sifted carefully for evidence about China's intentions concerning its dollar reserves.

Yu Yongding, an Oxford-educated Chinese economist, has been on the front lines of advocacy for greater liberalization of China's exchange rate. He was an academic member of the PBC's monetary policy committee from 2004 to 2006, a period in which he made waves by pushing for further liberalization. On November 25, 2004, he was at an event in Shanghai, where he was quoted as saying that China had taken steps to reduce its holdings of U.S. Treasuries. Right after his speech was reported, the dollar fell against other major currencies. The next day, following reports that Yu said he had been misquoted, the dollar was back up.

Although it is hard to know what drives currency movements day to day, these and other widely reported episodes of Chinese officials' statements rattling currency markets indicate how fragile sentiments in markets are.

Would China consider the use of its holdings of Treasuries as a weapon against the U.S.? In the Q&A posted on its Web site in 2011, China's State Administration of Foreign Exchange attempts to be clear that its investment decisions will be based only on rational economic factors and that its reserves will not be used as a weapon of international diplomacy:

> Q: Will China use its foreign exchange reserves as a trump card or as an atomic weapon?
>
> A: We have always emphasized our role as a responsible long-term investor. During the investment and operations of our foreign exchange reserves, we will strictly follow the rules of the market and the laws and regulations of the country concerned … we will use the reserves as a financial investor and will not seek control over those investments … we will actively cooperate with those countries that welcome our investment. But if any country is doubtful, we will slow down and try to reach agreement through communications. As has been proven by the facts, the above concerns and worries are completely ungrounded.

Perhaps this response is meant more as a reassurance to the rest of the world rather than to Chinese citizens. The conventional wisdom is that China would be playing with fire if it tried to dump a significant portion of its dollar reserves. Attempting to sell even 10 percent of its reported holdings of U.S. Treasuries, which would amount to at least $130 billion, would probably be enough to set off panic in bond and currency markets.

In ordinary circumstances, this amount would not be large enough to create tremors in such a deep and liquid market. But these are not normal times. With bond investors already nervous about the high and rising level of U.S. debt, such an action could act as a trigger around which negative market sentiments coalesce, especially if China's actions were seen as presaging similar moves by other foreign central banks.

The cost of U.S. government borrowing would rise, and the dollar would fall, which would certainly hurt the U.S. But China would hardly be immune and would itself stand to lose a lot. A fall in Treasury bond prices would result in a substantial drop in the capital value of China's existing holdings of U.S. government bonds. Moreover, if the dollar depreciated against the renminbi, then the value of those bonds denominated in renminbi would fall even more – in short, a bad deal for China in many respects.

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It is also not easy to envision what China could do with the money if it pulled significant sums out of U.S. Treasury bonds. Its sovereign wealth fund has enough challenges on its hands trying to find good investments, the gold market remains small and other global bond markets simply do not have the capacity to absorb hundreds of billions of dollars.

This suggests that China cannot credibly threaten to disrupt U.S. financial markets without shooting itself in the foot. The logic is correct in purely economic terms. But politics sometimes overrides economics, and that may be the true wild card.

WHEN GEOPOLITICS TRUMPS ECONOMIC INTEREST

In early 2008, China cracked down hard on rioters in Tibet. These actions had a palpable effect on Taiwan's presidential election cam-

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paign, which was heading into its critical phase. Before the riots in Tibet, a victory for Taiwan's Kuomintang party candidate Ma Ying-jeou, who favored stronger linkages with Beijing, looked like a sure bet. But the events in Tibet shifted momentum toward Frank Hsieh, the candidate of Taiwan's ruling Democratic Progressive Party, which preferred a harder line toward Beijing. As China made it clear that it was not happy with the way things were going, the U.S. dispatched two aircraft carriers for joint military exercises with Taiwan, further inflaming tensions in the region.

I made a trip to Beijing in March 2008 while these tensions were brewing. This was a few months before the city was to host the Olympic Games. China clearly viewed the Olympics as an opportunity to show the world that it had definitively established itself as a major sporting, economic and political power. Beijing was being spruced up and its grimier side was being sanitized, so no signs of poverty or disorder would be allowed to besmirch the reputation of a great power. Plans were even afoot to limit traffic on the streets and get factories around Beijing to shut down for a short period before the games started in order to alleviate concerns about pollution.

Clearly, the games were a big deal, and no expense or effort was going to be spared to ensure their success. Imagine, then, my surprise when, at virtually every meeting with senior officials during that visit, the one theme that inevitably came up was Taiwan.

They made it clear that if Taiwan were to make any move to exert freedom from the mainland, China would have no choice but to intervene by force. They dismissed as being of

little consequence any threat that military intervention could invite a boycott of the Olympics by certain countries, such as the U.S. The subtext was that national pride and sovereignty were far more important than any damage to China's moment in the sun as the host of the Olympics.

This is consistent with a pattern that China has demonstrated in its past actions, making it clear that it puts territorial sanctity above other political and economic considerations. A more recent example of this is the dispute with Japan over a string of barren islands in the East China Sea, referred to by China as the Diaoyu Islands and by Japan as the Senkaku Islands.

These uninhabited islands are claimed by China, Japan and Taiwan. The islands have no intrinsic value, but are strategically valuable because they are close to key shipping lanes and fishing grounds, and there is also the prospect of oil reserves nearby. In September 2012, the Japanese government purchased three of the disputed islands from their private owner. The objective was ostensibly to prevent the owner or others from using the islands for nationalistic expressions that would inflame tensions with China. But it had the opposite effect.

The Chinese saw the purchase as a provocative move by Japan to reinforce its territorial claim. Official condemnations from Beijing followed swiftly, along with street protests in many cities around China. Cars made by Japanese automakers were burned or smashed on the streets of many Chinese cities, and many Japanese manufacturers temporarily shut down their factories in China to avoid further damage.

China clearly did not feel the need to be subtle or nuanced in showing its displeasure about the escalation of the territorial dispute with Japan. In October 2012, as Japan was preparing to host the prestigious IMF-World Bank annual meetings in Tokyo, Chinese banks started pulling out of events they had sponsored. At the last minute, China's senior officials also boycotted the meetings, which featured the senior-most officials – finance ministers and central bank governors – from practically every other country in the world.

China's finance minister and central bank governor were conspicuous by their absence from the meetings. PBC Governor Zhou Xiaochuan had been slated to give the prestigious Per Jacobsson lecture on the last day of the meetings. His lecture was instead read out by another Chinese official.

China's actions were obviously intended as a slap in Japan's face at a time when Tokyo was hoping to showcase its economic restoration after the March 2011 Sendai earthquake and tsunami. Chinese officials' no-show became one of the big stories of the meetings, which was certainly not what the hosts had hoped for.

An article published in *China Daily*, an official newspaper, summed up China's views on the matter. It laid out the official view that China did not see the island purchase as a matter of negotiation but as a land grab by Japan that needed to be beaten back:

> China has used its diplomatic channels to make it clear to the international community that it wants to resolve the Diaoyu Islands dispute with Japan through diplomatic negotiations. China's State leaders, the Ministry of Foreign Affairs and other government agencies and civil organizations have declared time and again that the so-called nationalization of the Diaoyu Islands by Japan is illegal and China will "make no concession" on issues concerning its sovereignty and territorial integrity.

The article then went on to make it clear, in case there were remaining doubts, that China's actions, such as senior officials' boycott of the IMF-World Bank meetings, were

intended to convey the government's displeasure with Japan's stance on the matter:

> China has not only canceled many activities to commemorate the 40th anniversary of the normalization of its diplomatic relations with Japan and called off high-level governmental and military reciprocal visits, but also boycotted a series of international conferences and cultural activities in Japan, showing its determination to safeguard national sovereignty and territory.

The takeaway from these episodes is that, in line with a pattern demonstrated by its past actions, China is raising the stakes on geopolitical maneuvering. For the Chinese Communist Party, maintaining legitimacy is a tricky balance between delivering economic growth and stoking nationalistic pride. Given its unwillingness to entertain any serious moves toward an open democracy, unleashing nationalistic sentiments provides a safety valve for social restiveness. Perhaps one ought to be cautious about dismissing as impossible a situation in which, even at a short-term economic cost to itself, China might be willing to put the U.S. through the economic wringer.

HOW BIG WOULD THE DISRUPTION BE?

The credibility of any threat to dump U.S. Treasury bonds depends on how disruptive such a move would be to those bond markets. Estimates by researchers at the Federal Reserve suggest that a decline in foreign official inflows into U.S. Treasuries of about $100 billion in a given month could push up five-year Treasury bond yields by about 40-60 basis points (100 basis points = one percentage point). But such an increase in bond yields would also be likely to pull in more foreign investors, dampening some of the initial rise and reducing the effect to about 20 basis points.

In principle, these numbers suggest that it would take a big shift in foreign official inflows to raise interest rates by a full percentage point. It should be noted that the estimates are based on the effects of foreign inflows on Treasury bond yields in normal times, as the researchers' data set ends in 2007 and excludes the crisis period. With the financial crisis fresh in investors' minds, a significant shift in patterns of official inflows could have unpredictable effects on other investors and on bond markets. A big move away from U.S. Treasuries by the central banks of China and other emerging markets could spook private investors as well and set off more panic. This is uncharted territory, however, and any predictions about how investors will behave at a time of enormous stress in financial markets may have little to do with patterns of behavior in normal times.

Extrapolating from some aspects of what happened during the financial crisis, one cannot rule out the alternative possibility that turmoil in U.S. bond markets could spill over into even greater turmoil in other financial markets. The latter would eventually drive more money into U.S. bond markets on account of the safe-haven effect, thereby more than offsetting the initial rise in bond yields.

Moreover, the Fed has left little doubt that it would step in and take extreme measures when necessary to stabilize the U.S. financial system. The Fed could easily mop up any debt sold by foreign official investors, given its demonstrated willingness to expand its balance sheet by buying Treasury bonds when it deems such a step to be necessary. This willingness substantially reduces the credibility of any foreign government's threat to destabilize U.S. bond markets by dumping even a portion of its holdings of those bonds.

In a report to Congress in July 2012, the U.S. Department of Defense examined the national security risks to the U.S. that China's ownership of U.S. debt posed. The conclusion

of the report was relatively sanguine:

> Attempting to use U.S. Treasury securities as a coercive tool would have limited effect and likely would do more harm to China than to the United States. As the threat is not credible and the effect would be limited even if carried out, it does not offer China deterrence options, whether in the diplomatic, military or economic realms, and this would remain true both in peacetime and in scenarios of crisis or war.

The United States apparently does not view China's holdings of U.S. debt as a threat or as giving the Chinese any leverage in bilateral negotiations.

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THE RISK OF AN "OWN GOAL"

The U.S. Treasury bond market is vulnerable enough that one does not necessarily need to count on external agents to bring things to a tipping point. Even domestic investors may at some point start to have second thoughts about relying on U.S. Treasury bonds for safety, or at least start demanding higher returns for investing more in those bonds. The high level of public debt is risky, because a small change in interest rates can have a large effect on debt financing costs. The U.S. Congressional Budget Office has warned that:

> A growing level of federal debt would … increase the probability of a sudden fiscal crisis, during which investors would lose confidence in the government's ability to manage its budget, and the government would thereby lose its ability to borrow at affordable rates.

With the level of debt held by the public (excluding the Fed's holdings) equivalent to three-fifths of annual GDP, a one percentage point increase across the entire spectrum of interest rates could mean an increase of about 0.60 percentage points of GDP in government expenditure on debt financing. Such increases can quickly squeeze out other discretionary government expenditures.

In practice, though, the increase in financing costs is likely to be lower, as it depends on the maturity structure of government debt – the time-profile for repayment or refinancing of that debt. Longer-term debt does not have to be refinanced as often, whereas short-term debt is more exposed to interest rate increases. The average maturity of U.S. Treasury debt had fallen steadily from a peak of 71 months in 2001 to 48 months in late 2008. This meant that the U.S. needed to refinance an amount equivalent to half its entire stock of debt roughly every two years.

After the crisis hit, even as the stock of U.S. net public debt was exploding, the maturity structure of debt was in fact turning more favorable. This happened because the U.S. Treasury wisely used to its advantage the rising global demand for longer-term bonds. By June 2013, the average maturity had risen to 66 months, well above the average of 58 months for 1980-2010.

Part of the increase was accounted for by the Fed's purchases of Treasury notes and bonds (securities with a maturity of more than one year) as part of its quantitative easing operations. From the end of 2008 to June 2013, the level of outstanding Treasury bonds and notes held by the public (including the Fed) rose by $5.5 trillion. Fed purchases of these securities accounted for $1.4 trillion or roughly one quarter of this increase. Thus, the increase in the average maturity of debt

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held by private investors is somewhat smaller. Nevertheless, the increase in the average maturity of Treasury debt provides a layer of security, as a rise in interest rates will not immediately feed through into a proportionate increase in debt financing costs.

Still, the sheer volume of debt, the expected trajectory of future debt, and the prospect that market turmoil could lead to a sharp spike in rates leaves little room for comfort. The amount of expected future accumulation of debt is enormous. The U.S. Office of Management and Budget forecasts that net borrowing from the public will amount to more than $4 trillion over 2013-17 and an additional $3 trillion or more over the following five years.

MIXED SIGNALS

A complex balance of forces is at play in the market for U.S. Treasury debt. An increase in bond yields for the right reasons – a recovery in economic activity, a tighter labor market and a modest increase in expectations of wage and price inflation – would not be such a bad thing. Interest rates typically rise and fall along with the business cycle, so higher bond yields relative to those that prevailed in 2012 and through the summer of 2013 would signal a return to normalcy. It could create the right incentives for fixed-income investors to come back into the bond market for the traditional reasons – the prospect of earning a modest rate of return with little risk.

Their reappearance would be healthier than the force that is now driving investors into that market: the willingness to accept practically a zero rate of return to minimize risk in a highly volatile environment. In contrast, an increase in bond yields attributable to rising concerns about the level of debt and a possible surge in inflation without a strong recovery would be harmful. It could quickly spin out of control as investors rush for the exits. The trouble is that these two outcomes are observationally equivalent in the short run, and investors who are unable to tell them apart could mistake one for the other, setting off a panic-driven dumping of U.S. Treasury bonds and dollars.

Still, it is not easy to envision a scenario in which the dollar comes crashing down. Indeed, one small and somewhat dubious source of comfort is that such a situation of panic might again be self-correcting. Individual investors could find small supplies of other high-quality assets, such as investment-grade corporate paper, to shift their savings into. But larger institutional investors, and the market as a whole, simply lack viable alternatives either in the U.S. or abroad. Thus, in yet another irony, the panic set off by such an event would simply lead to money pouring back into the dollar.

A BLAST FROM THE PAST

Although the dollar has been at the center of the international monetary system for decades, it has come under threat on many occasions in the past, and there have been times when the U.S. needed financing from abroad to support the dollar's external value. Those episodes might seem to provide an object lesson on how a dollar crisis might unfold. Instead, they actually illustrate how sticky the dollar trap is.

In 1961, when the international monetary system was still on the gold standard, there were concerns that the dollar was vulnerable to a run by countries that wanted to convert their dollar holdings into gold. Many foreign central banks had built up large holdings of dollars, well beyond the levels needed to ensure their own currencies' convertibility into dollars. U.S. gold stocks, which in 1950 were enough to cover foreign central banks' dollar holdings

many times over, had fallen by 1960 to a level barely sufficient to cover those holdings.

Robert Roosa, then the undersecretary for monetary affairs at the U.S. Treasury, went on the offensive on multiple fronts to protect the dollar's primacy in the international monetary system. He pushed for the creation of a "gold pool," a mechanism for merging gold reserves of major central banks to thwart speculation, helped create a new lending facility at the IMF called the General Arrangements to Borrow, and jawboned current-account surplus countries like Germany and Japan to stimulate their economies to boost domestic demand.

The final arrow in his quiver was the creation of what came to be called "Roosa bonds." These were non-negotiable U.S. government bonds denominated in foreign currencies that were sold to foreign central banks. The bonds transformed a portion of dollar holdings of foreign central banks into longer-term debt that was protected from a fall in the dollar's value, and were therefore designed to slow the conversion of foreign dollar holdings into gold. The bonds could be redeemed whenever their holders chose.

Some central banks were reluctant to buy Roosa bonds. But for others, these bonds made it easier to justify their large dollar holdings. From 1962 to 1974, the U.S. issued $4.7 billion worth of Roosa bonds, which were purchased by the central banks of Austria, Belgium, Germany, Italy, the Netherlands and Switzerland.

Roosa bonds and currency swap lines that existed in the 1960s have been characterized as "bribes" in the form of a portfolio substitute for gold offered by the U.S. to other central banks. These facilities have served as a substitute for conversion of dollars into gold at times of crises.

Such measures taken by the U.S. Treasury and Fed were designed to stabilize the international monetary system and, more importantly, to maintain the dollar's primacy. And it is worth noting how other countries reluctantly but eventually fell in line with these plans, as a precipitous fall in the dollar's value would have hurt them as well by causing turmoil in global financial markets.

That would not be the only time in recent history when the U.S. issued government bonds denominated in foreign currencies. In the fall of 1978, there were growing concerns about weak U.S. macroeconomic policies, with inflation rising rapidly. Currency markets were in disarray, with the U.S. dollar under severe downward pressure and falling against other currencies, including the German deutsche mark and the Japanese yen. On November 1 of that year, the Carter Administration announced a multipronged dollar defense package.

The package included a sharp, one percentage point increase in the main policy interest rate (the Fed's discount rate) and a $30 billion package of foreign currency resources to facilitate exchange market intervention. The $30 billion comprised $15 billion in currency swaps with foreign central banks, $5 billion from the IMF and up to $10 billion in "Carter bonds." These bonds were to be denominated in foreign currencies (à la Roosa), so the U.S. Treasury was encouraging foreign central banks to buy the bonds by taking upon itself the currency risk that would arise from a falling dollar. Their issuance could also be seen as signaling a commitment by the U.S. to take necessary steps to support the dollar's external value.

By January 1980, the U.S. had issued about $6.5 billion of Treasury securities denominated in deutsche marks and Swiss francs. The dollar defense package was an impressive one. Because it was backed up by strong monetary and other macroeconomic policy

changes, it proved effective. The package quickly stabilized the dollar's value, and the dollar even rose in subsequent years, earning a tidy profit for the U.S. government when it retired the Carter bonds fully in July 1983.

OBAMA BONDS?

In principle, the U.S. could issue similar instruments now if global demand for dollar-denominated assets were to decline and the economy needed financing for its large current account deficits. This action might temporarily prop up the value of the dollar, which would otherwise have to decline to bring down the current account deficit. Of course, the U.S. government would be unlikely to take such an action at a time when it has been trying to guide the value of the dollar downward to boost exports. After all, the whole point of the ongoing currency wars is that other countries are doing all they can to prevent their own currencies from appreciating against the dollar, as that would hurt their export competitiveness.

Either way, the U.S. would be in a favorable position, even if it did issue such bonds. If the dollar stayed strong, the U.S. would continue getting cheap funding from foreign countries. If the dollar fell in value and U.S. inflation rose, the country would face a loss on its new foreign currency bonds – but would foist on foreign central banks and other foreign investors an even larger loss on the enormous stock of dollar-denominated assets that they already hold. In short, any drastic changes to the dollar-centric system would be a lose-lose proposition for foreign countries, strongly favoring the perpetuation of the status quo.

* * *

One legacy of the global financial crisis is the stripping away of the veneer of safety in a broad class of other financial assets, even as it has created greater demand for safe assets. So even if the world recognizes it is on an unstable sand pile, its only option seems to be to try to reinforce the foundations of that sand pile to avoid being hurt by its collapse. M

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INSTITUTE VIEW

BY GLENN YAGO

With per capita income doubling in the last two decades (to New Zealand's level), the Israeli economy seems to be doing everything right. Well, almost everything. With investment opportunities galore, Israel should be attracting a lot of foreign capital and growing even faster.

Instead, foreign portfolio investment is flowing out of the country, dimming Israel's potential to move from a "startup" to a "scale-up" nation and slowing its attainment of the prosperity enjoyed by the most productive Western economies.

Israel now captures only a small portion – often limited to high-end R&D – of the global technology value chain. Although the country is known for innovation in a number of fields including software, medical devices and agriculture, its startups have been less successful at commercialization. Israeli venture capital and private equity are highly concentrated in the early stages of business development (80 percent versus 52 percent in the United States), with little available for later-stage growth. Yet the late stage is when the impact of a company's evolution is most crucial. All too often, Israeli firms are going to market before they get to the product-development stage, at which they would attract much higher valuations.

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Those searching for explanations point to very low securities liquidity. Indeed, the pace of turnover on the Tel Aviv Stock Exchange is dismal; it ranks 30th in turnover ratio among developed-country exchanges. IPOs at home are thus not an option for most Israeli firms. As a result, 95 percent of the country's successful startups are sold to foreign entities through mergers or acquisitions. As Israeli firms move to more liquid climes, their delisting from the Tel Aviv exchange is costing the markets billions of shekels in investment opportunities that could drive growth.

But illiquidity is more a symptom of the malaise than a cause. At the root of the problem is excessive market concentration in a number of sectors – and a resulting lack of competition – that emerged from the privatizations of the 1990s and the growth of business conglomerates. The numbers are chilling. Just 24 major business groups control 136 out of 596 listed companies and approximately 68 percent of total stock market capitalization. The combined market cap of the 10 largest business groups alone amounts to more than 40 percent of the aggregate capitalization. The five largest business groups hold assets equal to approximately 60 percent of Israel's annual GDP.

Indeed, concerns about concentration and its negative impact on competition have led to government initiatives that aim to separate industrial holdings from financial holdings. Thus, for example, a holding company or private equity firm would be prohibited from controlling a large financial services provider. Enabling laws to force de-concentration and de-conglomeration passed the Knesset 73-0.

What's needed now is a true reinvention of Israel's capital markets, an application of old-fashioned regulation-mandated transparency and new-fashioned financial engineering. The clock is ticking on initiatives to increase transparency and accessibility to foreign investors requiring that:

• Firms issue annual reports in English and companies comply with international accounting standards.

• Regulators create rules and metrics comparable to those of major financial centers, making it easier to compare Israeli firms with their counterparts on other international exchanges.

• Regulators create a mechanism for firms to issue "shelf offerings" – that is, equity issuance in which the shares are released over time, rather than in a single public offering, to manage liquidity issues.

To the same end, the government (and the business community) should encourage the creation of versatile financial products, such as exchange-traded funds, that can attract foreign portfolio investors. In the major capital markets, index-based ETFs are replacing conventional mutual funds as a low-cost, highly liquid way to gain broad exposure to whole industrial sectors, geographic regions and classes of securities. Israeli ETFs constructed from index benchmarks tailored to the particularities of the opaque, tangled Israeli capital market could be designed to sell on U.S. exchanges. Other pooled investment vehicles would fit here, too, as a means of attracting foreign capital – for example, index-linked bank CDs that give fixed-income investors a taste of the equity upside.

Likewise, it would make sense to smooth the path to expanded markets in venture trusts and business development corporations. Israel could build on the examples of

the United States and Britain by developing financial products that pool investments in portfolios of smaller and mid-market firms in technology or tech-application industries. These could include financing for companies from other startup nations as well as in core technology areas by providing equity in unlisted companies through public trades in the capital markets.

Securitization could help as well. While the details probably don't belong here, suffice it to say that securitization could be used to make late-stage venture investments both liquid and transparent, and thus more attractive to foreign investors. They could be structured as

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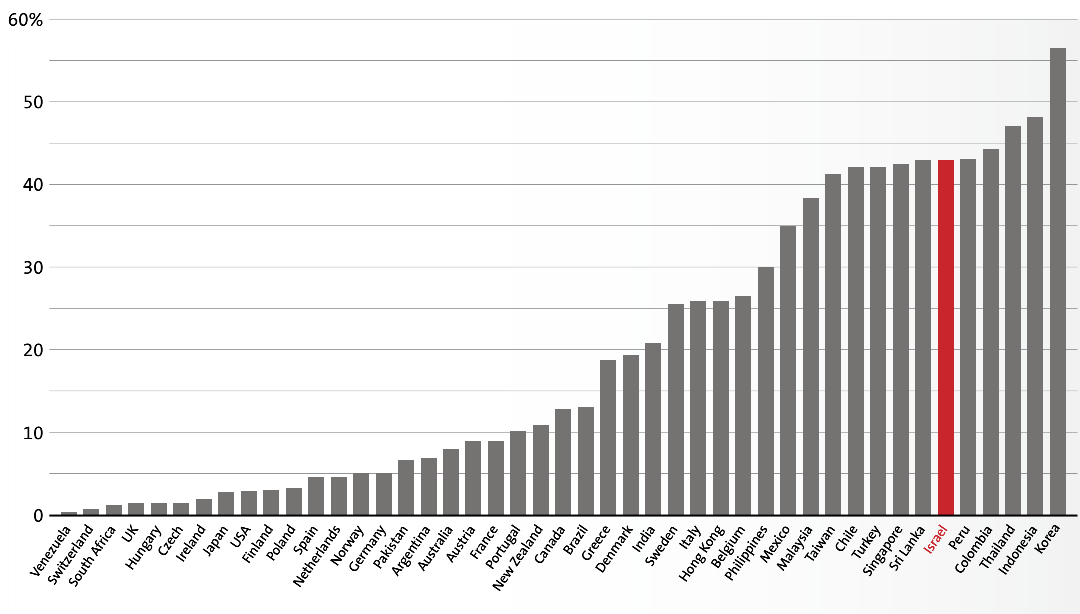
BUSINESS GROUPS' SHARE OF STOCK MARKET CAPITALIZATION, BY COUNTRY



SOURCE: The author

mutual funds with an investment mandate that focuses on a particular technology niche – cybersecurity, biomed, agri-technology, water and the like.

Actually, I may have put the cart before the horse. The first step in creating the value chain of new capital would be to bring pre-IPO companies into an institutional investor asset class. This could be done by encouraging the development of a fairly transparent, non-exchange-traded, private-shares market that was more diverse than the traditional venture capital market – one in which promising companies would have access to a global community of asset managers. This market would give startups more breathing room to develop independently. Equally important, its use would provide them with an institutional stamp of approval that would increase their credibility in an IPO or in a merger with a foreign partner.

Historically, new Israeli tech companies have used the Nasdaq exchange to float IPOs. Since the passage of the Sarbanes-Oxley Act in 2002, however, the regulatory costs of going public in the United States have risen so much that public offerings rarely make sense unless a firm's valuation is above $200 million. And that makes it all the more important to render the Tel Aviv Stock Exchange user-friendly. In fact, it gives the privately owned exchange an opportunity to extend its reach and profitability. To get from here to there, though, the exchange and its regulator, the Israel Security Authority, need to bring it up to global competitive standards.

There's no doubt that Israel has the potential to join the elite group of economies that generate much of the technology powering global growth. What's not clear, though, is the business sector's commitment to create and support the financial infrastructure needed to reach its potential. The ball's in Israel's court.

BY JOEL MOKYR

The economic history of the 20th century was nothing short of miraculous. The century experienced more technological progress in areas that truly affect material well-being than in all of previous history. Even a casual examination of the technological menus available to consumers, from lighting to dentistry and antibiotics, from laundering to musical entertainment and social interaction, confirms this.

Vaclav Smil, an eminent historian of 20th century technology at the University of Manitoba, has described what happened as the "astonishing concatenation of technical advances" creating "a new kind of civilization." He points out that most of the world's six billion people [today, more than seven billion] reside in "largely or overwhelmingly man-made rather than natural environments." Economic growth, more than ever before, was technology-driven.

Can this continue? A wave of pessimism has swept the economics profession – with many analysts concluding that the best is behind us, that the low-hanging fruits of technology have been picked and that we can no longer replicate the enormous technological successes attained during the second Industrial Revolution (1870-1914) and in the last decades of the 20th century. Some, notably my Northwestern University colleague Robert Gordon, have made this notion concrete by predicting a precipitous decline in per capita growth in the future. From a rate of about 2 percent annually in the United States in the 20th century (and similar figures for the rest of the industrialized world), we are told that in the coming decades it will be, at best, 0.5 percent – and not even that for those of us who find themselves in the "bottom 99 percent." Things look even worse in terms of productivity growth.

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One objection I have to these calculations is that computations of productivity and growth are mostly designed for very short-term comparisons – say, to measure this year's results against last year's. But the longer the period, the dicier the comparisons become, especially during an era of rapid technological

change. New products appear on the market that augment consumer welfare in ways that would have been unimaginable before, while existing products are improved in so many dimensions that it seems silly to compare them with those of a decade earlier. In how many ways is an Apple iPhone 5 "better" than a Nokia flip-phone, vintage 1995? The same is true for services: how does one compare the reliability and certainty of ordering a taxi from Uber or Gettaxi with the Hail Mary service and the long waits of phone-operated taxi companies of yore?

BITE-BACK

There is a deeper and more troubling dimension to those comparisons, though, that is worth a close look – a phenomenon that sheds a different light on the dispute between techno-pessimists and techno-optimists. The problem with technological progress is not just that we are hooked on it to raise living standards. Far more often than not, implementation initiates a journey into the unknown, with consequences that could not be foreseen at the time the innovation is introduced.

This is true almost by definition. To predict the full ramifications and fallout of every new technology, we would need a complete understanding of the forces that govern it. Yet such is rarely, if ever, the case: when pharmaceutical scientists develop a new drug, they cannot foresee all the side effects (though not for lack of trying). Indeed, most technologies developed in the 20th century had unanticipated side effects, most of them negative.

This means the social costs of new techniques (as opposed to the costs captured in market prices) are systematically underestimated. In more technical terms, some of the gains in productivity were attained through "inputs" that were either not seen as scarce or else not paid for because nobody realized they were being used at all.

Yet accurate productivity computations require subtracting all inputs from the estimated output. If we fail to do so, we underestimate the costs of production and thus overestimate the gains from innovation. Eventually, society must pay the bill, either by living with (and adjusting to) the consequences or by coming up with (often costly) fixes to

original gains were overestimated by one-third and that the full gains are not realized until the damage is repaired.

How common are such cases of unanticipated costs? Very common; indeed, it is hard to come up with examples of a major breakthrough in technology in which it was not later realized that the accompanying "creative destruction" included some of the uncreative sort. Unfortunately, correcting national income calculations to account for such effects is difficult because the exact costs of the "omitted input" are not known (and by definition are not paid for).

BITE-BACK, UP CLOSE AND PERSONAL

The mother of all omitted inputs, surely, is climate stability. We now know, as certainly as one can ever know such things, that the engine of much economic growth, the burning of fossil fuels, uses resources that were never imagined to be scarce by those who built the first coal-burning steam engines in the early 18th century: climate stability, sea-water temperature and acidity, the size of the arctic ice cover, and the surface size of the oceans.

Robert Pindyck of MIT, one of the foremost experts on the economics of climate change, has (much like Socrates) concluded that the only thing we know about it is that we do not know anything. But it's plain enough that, had we subtracted even a rough proxy of the full social cost of the energy used so profligately in the 20th century from the value of output it produced, productivity growth would have been much lower than is generally believed.

The problematic relationship between energy technology and climate change comes up in many other contexts. As the technology analyst Edward Tenner noted in his seminal 1996 book *Why Things Bite Back: Technology and the Revenge of Unintended Consequences*,

modify the technique and repair the damage.

Although formal national income accounting calculations are not exactly the stuff of great excitement, the issue here is sufficiently important to merit some emphasis. Suppose that a new technique is invented that adds 2 percent to GDP, but also suppose that this technique is later discovered to cause damage that needs to be remedied at the cost of 0.5 percent of GDP. This means that the

most of the path-breaking inventions of the 20th century have unwittingly used up some valuable resource that was not paid for because the fact of its existence (and scarcity) was only discovered much later. Chlorofluorocarbons, once used almost universally as refrigerant gases, were found to destroy a scarce resource nobody before paid any attention to: the atmosphere's ozone layer. Meanwhile, DDT, a wondrously effective insecticide discovered on the eve of World War II, proved as dangerous to two- and four-legged creatures as it was to six-legged ones.

More generally, our war on noxious critters seems to be a continuous series of forward moves followed by reverses, as rapidly multiplying organisms mutate around whatever poison we throw at them. Antibiotics, one of the most significant discoveries of all time, have a built-in bite-back mechanism: with enough exposure, bacteria mutate sufficiently to become drug-resistant. Antibiotics' ancillary benefit to agricultural productivity in the second half of the 20th century has been significant. But the cost in terms of loss of their efficacy in containing human disease must be weighed against those benefits.

It is thus now plain we have overestimated the productivity gains associated with technological change in the 20th century. The degree of overestimation depends on the costs of remedying the damage, or finding an alternative way of producing the gain. Yet, since such costs are still unknown in most areas, the calculations by Gordon and others that suggest we cannot possibly match the productivity growth of the 20th century are robbed of much of their meaning. This ignorance has been historically costly: almost three decades ago, *The Economist* magazine asked rhetorically if the internal combustion engine had from the start been charged its full environmental cost, whether it would have been adopted at all.

Why is bite-back so common? When we invent something, we know enough about the underlying science to make it work, but rarely know enough to assess all the potential side effects. This is well-recognized in pharmaceutics – hence FDA testing. But it has been equally true in the disruption of ecological systems (which are enormously complex), and in many other areas of economic activity. Like the sorcerer's apprentice, we sometimes unleash forces we do not fully understand and cannot control.

ANDERS WENNGREN

When we invent something, we know enough about the underlying science to make it work...

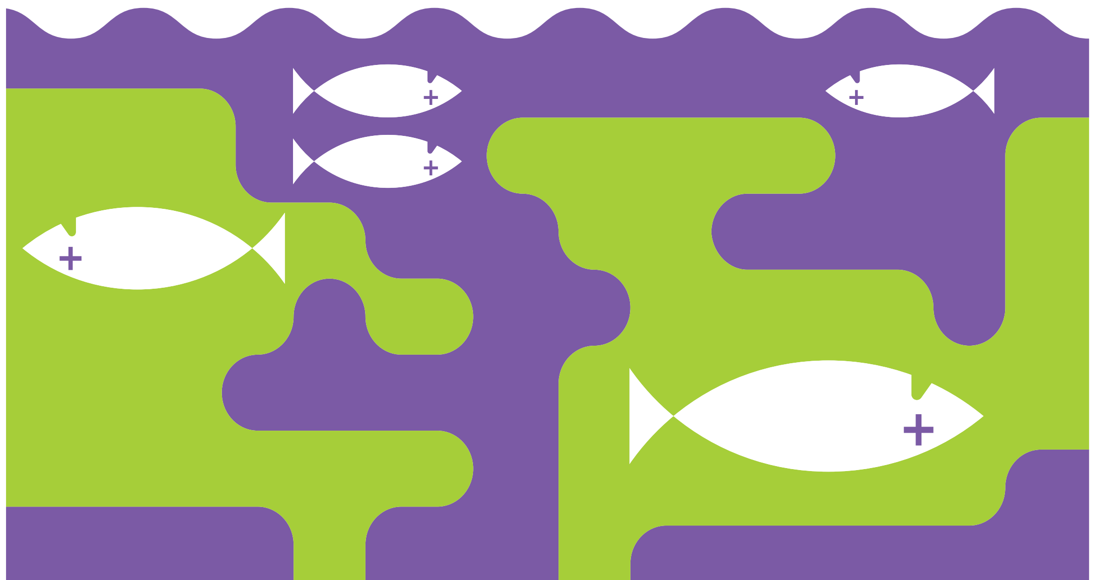
The surprising discovery of omitted inputs is particularly interesting in the case of one of the most important inventions of the 20th century, the Haber-Bosch process for making ammonia from atmospheric nitrogen. There can be no doubt that existing supplies of nitrates from mineral sources alone would not have been able to provide enough fertilizer to feed a rapidly growing humanity. By the year 2000, half the nutrients supplied by the world's crops and 40 percent of proteins can be traced to Haber-Bosch. But it was not suspected until fairly recently that the casual application of nitrates to agriculture threatened water supplies.

Fertilizer runoff has become a serious threat to both aquifers – in quantity, nitrogen fertilizer makes water non-potable – and coastal ecologies. Man-made eutrophication has led to massive algae blooms and the appearance of large "dead zones" in coastal waters. The dead zone in the Gulf of Mexico was estimated in 2011 at about 6,700 square miles, an area the size of Connecticut. The same is true for phosphorus, another essential ingredient of fertilizers (and thus plant life).

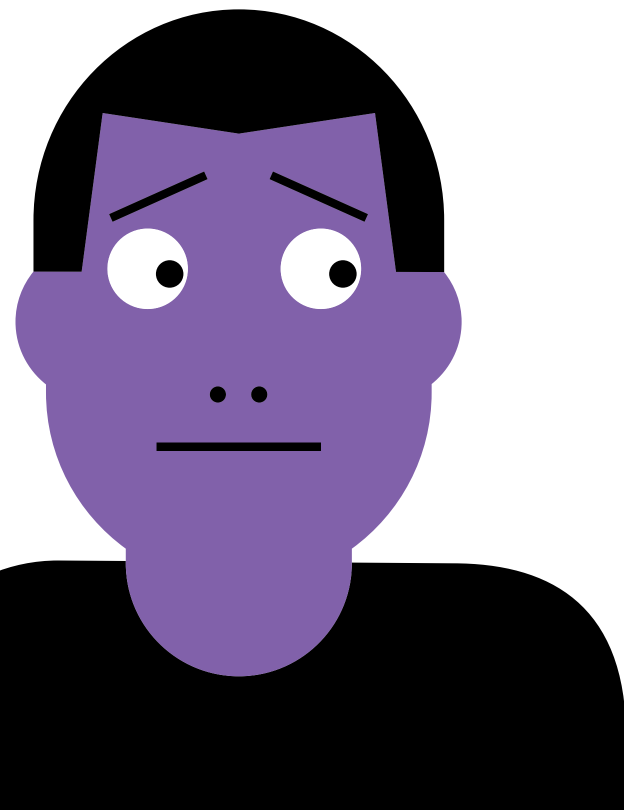
But the bite-back effects of technological progress are often much more insidious than environmental damage. Unintended consequences come from unexpected corners. The history of sugar is a case in point.

For much of human history, sugar was rare and its consumption limited to the very rich. However, cultivation of sugar cane on New World plantations and, later, the development of sugar beets that flourished in cooler climates meant that sugar became available to all. A result was a precipitous increase in tooth decay in the industrialized world. Thus, part of the added output of dentists needs to be subtracted from the national accounts because dentistry in large part was necessitated by easy access to sugar.

Quantitatively, this is, of course, a tiny effect, but the concept scales up to agricultural productivity in general. The growth of agricultural productivity since 1890 has increased



but rarely enough to assess all the potential side effects.



ANDERS WENNGREN

the consumption of calories from proteins and fat. While this was at first a desirable outcome, it eventually led to an epidemic of obesity and associated health problems.

Obesity is rarely taken into account as a negative unanticipated side effect of technological progress, but it should be. Junk food is cheap because we are very efficient at making and distributing it. Much of the population in countries in the developing world today are struggling with rising obesity, even as others must still worry about widespread malnutrition – 70 percent of all Mexicans are overweight, and a third are clinically obese. A recent study by the Overseas Development Institute estimates the number of overweight people in developing countries to be around 900 million, three times the figure in 1980.

Healing these self-inflicted wounds would be very costly; the cost thus should have been subtracted as "omitted inputs" in productivity calculations. Of course, this was not done and could not have been done. Who could have known in 1921 that adding a lead compound to gasoline to make car engines run better would lead to an enormous cost in terms of lead poisoning? Some scholars have even argued that the lead in gasoline was in part responsible for rising crime rates.

(Thomas Midgley, the General Motors chemist who developed leaded gasoline, might be described as the king of technological bite-back. He later developed Freon, the gas that was long used as a refrigerant but was later phased out because it damaged the atmosphere's ozone layer.)

The same is true for construction materials: lead-based paints and asbestos, to name

just the most obvious ones, were later discovered to cause serious health problems. Asbestos, known since antiquity (the word is derived from ancient Greek), has fascinated engineers and chemists for centuries and was widely hailed as a miracle material – one that was abundant, strong, malleable and fire-resistant and, in combination with rubber or cement, a very effective building insulator. In 1939, the New York World's Fair had an exhibit celebrating asbestos' "service to humanity." Only in the 1960s were the dangers of asbestos fully recognized. The campaign to stop its use and remove it from millions of structures has cost $50 billion in the past 20 years.

The point here should now be clear: by not adjusting productivity calculations for these bite-back effects, we make the 20th century look better than it really was and, by implication, probably make the future look worse than it will be. Only when additional advances take account of the omitted costs involved in employing new technologies will we be able to know how much they contributed to productivity.

In some cases, such as asbestos, the gain may in fact be a loss. In others, such as antibiotics, we simply need to put in a lot of effort to retain the gains we have already made. Leaded gasoline turned out to be easy to fix. Ocean acidity will not be.

MORE IS MORE

Unlike the suggestions of some more wild-eyed technophobes, my conclusion is not that technological progress has been an unmitigated disaster. Technological change does not need to be slowed. Quite the reverse: we need *more* of it. Unlike the sorcerer's apprentice, we eventually learn, adjust and correct. Technology creates problems and technology fixes them. The remedy for technology's unintended consequences is to fix, whenever possible, the techniques causing them, and/or to replace the problematic technology with more benign ones.

This is not wishful thinking. In the past, adaptation has worked more often than not. Burning coal for home heating, electricity generation and manufacturing (made possible by continuous cost declines in the production and transportation of coal since 1800) led to massive urban air pollution. The problem was largely solved by switching to low-sulfur coal, cleaning up smokestacks or moving on to natural gas. Sugar-induced tooth decay was drastically reduced by adding fluoride to drinking water. The need for tetraethyl lead in gasoline was eliminated by technical advances in automotive engineering and petroleum chemistry.

Consider the issue of global warming, about which so much is being written. It seems, as of now, highly unlikely that a political solution will be negotiated that drastically curbs carbon emissions. So some technological fix will have to be found. The possibilities vary from more reliance on renewable fuels (such as solar and wind power) to geoengineering that reduces the amount of the sun's energy trapped by the atmosphere (although the possible bite-back effects here could be horrendous).

More plausibly, we will be driven to partial technological adaptations. For example, those who live on land increasingly vulnerable to flooding because of rising sea levels may be resettled or protected by barriers. We may also need to change building codes and construct dwellings on stilts to protect them from occasional surges.

The ongoing acidification of the world's oceans, largely a function of waste runoff, poses another major challenge. The water's acidity has increased by a substantial amount (with its pH already declining from 8.2 to 8.1),

endangering shell-forming organisms and plankton. That, plus serious overfishing, almost guarantees that we will grow ever more dependent on farm-raised seafood. Painful as it may sound, this will be an adaptation to technological bite-back that closely parallels one experienced thousands of years ago. As hunting technology improved, land animals became rare and their domestication in the Neolithic age was an adaptation to the resulting scarcity.

We do not eat much game anymore, and we think little of it. Modern technology, using best-practice physiology and genetics, computer-controlled fish ponds and robots, is certainly up to the task of providing fish lovers with what they want, even if the oceans are eerily empty.

Adaptation will be made possible by a group of technologies developed in the last three decades: genetic engineering. The potential of genetically modified organisms to "repair" the damage done by previous technologies is now recognized, but its full impact is still in the future. There are already glimpses, though, of what can be done.

One of the biggest bite-backs of agricultural technology is the salinization of soils and ground water resulting from water overuse and drought. The problem is particularly acute in Africa and the Middle East, but is also serious in Texas and China. Genetically modified saline-tolerant crop varieties have been developed in which a gene from a plant that grows well on saline soils has been inserted in a rice variety.

It is also possible that genetic engineering will come up with new fish varieties that thrive in more acidic oceans – in which case the bleak prediction of fishless oceans may not come to pass after all. Genetically modified organisms may also be the answer to nitrate pollution: some plants, such as clover, are able to produce their own nitrogen fertilizers by cultivating symbiotic bacteria that convert atmospheric nitrogen into fertilizer. Genetic research is trying to "teach" other plants to do the same by inserting into them the appropriate genes from nitrogen-fixing plants. The GMO frontier is huge. Among other advances to date: soybeans modified to resist insects without the use of pesticides and "golden rice" fortified with vitamin A.

From this perspective, political opposition to GMOs seems particularly misplaced. If you love the environment, you should like these new plants. But more than anything else, they will help humanity clean up the mess left by earlier innovations.

To be sure, GMOs may generate bite-back, too. Precisely because the science of genetic modification is very young, we do not know whether it may itself have any bite-back. It is those effects that the people who object to GMOs are concerned about. But there are solid reasons to believe the likelihood is low that the bite-back effects involved are so huge that costs will exceed their benefits (the "asbestos syndrome").

The nightmare scenario in which some "Frankenfood" wipes out other crops or causes some unanticipated disaster is very unlikely. While it cannot be ruled out altogether, as our knowledge of molecular genetics increases exponentially with time, the risks seems manageable.

* * *

The human species has been on a wild techno-ride for millennia, as innovation after innovation disrupted business as usual. Bite-back is common, and in some cases disastrous. Yet, while technological progress is never riskless, the risks of stasis are far more troubling. Getting off the roller coaster mid-ride is not an option. M

OH, ATLANTA

Undaunted by a snowstorm that buried the eastern seaboard, some 200 participants – members of Congress, industry leaders, foundation heads, philanthropists, scientists and university presidents – convened in January at the headquarters of the Centers for Disease Control and Prevention, in Atlanta, for an event hosted by the Institute and the CDC Foundation. Building on the Institute's Celebration of Science initiative launched in 2012, the goal of Atlanta Summit on Public Health was to reaffirm America's commitment to public health. To view the panel sessions in their entirety, go to milkeninstitute.org/atlantasummit. And take our word for it: it's so much nicer to watch in the comfort of your own tablet than to risk getting stuck at Hartsfield airport.

CHECK UP

Prepared for the Atlanta summit (and now available on the Institute Web site), our research report, "Checkup Time," estimates the economic burden for America associated with five leading chronic diseases. The report updates our groundbreaking 2007 analysis, "An Unhealthy America," which has served as a source of information for journalists and policymakers on the subject. Checkup Time finds that the bill for chronic diseases is rising, driven by ever-higher obesity rates. The good news: heart disease prevalence and treatment costs per patient are lower than the gloomy predictions in 2007. And did you notice? A new federal government survey suggests that childhood obesity rates are finally falling.

BUMMER

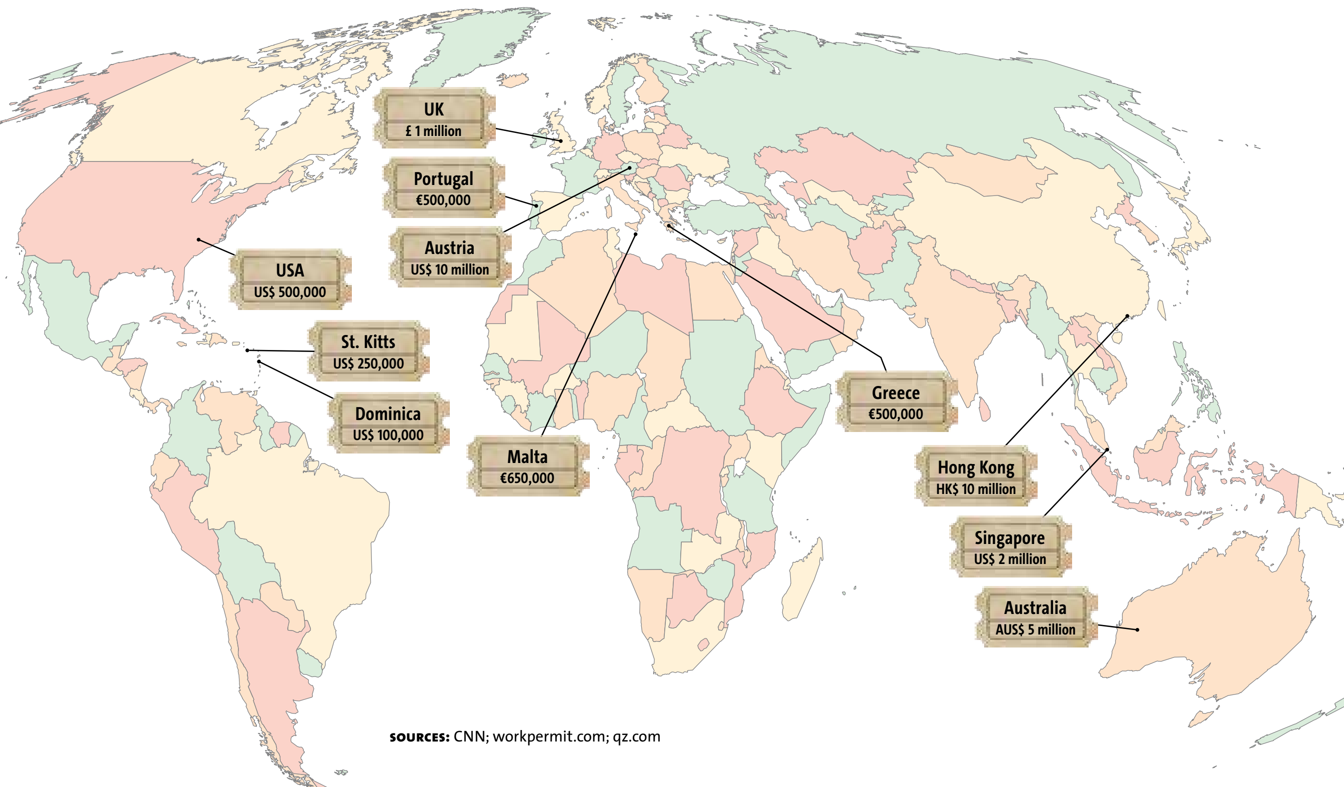
Days before this year's Academy Awards, the Institute's California Center issued a report (available on the Institute's Web site) suggesting that all is not well in Tinseltown. The report, "A Hollywood Exit: What California Must Do to Remain Competitive in Entertainment – and Keep Jobs," surveys the decline, starting with the introduction of Canadian film incentives in 1997. Today, 43 states offer subsidies for film and television production. And it suggests ways California could fight back without joining a race to the bottom. Stay tuned for a progress report down the road. Like Hollywood, the Institute loves a sequel.

Howdy, Stranger

Give me your tired, your poor… Well, not so much, any more. Your huddled masses and wretched refuse are out of fashion in the United States, and pretty much everywhere else. Conversely (and not coincidentally), we seem to have entered a golden age of transnational mobility for those with the gold. A slew of countries almost automatically grant residency to foreigners willing to invest a lot of money to improve the neighborhood. Meanwhile, a handful of Caribbean tax havens and at least one cash-strapped European Union country have proposals to sell instant citizenship. Cyprus offers residency as a consolation prize: Russian plutocrats – and others, if there are any – who lost at least €3 million from their accounts when the island's banking system crashed can live there if they wish.

The United States, for its part, demands a credible plan to create 10 jobs, along with a cash investment. But the Kauffman Foundation suggests a more focused means of exploiting the attractions of U.S. residency: issue "start-up" visas for highly skilled foreigners already in the country – typically, on H1b visas – who want to stay in order to start businesses. The deal would come with strings, including a requirement to raise $100K in capital. Kauffman estimates that the program would create 1.6 million jobs over a decade.

THE PRICE OF ADMISSION



SOURCES: CNN; workpermit.com; qz.com