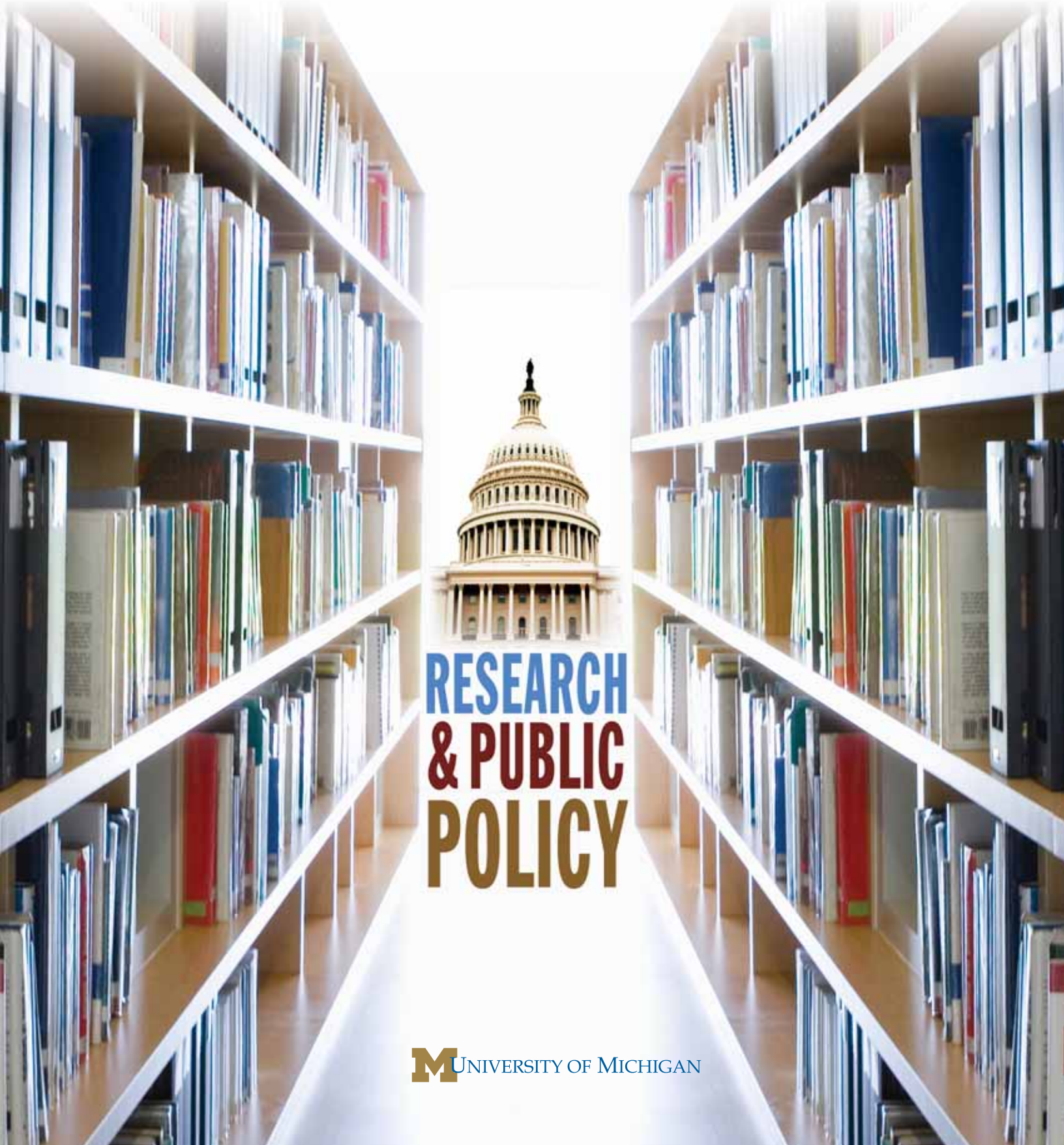


SEARCH & DISCOVERY

R E S E A R C H A T M I C H I G A N



**RESEARCH
& PUBLIC
POLICY**

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MY EXCELLENT ADVENTURE IN WASHINGTON

This issue of *Search & Discovery* is dedicated to policy: how it is formulated, how it is translated into practice, and how it changes our lives, hopefully for the better. Being a physicist and engineer, I generally watch policy-making like most of the general public—from the sidelines. But once in awhile my own research, and my job as vice president for research, puts me on a collision course with the policy-making machine within the leading policy-making city of our country. In September, I had one such head-on encounter.

Early in the month, I had an urgent call from our director of Federal Relations for Research, Sarah Walkling. She had received a request for me to appear in front of the House Select Committee on Energy Independence and Global Warming to make a case for increased funding in energy science and technology. This subject strikes close to home with me as a scientist and with U-M's vision of increasing its "footprint" as a major contributor in changing what must be changed. Our nation *must* reduce its dependence on fossil fuels, which is draining our nation's wealth, creating a significant security risk, and damaging our environment.

At present, the return of revenue into R&D in energy is by far the lowest of any major sector of the economy. The energy industry brings in nearly \$2 trillion annually, which significantly outstrips both defense and health care. Yet only 0.23 percent of the sector's revenue is plowed back into R&D. This is less than one-tenth of the average R&D return for the economy overall. And it pales by comparison to 10–20 percent of revenues invested in R&D for such high-tech industries as pharmaceuticals and electronics.

If we are going to meet the challenge of transforming our energy economy, the government needs to be more active than it has been. Sadly, government support of new energy technologies falls woefully short of the need. Others "get it," however. For instance, Japan's government spends four times as much on energy research as our own, measured as a fraction of gross national product.

So there I was in the hearing room with MIT President Susan Hochfield; Daniel Kammen of UC-Berkeley; and Jack Fellows, vice president of the University Corporation on Atmospheric Research. My message was that U.S. attitudes and policies were in dire and urgent need of change. Government investment is necessary. There can be no more delay in this area of deep national concern and strategic necessity.

I found the committee was engaged and the question-and-answer period was quite interesting. The members expressed genuine concern about risks to our global economic and strategic position created by the nation's inaction on energy research. (In fact, the Q&A reminded me a bit of my thesis defense here at the U-M in the 1970s.)

In spite of this, it was sadly obvious that Congress views energy policy as yet another partisan issue dominated by "red vs. blue" politics. This is disheartening. In our nation's past, we were able to address certain issues of strategic and economic survival without reducing them to political battles. In the Second World War, the nation came together to solve a problem of grave national consequence without basing actions on pure politics. Arguing about the reality of global warming or the stability of our energy supply from (mostly unfriendly)



foreign governments misses the point. The issues that confront us are serious, and the consequences for inaction are irreversible.

One response is to retreat to the lab. I think that's the wrong conclusion to draw from this experience. Rather, when knowledgeable people speak with a unified voice, policy can change for the better. That is the nature of democracy. It is contentious and difficult and frustrating. But we can make a difference if we care enough to be committed to the changes demanded by our times.

A handwritten signature in blue ink that reads "Step Herrero".

[For details on hearing
www.energy.umich.edu/news](http://www.energy.umich.edu/news)



POLICY CHOICES KEY TO A SUSTAINABLE ENERGY FUTURE

The idea of finding a brilliant widget or a clever technology that could solve a problem as complex and convoluted as replacing fossil fuels is seductive.

But the real sexiness of energy solutions lies in policy.

Policy changes arguably may emerge as the white knight of the energy crisis. Clad in robes woven of long meetings, densely packaged piles of data, and reports with no pictures but lots of charts, policy still can be the soul of innovation.

For as exciting and promising as windmills and PHEVs (plug-in hybrid electrical vehicles) and newfangled light bulbs are, they're only as good as the peoples' buy-in. And that is the heart-beat of policy research: the way to guide decisions and achieve rational outcomes.

"Energy is one of the most complex issues we have to deal with," says former U-M President James Duderstadt. "In addition to technology, it involves behavior, policy, social acceptance, culture, put together to form national policy. The University of Michigan is one of the few places in the nation which can address the totality of the energy challenge. Change is driven by culture and behavior rather than technology."

An arresting institutional symbol of the merging of technology and policy on campus is a phoenix, in this case one lifted from ashes with new uses of energy. The Michigan Memorial Phoenix Energy Institute takes its traditional exploration of peaceful uses of technology and adds to its wings the social sciences and business approaches

needed to rise above the confines of fossil fuels. The Phoenix Energy Institute was initially proposed by a committee Duderstadt chaired, and was launched in 2006.

“The Michigan Memorial Phoenix Energy Institute is an example of how the University of Michigan leverages its considerable strengths to find solutions to multidisciplinary challenges to society, such as a secure, affordable, and sustainable energy future,” says Gary Was, Phoenix Energy Institute director and the Walter J. Weber, Jr. Professor of Sustainable Energy, Environmental and Earth Systems at the U-M. “We not only want to lead the scientific and technological innovation, we also want to lead the acceptance and integration of these solutions into our social system so that they can be put to work in the most effective manner possible. Our approach is both revolutionary and consistent with our strengths.”

Policy research is something like a behavioral GPS—a way to guide society to productive and effective ways to power transportation, heat and light buildings, and run a growing plethora of gadgets.

“People love science as long as they get something out of it, but the minute they have to give something up, there’s a problem,” notes Irv Salmeen with the Center for Complex Systems. “Systems are complicated, but people long for a silver bullet.”

Salmeen, who came to the U-M from the Ford Motor Company Research Laboratories, is working with a team funded by a Department of Energy grant that is aimed at providing data to create policy steps that can take PHEVs from the category of “cool

(FROM LEFT) LEVI THOMPSON, DIRECTOR, U-M HYDROGEN ENERGY TECHNOLOGY LABORATORY, AND GARY WAS, DIRECTOR, MICHIGAN MEMORIAL PHOENIX ENERGY INSTITUTE



JAMES DUDERSTADT,
U-M PRESIDENT EMERITUS

idea” into the realm of the mainstream.

A lot of hype surrounds PHEVs, made nearly irresistible with their potential for high mileage and limited fossil fuel consumption. But in their early stage of development, their appeal has been limited to those who aren’t swayed by high cost and untested performance.

Too much is at stake in the PHEV’s survival and ability to thrive in the marketplace to be left to guesswork. Enter computational social science, where virtual decision-makers can react to market ups and downs or other events.

John Sullivan, who also came from Ford Motor Company, is a research scientist and head of the Sustainable Transportation Systems effort at the University of Michigan Transportation Research Institute. In collaboration with the Center for the Study of Complex Systems, Sullivan is building a computer model to simulate the potential for PHEVs to penetrate into the automotive marketplace.

The initial cost of a PHEV is quite high. Sullivan’s model will allow policy makers to test drive various strategies that might attract car buyers to PHEVs and smooth the entry of these vehicles into the marketplace.

In the computer model, the virtual decision makers—including consumers, government officials, fuel producers, and car manufacturers—live to achieve their “personal” and “organizational” objectives. For example, the virtual consumers have incomes, budgets, home and work addresses, as well as transportation needs and wants and vehicle preferences which lead them to purchase fuel and vehicles. The businesses in the model—like car companies, car dealers, and energy providers—wish to sell their products at a profit. This all happens in the virtual marketplace.

“Energy is one of the most complex issues we have to deal with. In addition to technology, it involves behavior, policy, social acceptance, culture, put together to form national policy. Change is driven by culture and behavior rather than technology.”

James Duderstadt, former U-M president



IRV SALMEEN, RESEARCH SCIENTIST, AND CARL SIMON, DIRECTOR, CENTER FOR COMPLEX SYSTEMS



(FROM LEFT) TOM LYON, SCHOOL OF BUSINESS, AND DENNIS ASSANIS, COLLEGE OF ENGINEERING

The virtual automotive marketplace, like the real one, is stimulated by economic events such as a rise in gas prices, policy initiatives like a tax rebate for buying a PHEV, or purchasing incentives from the electric company or vehicle manufacturer. How these instruments or events play out in the virtual marketplace can give an idea of what set of circumstances could enable PHEV success in the market.

“These models can’t predict the future,” Sullivan says. “But by exploring many scenarios with different but appropriate starting conditions and a diverse population of players, we can estimate from the model the likelihood of an outcome, in this case a successful penetration of PHEVs into the auto market place.”

Tom Lyon, Dow Chair of Sustainable Science, Technology and Commerce and director of the Erb Institute for Global Sustainable Enterprise, has been probing the back story of renewable portfolios standards (RPSs)—a policy tool that encourages electricity providers to use more renewable energy sources, such as solar, wind, biomass, or geothermal.

An RPS can be a powerful way to reduce the environmental impacts of energy production, but Lyon’s group is finding that, even though widely embraced by states in the name of good environmental stewardship, RPSs aren’t necessarily the most efficient or effective way to reduce the impacts. A carbon tax, for example, is a more efficient way to address climate change.

The issue, Lyon says, is that policies that seem on the surface inspired by green concerns are in fact driven by other fac-

tors as well. Consistent with environmental concerns, states with air quality problems are indeed more likely to adopt an RPS. But the state’s political leanings matter too, even though environmental issues are painted as transcending partisan politics. Research finds that states that lean Democratic are more likely to have RPSs. Green apparently is blue when it comes to environmental policy.

Trade associations also weigh in, notes Lyon. If the American Solar Energy Society has a chapter in the state, for example, it more likely that an RPS in that state will tilt in favor of solar power, a likely bow to the power of lobbying.

Job creation also was expected to be a big driver of RPSs, since such initiatives often come with the promises of new green jobs. But Lyon points out that the shift to renewable energy sources can mean an increase in electricity prices, which in turn

can result in the loss of jobs in other sectors. This unintended outcome can make states shy away from this policy tool. In reality, it is states with low unemployment rates that tend to adopt RPSs, suggesting that job creation is not a major factor.

There also are opportunities—some realized, many not—to allow states to play on their strengths and trade with other states to optimize resources. Sunny states and states strong in natural gas resources, for example, can trade to balance economic power with natural resources.

And that’s the allure of good policy: it’s a chance to make good on brilliant ideas and possibilities. It’s putting innovation into action by taking a worthy stab at setting society on the right path to meet the challenges of energy.

—SUE NICHOLS
Michigan Memorial Phoenix Energy Institute



Teamwork breeds success for U-M Solar Car racers

Last summer, a team of U-M students finished in first place in the 2008 North American Solar Challenge. The Challenge is a competition to design, build, and drive solar-powered cars in a cross-country time/distance rally event. The 2008 race covered a 2400-mile route from Dallas, Texas to Calgary, Alberta. (More on the race on page 24.)

The U-M Solar Car team is an entirely student-run organization which does all of the design and construction of the car, in addition to raising all of the money necessary for the project. The organization’s overarch-

ing goal is to develop and promote the potential of alternative energy technology.

Students who volunteer for the Solar Car are typically undergraduates, and they come from a wide range of academic disciplines, including majors within the College of Engineering, the Ross School of Business, and the College of Literature, Science, and the Arts, with as many as 200 students participating on the team. Nearly all of the team members work on a volunteer basis, although some participants receive credit for their efforts through the U-M Undergraduate Research Opportunities Program.



VP Forrest Testifies on Energy R&D Policy

Stephen Forrest, University of Michigan vice president for research, testified in Washington on September 10 before the House Select Committee on Energy Independence and Global Warming at its first hearing to address energy research and development.

“Transforming our fossil fuel economy into one based on renewable, carbon-free energy solutions is a national priority of the highest magnitude,” said Forrest. “Solutions to this problem are not simple. Nevertheless, America’s research universities—homes to high-risk innovation and discovery—are ready and eager to join in a partnership with government and industry to solve what is the largest single problem of the 21st century.”

Forrest pointed out that energy research funding overall, and alternative energy funding, have been much too low to meet national needs. “Only 1.6 percent of all federal R&D goes to Department of Energy (DOE) research.”

Even at these low levels, DOE has been a valuable contributor to advancing energy research. He reported to the committee that “initiatives like DOE’s Solid State Lighting program, which supports both industry and academia, already has produced successes that will soon make the very inefficient incandescent bulb obsolete for interior lighting.

“However, to face today’s crisis, DOE’s programs must be enlarged to include new initiatives that encourage collaboration, and truly promote the transformation of our energy economy. It will take more than just increased funding. We also need better policy to make it easier and more efficient to collaborate.”

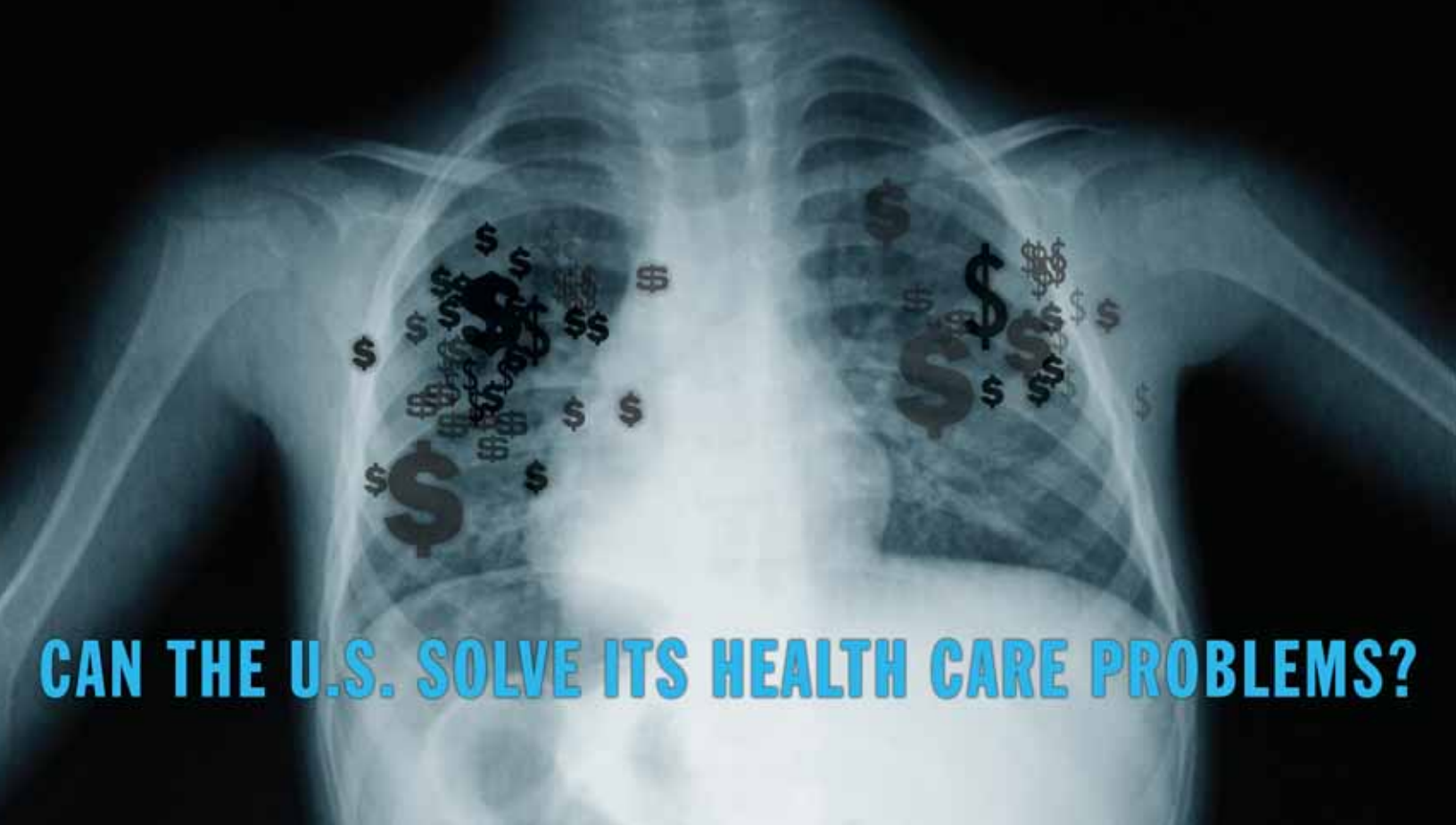
In particular, Forrest urged Congress to fund the recently authorized Advanced Research Projects Agency for Energy (ARPA-E), a flexible and independent agency within DOE to serve as a critical bridge between universities, as incubators for new ideas, and for companies which are able to put these ideas into practical use.

(FROM LEFT) SUSAN HOCKFIELD, PRESIDENT OF MASSACHUSETTS INSTITUTE OF TECHNOLOGY; STEPHEN FORREST, U-M VICE PRESIDENT FOR RESEARCH; DANIEL KAMMEN, PROFESSOR, UNIVERSITY OF CALIFORNIA-BERKLEY; AND JACK FELLOWS, VICE PRESIDENT, UNIVERSITY CORPORATION ON ATMOSPHERIC RESEARCH

Second, Forrest urged the creation of a network of energy Discovery Innovation Institutes (DIIs). These institutes have been recommended by the National Academy of Engineering as entities where federal agencies, research universities, and industry can collaborate to address energy needs. “DIIs will be regional so they’ll draw on that part of the nation’s strength, a strength that will be working in a new system to span seamlessly from basic science to commercialization.” **S&D**

For details on hearing

A link to the full text of Forrest’s testimony is posted on the Michigan Memorial Phoenix Energy Institute website, at www.energy.umich.edu/news.



CAN THE U.S. SOLVE ITS HEALTH CARE PROBLEMS?

With the possible exception of the nation's inability to face its energy needs in a rational way, the United States seems unable to develop a concerted national policy on health care. The country instead has settled for today's makeshift compilation of programs and policies run by government and business. And few policymakers or citizens believe the current situation is good.

According to World Health Organization statistics, the U.S. mixed public-private health care system is the most expensive in the world. Per capita spending on health care in this country is greater than any other nation. Only the Marshall Islands spends a larger fraction of its gross domestic product on health care than the U.S., where 15 percent of GDP is consumed by health care spending.

Besides high costs, a major shortcoming of the U.S. health care system is the large number of people who have no health insurance. Many politicians, policymakers, and academic researchers have examined this situation, and proposals have been put forward to reduce or eliminate this coverage gap ever since Medicare and Medicaid started in 1965. None of these efforts has enjoyed much success.

To study the causes and possible remedies of uninsurance, the Robert Wood Johnson Foundation gave a grant to the University of Michigan in 2001 to establish the Economic Research Initiative on the Uninsured (ERIU). The initiative's goal is to examine the issues of the uninsured through rigorous economic analysis, such as who lacks health insurance in the U.S. and why, how the labor market factors into insurance issues, and how the lack of insurance affects the health status. The ERIU director is

Catherine McLaughlin, health economist and professor of health management and policy in the U-M School of Public Health. The Initiative involves faculty from the School of Public Health, the Gerald R. Ford School of Public Policy, the Economics Department, and the Institute for Social Research, plus researchers from other major universities across the country.

Today, health care reform is once again in the public eye, as the presidential candidates—starting during the primaries—have spoken on this topic and have made proposals for changing the U.S. system. Not since the early 1990s during the first term of President Bill Clinton has health care received this level of attention.

In 1994, the Robert Wood Johnson Foundation sponsored a conference held at Princeton University. Academics from all parts of the country came together to assess needs and to present proposals for health reform. Ultimately, the Clinton-era reform effort stalled and no serious effort has been undertaken until now.



CATHERINE
MCLAUGHLIN

On June 2, the Economic Research Initiative on the Uninsured sponsored an interactive web conference, or “webinar,” featuring four individuals who participated in the 1994 conference: Henry J. Aaron, Bruce and Virginia MacLaury Senior Fellow, the Brookings Institution;

Joseph P. Newhouse, John D. MacArthur Professor of Health Policy and Management, Harvard University; Mark Pauly, Benheim Professor, Department of Health Care Systems, Wharton School, University of Pennsylvania; and Uwe E. Reinhardt, James Madison Professor of Political

Economy, Princeton University. U-M’s McLaughlin also took part in the webinar, joined by Susan Dentzer, Editor-in-Chief of *Health Affairs*, who served as the moderator.

The general theme of the meeting was to look back over the last 14 years and review what has changed with regard to health care economics. “Should we rely on markets to contain costs and improve access to high-quality care, or do the markets alone fail to achieve an efficient, equitable allocation of resources?” posed McLaughlin. “Does the current situation call for some form of government intervention?”

McLaughlin also noted that following the 1994 conference, there was discussion of health insurance mandates for coverage. “Historically, this country has had coverage linked to employment for the overwhelming majority of workers, and the question then was, ‘Does this make sense to still continue? What are the positives of having that linkage? Do they outweigh the negatives?’” she said.

Lastly, McLaughlin asked “Who pays?” If the country sets a goal of attaining health insurance coverage for all, does this coverage remain rooted in the private sector and employment-based, or does the “public” (meaning government) become the main payer?

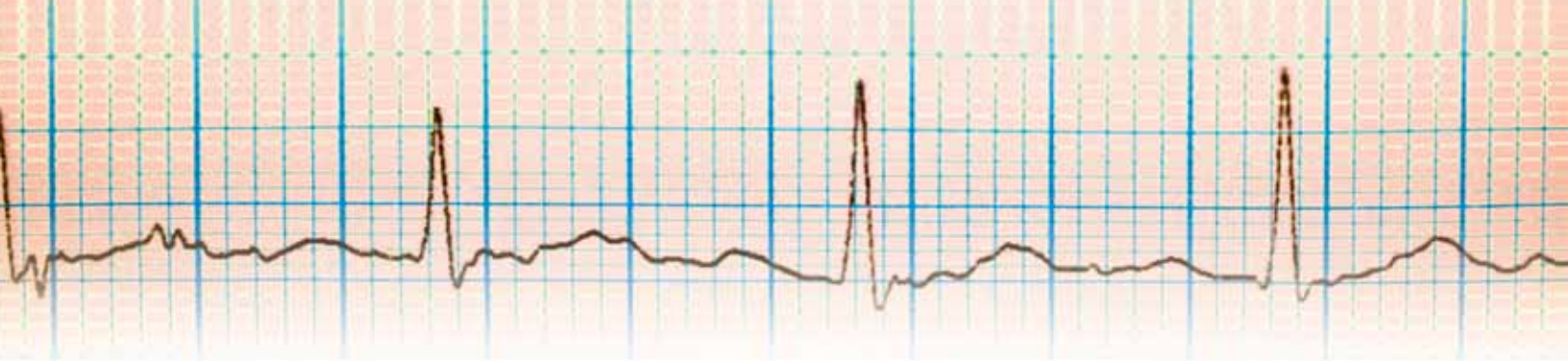
She added that one difference between 1994 and the present is the new research conducted since then, including several dozen research projects conducted under the auspices of the Economic Research Initiative on the Uninsured at Michigan with Robert Wood Johnson funding, all of which provide new insights not available 14 years ago. The ERIU website (eriu.sph.umich.edu) includes summaries on all of these studies, as well as a searchable database of over 4,000 research articles about the uninsured published since 1990.

“There are more uninsured people [now] and we are nearer to what many people regard as an impending fiscal meltdown arising from rapidly growing Medicare and Medicaid spending by the federal government.”

—Henry J. Aaron, Bruce and Virginia MacLaury Senior Fellow, *The Brookings Institution*

Dentzer began the panel discussion by noting how many of the issues today are so similar to 1994 even though “many of the facts on the ground are different.” For example, there remains a tension over how to supply health care most efficiently while also making sure that all strata of the public are treated equitably. Furthermore, longstanding disagreements about the proper balance between the reliance on market forces versus government intervention remain largely unresolved, even as the amount of money spent on health care today compared to then has grown tremendously.

Aaron of the Brookings Institution added that in spite of increased spending, “there are more uninsured people [now] and we are nearer to what many people regard as an impending fiscal meltdown arising from rapidly growing Medicare and Medicaid spending by the federal government.” One consequence of these conditions, he said, is that some of the policymakers and politicians and other interested groups



“Health care reform equals income redistribution. And that means there is a loser for every gainer.”

—Henry J. Aaron, Bruce and Virginia MaLaury Senior Fellow, *The Brookings Institution*

opposed to health system reforms 14 years ago are now much more amenable to some kind of federal action. Nevertheless, “the obstacles to action remain the same as they have been before.”

Assuming that the nation as a whole doesn’t plan to spend more on health care than it currently does—a widely shared idea—then Aaron noted that “health care reform equals income redistribution. And that means there is a loser for every gainer.” For every proposal for change, there is likely to be “adamant” opposition, making any sweeping reform just as difficult now (if not more so) than in years past.

“It is vitally important, in my view, that people identify enactable, specific changes that can take place within the next year or two,” said Aaron.

The Wharton School’s Pauly went one step further. “I do think that the stars and planets may be coming together in a way that will actually allow us to do something substantial to reduce the

number of uninsured and perhaps move toward universal coverage.” He points out that both presidential candidates “envision the use of markets or market-like arrangements [to provide health care], at least in the sense that people could choose among a variety of health plans with price or premium differences. That would look more like a market and less like a monopoly government provision of a public good.”

In the 1990s, President Clinton proposed such a move, recalled Newhouse of Harvard University, moving away from employer-based insurance to health care alliances that would offer competing plans. Today, this is a feature of Medicare and of many employer plans. “That theme of having individuals choose among competing plans has survived,” said Newhouse.

In addition to general support for individuals choosing a health plan, Pauly’s optimism that some reforms are possible today stems from other areas of apparent agreement, at least as reflected in the current presidential campaign. For example, both candidates’ health care proposals appear to acknowledge a kind of reform that would “means test” benefits—a plan that would be “more generous to low-income people and stingy to high-income people.”

With income levels varying so much across the population, said Pauly, “Giving everybody the same plan will allow the well-off and the better-educated to outbid and out-talk their way through the system compared to the poor and less advantaged.”

Princeton’s Reinhardt presented a simple scenario to demonstrate why subsidizing lower-income people is essential for meaningful reform. The basic cost of health

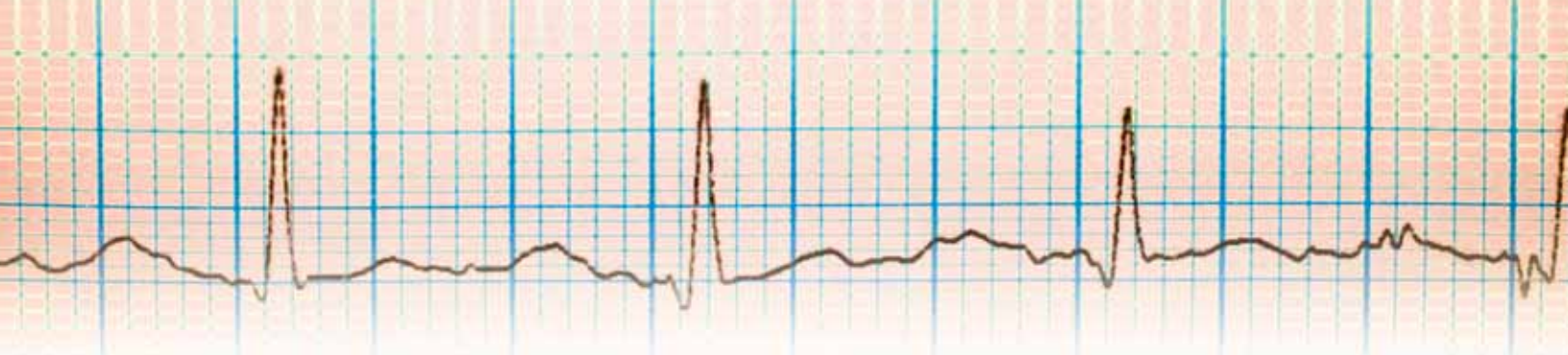
care in this country for a family of four is \$15,000 a year at present. Now, said Reinhardt, look at a typical family with two working adults. One works at Wal-Mart, one at Home Depot. Each earns \$25,000.

“Let their wage base grow by 3 percent per year, which is roughly what it’s been growing at, and let health spending for such families grow at 8 percent per year. In 2010, one-third of the family’s wages will be absorbed just by health care. And in the year 2018 it will be 50 percent.” If the U.S. puts in place a non-subsidized health plan for working-class people, he concludes that these families will end up uninsured. To serve families in this stratum of society, the health system will need to redistribute costs according to their income.

But contrary to Pauly’s optimism, Reinhardt is not hopeful for meaningful reform because he sees too little “social solidarity” among citizens today. “I’m just wondering whether we, the haves in the upper part of this income distribution, are willing to cough up the \$120 billion or so a year, growing at 6 percent, that it would cost to get universal coverage.”

The cost of health system reform will cost the nation “real money” and, say all of these experts, there are limited ways to reduce current spending levels to free up funds for reform. Aaron pointed out three “fairy tales” that politicians and the public believe can save enough money to make reform relatively inexpensive.

“One is that if we invest more in preventative health care, we will somehow take the wind out of the sails of rising health care spending,” said Aaron. However, research has shown repeatedly that while preventative care is good for your health, it mainly shifts spending from a post-illness to pre-illness interventions without reducing the overall health care bill.



“I’m just wondering whether we, the haves in the upper part of this income distribution, are willing to cough up the \$120 billion or so a year, growing at 6 percent, that it would cost to get universal coverage.”

—Uwe E. Reinhardt, James Madison Professor of Political Economy, Princeton University

Adopting new information technology is also no panacea. “Those who are closest to it believe that the potential for improving the quality of care is enormous, but it’s expensive, and it’s going to take a long time to bring into use,” Aaron explained.

And the “greedy” drug companies, HMOs, insurance companies—anyone making a profit—cannot be tamed sufficiently to free significant amounts of money for reform. “Even if one eliminated profit entirely from all of them, the impact on total [health care] outlays would be temporary and small.”

The truth is, continued Aaron, Americans do want access to a broad array of health care services and these are expensive. “A good deal [of this] is highly beneficial, some is only slightly beneficial, and we have not yet figured out how to get rid of the care that isn’t really worth what it costs without getting rid of other care that is worth a great deal more.”

When asked about the kinds of changes the panel foresees under the next administration, there was general agreement that some important, if not entirely sweeping,

actions appear likely. For one, the group notes that SCHIP (the State Children’s Health Insurance Program) was almost expanded recently and it seems possible that it can get through the Congress next year and be signed by the next president. This federally funded, state-operated program provides health insurance to children in low-income families, and in some states, to their parents.

Aaron noted that two separate vetoes by President Bush stopped the SCHIP expansion. “There was strong support among both congressional Democrats and congressional Republicans, particularly in the Senate, for such an extension. With support rather than opposition from the White House, this is really something that could pass in the first 100 days and be signed and put into effect. It’s a doable target and it would make a big difference for a lot of vulnerable people.”

The panelists also expect that adoption of information technology will continue in an effort to improve the system of delivery and monitoring. And Medicare and Medicaid, although very expensive, will remain in place, added Newhouse. “I think keeping Medicare and Medicaid afloat as we’ve known them will be something of an achievement, as well, given the problems that they’re facing.”

How about what is *not* likely to change? Aaron thinks that cost containment is not a good bet “until such time as essentially everybody in the country is covered—provided basic insurance.” Aaron noted that the sources of payment are so diverse and fragmented, and that the incentives for patients, doctors, and hospitals push

“One [myth of financing health care] is that if we invest more in preventive health care, we will somehow take the wind out of the sails of rising health care spending.”

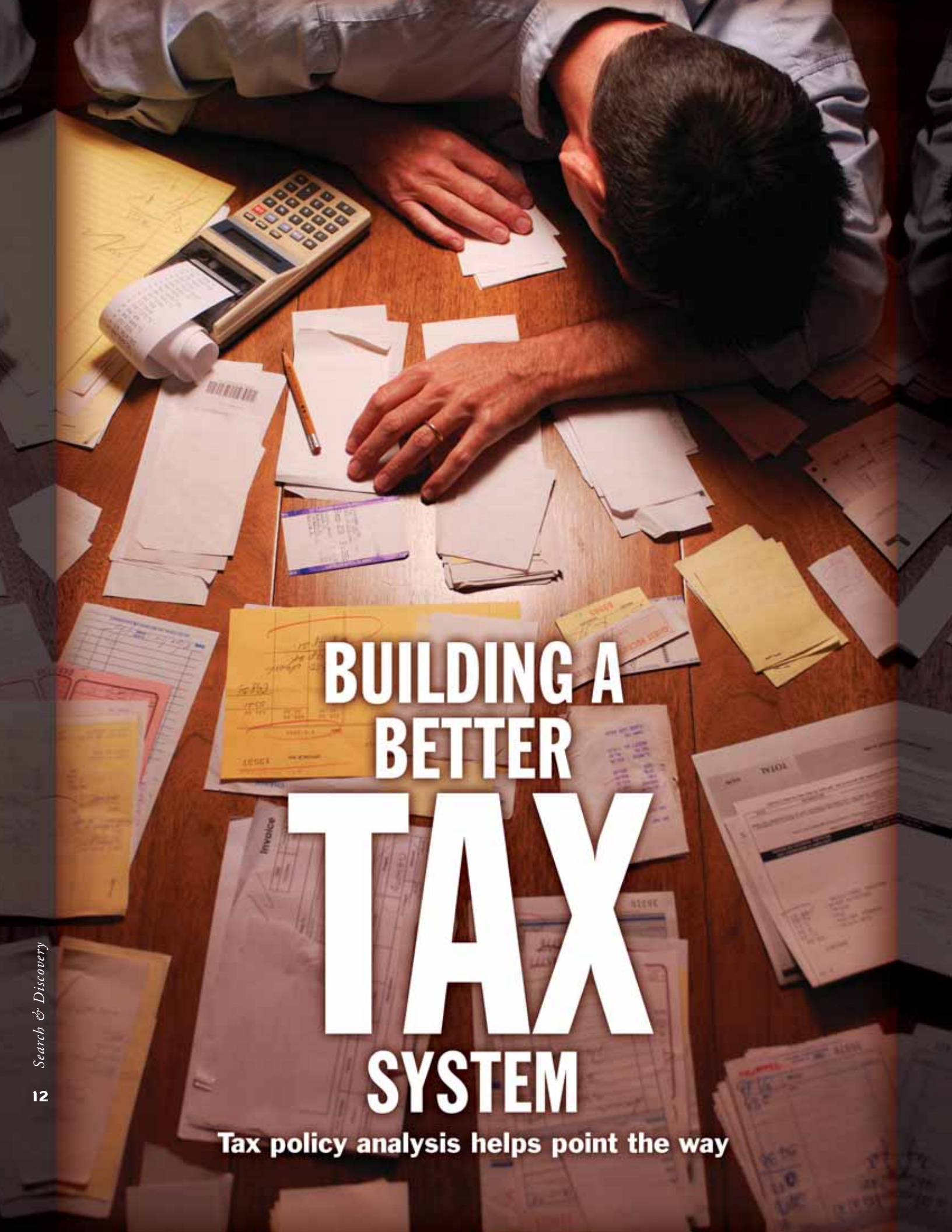
—Henry J. Aaron, Bruce and Virginia MacLaury Senior Fellow, The Brookings Institution

in the opposite direction from cost control. “Right now the U.S. health care system is well designed to frustrate virtually anything that promises to control spending to a significant degree.”

Reinhart said he foresees a few changes in the next few years, such as those mentioned above plus probably an increase in the number of people with insurance. “I think the big music, however, will come in 2012, when, according to my numbers, a lot more Americans are much more desperate and a lot of hospitals will have to deal with them. That’s my prediction.” S&D

Editor’s Note

This discussion took place in June—before the so-called “Wall Street bailout/rescue”—so the prospects for health care reform under the next president may not be as likely as it appeared then. The complete transcript of the ERUI-sponsored webinar is available at www.rwjf.org/files/research/eriuo62008transcript.pdf



BUILDING A BETTER TAX SYSTEM

Tax policy analysis helps point the way

Taxes engender strong feelings in most adults (especially in April). For politicians, taxes rank as one of their favorite topics—whether as a means to fund the government’s activities, as a tool to influence behavior, or as an “enemy” to battle.

During any election cycle—and especially during a Presidential election year—candidates and their surrogates make pronouncements related to taxation. There are statements about which group of taxpayers will have their tax rates raised or lowered, and how much these changes will stimulate business investment, reduce the federal budget deficit, enhance energy production, reduce poverty, or any of dozens of other policy goals.

These statements are more than slogans (at least usually). A candidate’s commitment to a particular policy will be backed up by some kind of analysis offered by a candidate’s staff or supporters. However, these analyses require making certain judgments—judgments that can lean a lot in the direction the candidate may need to justify the tax proposal. Media analysts then present their own interpretations of a proposal’s plausibility, which then may be tapped by the campaigns (or other media analysts and pundits) to support or refute the proposal.

Another breed of analyst resides in the academic world. One such person is Joel Slemrod, director of the Office of Tax Policy Research, an interdisciplinary research center housed at the Stephen M. Ross School of Business. In Slemrod’s case, he is interested in studying tax changes that have occurred to determine how the policies influence individuals and businesses. “One role of economic policy

research is to understand the behavior changes that might occur” under various proposals, says Slemrod, who is also the Paul W. McCracken Collegiate Professor of Business Economics and Public Policy and professor of economics in the College of Literature, Science, and the Arts.

At present, there is much discussion by the Presidential candidates and in Congress about whether to reinstate the tax rates on high-income individuals back to near the levels that existed before the so-called “Bush tax cuts” were enacted in 2001 and 2003. “An important question is, ‘how much more revenue would that collect?’” says Slemrod of proposals to roll back the tax cuts.

The answer requires more than taking the income base for the taxes paid under the current rate and then recalculating the tax liability under a new, higher rate. People respond to changes in tax policy in ways that are not always obvious, says Slemrod. “An ongoing project of mine asks how can we learn the response of high-income people to any particular policy change? What sophisticated tax avoidance behavior will be triggered?”

Slemrod looks at historical tax return data, often with assistance of U.S. Treasury Department officials who provide a buffer between his research and identifiable information about individuals. He tries to discern how high-income groups—such as private equity fund managers, CEOs of major companies, owners of highly successful start-up companies, and even star professional athletes—might convert regular income into lower-taxed capital gains, for instance, or make other financial adjustments. “We look at their previous tax-related actions, and then try to predict how similar future tax law changes will influence these taxpayers,” and, in turn, to what extent these actions will achieve, or undermine, the goals of a proposed tax policy change.

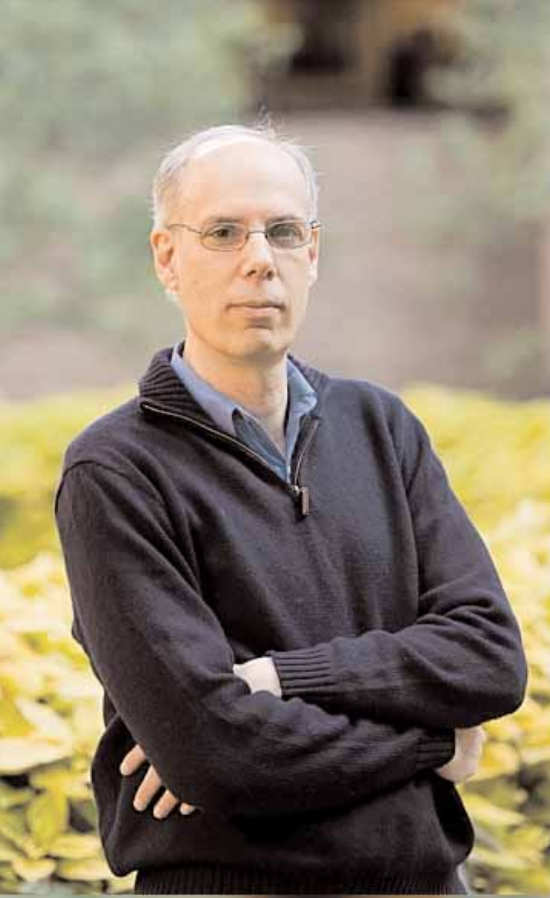
“An ongoing project of mine asks how can we learn the response of high-income people to any particular policy change? What sophisticated tax avoidance behavior will be triggered?”

—Joel Slemrod, Director of the Office of Tax Policy Research

Slemrod also collaborates with tax law experts on many projects. “You need to understand how tax rules are written to do this analysis.” In any policy proposal, the definitions of taxable and non-taxable earnings or other sources of income is key to having a tax change work as intended.

He will look at the timing of a past tax change, looking for any changes in behavior from before to after the change. Similarly, he compares the behavior of those affected by tax policy changes with other taxpayers who are not affected.

“The process requires lot of number crunching, doing econometric analyses,” says Slemrod. “You can often find significant associations. The ‘elephant in the room’ is whether you can show causation.” For example, the fact that the unemployment rate jumped during the Bush tax-cut years does in no way establish that the tax cuts caused the jump. There are many other possible explanations.



JOEL SLEMRD

It's not usually possible to do a controlled policy experiment, although Slemrod was involved in one conducted by the State of Minnesota several years ago. "The State asked how it could improve tax compliance behavior," says Slemrod. "I said it could do an experiment and, after much back and forth, it did."

A subset of Minnesota taxpayers were randomly assigned to two groups. One group received a letter from the State alerting them they will be audited the following year. The second group received no notice about an audit.

"We found some remarkable things," says Slemrod. Among those receiving the audit warning letters, a significant fraction (particularly the self-employed) reported more taxable income than expected, based on past tax returns and comparisons with similar taxpayers who did not receive a letter. The notification letters apparently caused some individuals to be more careful and conservative when reporting income on their tax returns.

"So we talked to some tax professionals, who—off the record—conceded that with complicated tax returns they consider the tax return filing as the first step in a negotiation. The tax return is really the opening 'bid' of what the taxpayer proposes to pay."

—Joel Slemrod

"Most surprising was that for about five or six percent of individuals in the highest income groups, the reverse happened. These taxpayers warned of an audit reported less income," says Slemrod. "How could this be?" we asked ourselves."

The researchers knew that all of these high-income individuals use tax accountants, and the accountants would hear about the audit letter. "So we talked to some tax professionals, who—off the record—conceded that with complicated tax returns they consider the tax return filing as the first step in a negotiation," says Slemrod. "The tax return is really the opening 'bid' of what the taxpayer proposes to pay." By starting low, the tax professional has room to agree to paying more during the audit. "This strategy may make it easier to limit the scrutiny of a return, since auditors undoubtedly consider getting a taxpayer to agree to pay more as a 'win,' and so may conclude the audit at an earlier stage."

The recent economic stimulus payments made to many U.S. households this spring as tax rebates gives Slemrod a special opportunity to analyze how these payments influence the economy. "My colleague Matthew Shapiro and I did a study of the tax rebate payments distributed in 2001," he explains. Now with a fresh set of data, he can compare and contrast the two rebate programs' effects on the economy. "We are again doing some surveys, asking taxpayers what they do with their rebate checks," says Slemrod.

The preliminary results of the 2008 tax rebate program indicate that it provided a "modest" economic stimulus. "Only about one-fifth of taxpayers say the payments induced them to mostly spend more, and the economic data from this spring reflect that," says Slemrod. "Personal savings went up at about the same amount as the total stimulus package. Is there a causal link between the rebates and spending or savings changes? It's likely, but these surveys don't carry as much weight in the academic economics community as some other kinds of research. Economists prefer to see actual measures of behavior, not what people report as their behavior."

When thinking about tax issues to study, Slemrod says he likes to try to anticipate policy questions that may arise in the coming few years. "If I bet right, we can have research findings that can inform the policy discussion."

Surprisingly, Slemrod and Wojciech Kopczuk, a former U-M graduate student now on the Columbia University economics faculty, conducted a study that they never imagined might have policy relevance in such a short time. In 2001, Slemrod and Kopczuk wrote "Dying to Save Taxes: Evidence from Estate Tax Returns on the Death

Elasticity,” which was published in the *Review of Economics and Statistics*. “The question we asked is ‘Can estate tax changes affect the timing of deaths?’”

“The idea for this paper came to us after reading a report that in New York City hospitals there had 50 percent more deaths in the first week of January, 2000 compared to the last week of 1999. It was speculated that some people simply wanted to live to see the new millennium,” relates Slemrod. After examining tax return data from 13 periods between 1917 and 1984, when there were significant increases or reductions in the estate tax, Slemrod and Kopczuk concluded that there appears to be a small effect of tax rate changes on time of death. “Evidence from estate tax returns suggests that some people will themselves to survive a bit longer if it will enrich their heirs,” wrote the pair.

The article earned Slemrod and Kopczuk an IgNobel Prize, a parody of the Nobel Prize that is presented to “honor achievements that first make people laugh, and then make them think. The prizes are intended to celebrate the unusual, honor the imaginative—and spur people’s interest in science, medicine, and technology,” according to the *Journal of Improbable Research*, which organizes the IgNobel awards.

Now this research may get another test. As the law stands, the estate tax will be eliminated for one year. On December 31, 2009, the maximum estate tax rate will be 45 percent; at 12:00 A.M., January 1, 2010, the estate tax expires and the rate drops to zero until the end of 2010.

Although Slemrod does not think Congress will allow the estate tax to “expire,” if it does and a wealthy individual passes away before the end of December 2010, the heirs would receive millions of dollars more than if the person lived into January 2011. There is, however, one other variable in this analysis, Slemrod notes: there is no easy way to distinguish in past records between the actual time of death and the time of death entered on the death record.

A paper that Slemrod published in 2005, “My Beautiful Tax Reform,” also has implications for future tax policy discussions. A complex tax code is something often condemned, but progress toward a simpler tax system has been elusive. “One reason is that tax policy involves a trade-off among objectives,” notes Slemrod. To be both equitable in tax treatment as well as efficient in tax collection often requires complexity in how the tax rules are written.

Another obstacle to simplicity is the necessity for a fairly rigorous system of collection and enforcement no matter what tax system is put in place. “No government can simply announce a tax system, sit back, and wait for the money to roll in,” he observes. Eventually even “dutiful citizens” would see there is no penalty for ignoring the law and the government’s tax revenue would be reduced to a trickle.

In presenting his thoughts on tax reform, Slemrod points out that his analysis is based both on economic assumptions as well as his own values. “Saying exactly what tax reform I favor without laying out what leads me to this choice wouldn’t contribute much to the public policy debate,” he says. Likewise, he encourages others to identify what assumptions, both about how the economy works and their own values, underlie any tax reform proposal.

Slemrod first examines replacing the federal income tax with a national sales tax, which “from afar looks beautiful, indeed.”

“Evidence from estate tax returns suggests that some people will themselves to survive a bit longer if it will enrich their heirs.”

—Joel Slemrod and Wojciech Kopczuk

No Form 1040 to slog through each year. Pay your taxes as you go, when you buy clothing or cars or other consumer goods. Then comes some harsh reality. To replace the money collected from income tax would require a federal sales tax rate of about 27 percent. The tax rate could end up even higher, and the problems of collection and enforcement facing the government would be so difficult as to make this option impractical on many levels, and very few countries have used this tax with success.”

A related option is the “value added tax,” or VAT, which places a tax on businesses based on the difference between their receipts and their purchases from other businesses. And not just retail businesses, but all businesses. More than a hundred countries use this tax.

Slemrod concludes, however, that “the VAT should not be a substitute for the income tax” in spite of its comparable simplification advantages. “I believe the government has an obligation to consider how its policies affect not only the dollar sum of gross domestic product, but also whether the total is equitably shared,” he says. And so Slemrod favors progressivity of tax burden: “Not only should Bill Gates have a higher tax burden than a single mother earning \$10,000 year, but his tax burden as a fraction of his income should be higher (much higher, in my opinion).”



Slemrod is well aware that a progressive tax can provide a work disincentive for those subject to high tax rates and an incentive to try to avoid paying taxes, which is often counter-productive for the economy. “But my reading of the empirical evidence has convinced me that the efficiency cost of progressivity is not so large (a professional judgment) that it overwhelms the benefits of a more equal distribution of well-being that tax progressivity provides (a value judgment).” In the end, neither a national sales tax nor value added tax is sufficiently progressive for Slemrod’s values and might only be acceptable with addition of some kind of government payments to low-income families.

There is a variation of the VAT that has been trumpeted from time to time—the so-called “flat tax.” As initially proposed in the early 1980s, all businesses pay a tax using a single rate after deducting its employee payroll and other expenses from its tax base, and individuals pay taxes at the same single rate based on their labor

income. Businesses would still collect withholding, as they do now, passing this through to the government. However compared to a VAT, many more people, possibly an extra 100 million employees, would need to file returns—although presumably much simpler ones. Furthermore, in its original form, there is only a standard deduction and personal exemptions to give a tax break based on family size, but nothing for mortgage interest, charitable contributions, child care expenses, tuition, or any of the other items many people are familiar with today.

One thing Slemrod likes about the flat tax is that it gives almost everyone some visible tax liability, and therefore a personal stake in the tax system and related policy matters. Unfortunately, as first conceived, it removes all progressivity, a step which Slemrod opposes. Of course, there is no reason that tax brackets cannot be added back to the “flat tax”—which indeed have been proposed under the name of “X tax.”

But the founders of the flat tax also intended to end the use of the tax system as a tool to help shape public policy through incentives for particular behaviors or particular groups of taxpayers, whether businesses or individuals. “The prospect of eliminating all of these incentives and rewards is exhilarating to someone who seeks simplicity and beauty in a tax system, but is Pollyanna-ish to those who understand the American political system and the rewards showered on those politicians who control the dispensation of these goodies,” says Slemrod.

It is a person’s views on the proper role of government in the economy that, continues Slemrod, “separates the tax-reform men from the tax-reform boys.” While Slemrod believes in a progressive tax system, he also says the government’s role in the economy should be limited. “Many conservatives who pay lip service

to limited government get cold feet when it comes to sweeping away the interventions that occur via the tax system,” Slemrod observes.

For his own part, Slemrod has assembled a partial list of tax deductions that he would part with to promote simplification, including the deduction for state income and sales taxes, the exclusion of health insurance benefits from a worker’s taxable base pay, and removing the government subsidy for home ownership provided through the deductibility of mortgage interest. This last item would be one of the most difficult reforms to put in place, as simply eliminating the mortgage deduction without addressing the new inequities that arise would be both politically treacherous and create a new favored group of home owners—those who can self-finance.

As Slemrod presents it, his “beautiful tax reform” would no longer require most Americans to file income tax returns. Furthermore, he would consolidate the deductions and other “goodies” currently distributed throughout the tax system and reduce the influence of taxes on economic behavior.

“My tax reform is not more beautiful than some other proposals,” he admits, “but simplicity is not the sole goal, as I value a progressive tax system and so will accept certain tradeoffs. I take some comfort in the words of perhaps the greatest of all scientists, Albert Einstein, who once cautioned that ‘everything should be made as simple as possible, but not simpler.’” **S&D**

—**LEE KATTERMAN**
Office of the Vice President for Research

MICHIGAN UNIVERSITIES KICK-START INNOVATION AND ENTREPRENEURSHIP

In the past year, the fifteen public universities in Michigan have formed a consortium—the Michigan Initiative for Innovation and Entrepreneurship (MIIE)—to both collaborate on and compete for small, strategic grants that will spur entrepreneurship and will invest in starting new businesses and industries. This consortium—funded by a C. S. Mott Foundation grant—has successfully completed its first funding competition, in which \$1.3 million was awarded to support 20 projects around the state.

The thrust of this first round is to foster the culture of entrepreneurship needed to support job creation, especially in the knowledge economy. The MIIE strategy is to leverage the enormous intellectual capital that exists in the state's universities, an approach that has proven successful in places such as the Palo Alto and Boston areas. Michigan universities attract more than \$1.5 billion in R&D funding each year into the state and graduate tens of thousands of students. These infusions of money and talent create a constantly renewable source of creativity, innovation, and physical infrastructure that can be developed to promote Michigan's economic transformation, in partnership with industry, government, and foundations.

The MIIE programs are organized in three thematic groups to change practice and culture across the state's campuses and communities with the envisioned support of \$75 million in foundation grants to the consortium. In 2008 and 2009, Phase I for the consortium will increase the connectors between invention and commercialization in Michigan; broaden and enhance the bridges between venture-ready business ideas and venture capital here in the state; and connect students, faculties, universities, and philanthropies with entrepreneurship and venture capital in new and creative ways. These efforts will serve to retain as well as recruit talent to the state.

The MIIE continues and expands on the Michigan Universities Commercialization Initiative (MUCI), a program funded by the Michigan Economic Development Corporation which has provided \$6.5 million to 14 universities to commercialize inventions and ideas. MUCI's first \$5 million has spawned 27 new businesses across the state. It is the success of MUCI which demonstrates that collaboration, competition, and transparency among the universities is possible. MUCI began as a group of three institutions—Michigan State University, University of Michigan, and Wayne State University—which grew steadily and then transformed into the larger MIIE consortium to encompass all fifteen public universities.

The first round of MIIE grants was announced in June 2008, with all fifteen public universities represented among the 20 awards. In all, 39 proposals were submitted. More rounds of grant competitions will take place in the fall of 2008 and beyond—initially made possible by a New Economy Initiative (NEI) grant of \$1.5 million. As the funded projects progress, the consortium hopes to attract additional grant funding from the state's leading foundations.

Two-thirds of MIIE's proposed \$75 million in funding will be focused on commercialization: taking ideas and inventions from the research lab and giving them time, focus, and money to move closer to venture capital (that might mean creating prototypes, writing business plans, undertaking market analyses, or other critical early functions). Grants at this stage—sometimes called pre-seed, early gap, or even 'valley of death'—are essential. The startup companies and license deals that emerge from this stage must be able to approach the venture markets without equity encumbrances, and in Michigan there is as yet no other way to meet gap funding needs. In places like California and Massachusetts, the sheer volume of venture capital allows money to 'bleed backwards' into these

very early stages. For Michigan to reach a similar stage, it must increase the volume of startups, and to make this possible, the MIIE believes the state's philanthropies must engage in this very early stage in order to kick-start a transformation.

In addition to awarding "gap" funds through the MIIE, two other "regranting" programs are being developed with a proposed funding level of \$25 million to support them. The first is focused on industry and economic engagement (IEE) and invests in significantly expanding the relationships between the state's businesses and industries and their potential collaborators on our college campuses. This will spur the exchange of ideas and the engagement of students and faculty in small and growing businesses and industries here in Michigan. Second, the talent retention and entrepreneurship education (TREE) fund is directed at advancing knowledge of entrepreneurial principles and practices among multiple student and faculty constituencies, and advancing a culture of technological innovation and entrepreneurship in Michigan. Awards from this fund will foster entrepreneurial educational, faculty development, resources, and programs.

Between the three funds, there is great potential for the full participation of all of the state's public universities and ripple effects into communities across the state. Over the next seven years, the MIIE may help launch 200 or more new businesses and has potential to create new industries for this state. Its commitment to changing culture—through intentional engagement with existing businesses and industries, and through expansion of entrepreneurial education opportunities on and off its fifteen campuses—is an essential ingredient for Michigan's comeback. This collaboration and commitment across the state's universities are the foundation for a sound, collective strategy that engages the research and entrepreneurial assets of higher education in this most important battle for the economic future of the state. **S&D**

FORMER PFIZER SCIENTISTS JOIN U-M FACULTY

In January 2007, Pfizer shocked the greater Washtenaw County region with the announcement that the drug-maker was closing its Ann Arbor facility. The closing cost some 2100 Pfizer employees their jobs, including at least 600 well-trained and, in many cases, quite accomplished scientists working in drug discovery and basic research. Earlier this year, the University of Michigan completed the recruitment and hiring of several new faculty. James Shayman, associate vice president for research and professor of internal medicine and of pharmacology in the Medical School, participated in this process. He spoke to *Search & Discovery* about how these hirings came about and what they mean to the University.

S&D: What led to the recruitment of Pfizer scientists?

SHAYMAN: While the Pfizer announcement was clearly a blow to the community, it also created a unique opportunity for the University— not only to step up and address the region's need to deal with this announcement, but to avail itself of this tremendous pool of scientific talent. On that basis, we approached U-M Provost Terry Sullivan with the idea that the University, and specifically the Provost's Office, could identify funds to supplement the recruitment of a select group of Pfizer investigators who would meet or surpass our standards for faculty appointment. Provost Sullivan recognized immediately the value of that proposal and committed \$3 million to be used in concert with funds identified by individual colleges or programs for the recruitment of Pfizer scientists. An announcement was sent out and in response we entertained inquiries and formal proposals from the College of Pharmacy, the Medical School, the Life Sciences Institute, and others.

S&D: What kinds of proposals came forward from schools or colleges?

SHAYMAN: Well, some of the proposals melded very nicely with ongoing programmatic initiatives that were being considered. For example, the College of Pharmacy recognized that the existing resources and pool of faculty involved in medicinal chemistry was limited, and yet there was a large number of highly talented medicinal chemists employed by Pfizer that might be amenable to staying in the area and joining the University. In the past, if an investigator at the University had a lead compound that was a good drug candidate, there was very little in the way of University resources or talent to take that compound and chemically diversify it into a small library to find a better compound that might be more suitable for clinical trials.

Dean Frank Ascione in the College of Pharmacy proposed the creation of what is called the Michigan Center for Drug Discovery, of which a critical component was the Medicinal Chemistry Core Synthesis Lab. Drug discovery today involves the ability to go to large libraries of compounds that are structurally diversified. By knowing, for example, the crystal structure of a protein, scientists can perform what is termed *in silico* drug discovery to interrogate those large databases and identify a number of potential lead compounds that can be actually synthesized and assayed for activity against that protein. At the U-M, Professor Hollis Showalter, who had been a senior scientist at Pfizer (and joined the University well before the Pfizer announcement), directs the Core Synthesis Lab and its impressive and talented group of investigators who conduct compound synthesis and analysis. As a part of the Pfizer recruitment program, a scientist named Paul Kirchhoff has joined the



JAMES SHAYMAN, ASSOCIATE VICE PRESIDENT FOR RESEARCH AND PROFESSOR OF INTERNAL MEDICINE, AND OF PHARMACOLOGY.

Lab, greatly aiding and expanding the University's capabilities and complementing those of two existing College of Pharmacy faculty members, Shaomeng Wang and Heather Carlson.

S&D: What was the University looking for from schools and colleges interested in recruiting Pfizer scientists?

SHAYMAN: We asked individual deans and department chairs to actually identify individuals that they would propose to recruit to faculty positions, primarily in the research scientist track, and to outline not only what the intentions were for their academic roles or their research roles, but what the expectations were in terms of teaching and in terms of a progression towards becoming independent investigators. It was important for us to identify Pfizer scientists who could adapt to life as University faculty members and who might ultimately obtain external funding that would allow their investigative careers to flourish. I personally have been quite impressed with how aggressively these new faculty members are pursuing a course toward independence.

S&D: Because these scientists come from the industrial background, at least most recently, is there a hope that they may

“I think that as a group, these new faculty members bring a wealth of experience, both practical and intellectual, in what it takes to move from a concept to an actual drug that one might use in the clinic.”

—James Shayman

SOME OF THE FORMER PFIZER SCIENTISTS NOW AFFILIATED WITH THE UNIVERSITY OF MICHIGAN COLLEGE OF PHARMACY. THEY INCLUDE, (LEFT TO RIGHT), BOTTOM TO TOP: GREGORY AMIDON, MEIHUA FENG, MICHAEL WILSON, PAUL KELLER, JAMES DUNBAR, HOLLIS SHOWALTER, RODERICK SORENSON, SCOTT LARSEN, PAUL KIRCHHOFF.



attract funding from the private sector as opposed to NIH or the government side?

SHAYMAN: It's our expectation that they will attract funding from both traditional and non-traditional sources. The NIH historically has been less supportive of funding work in drug discovery, although that has changed recently with the initiation of the Roadmap Programs. In OVPR we see importance to nurturing our relationships between our investigators with research groups in the private sector, and so we are certainly encouraging that. But we know that the primary source of funding still remains federal grants, and we are assisting these new recruits in obtaining funding from those sources as well.

S&D: Besides identifying good scientists and bringing them to the campus, is there anything else these particular individuals offer that might be a little different from people who come to the University through a more traditional academic career progression?

SHAYMAN: I think that as a group, these new faculty members bring a wealth of experience, both practical and intellectual, in what it takes to move from a concept

to an actual drug that one might use in the clinic. Most of these individuals have a very impressive track record in developing what are termed *new chemical entities* that in many cases have made their ways into clinical trials. This is the type of experience that we would like our faculty members to learn from. That is not to say that the University has been without success in identifying new biological targets for drugs, or in identifying new chemical entities that could serve as drugs, and in bringing these, in many cases, into clinical trials and approval. In fact there are about a dozen such entities that have already been developed by University of Michigan investigators.

We would like the drug discovery process to occur more efficiently, so the University has supported and invested in a number of complementary programs directed toward this goal. For example, we support the Center for Chemical Genomics in the Life Sciences Institute, a group set up to perform, among other things, high throughput screening to identify lead compounds that could serve as drugs. Then groups such as the Michigan Center for Drug Discovery can take these leads

and synthesize compounds for testing. These two groups already are working very closely together and are beginning to generate a number of successes.

Another aspect of drug discovery is characterization, through structural biology, of potential drug targets. We have a growing community of structural biologists involved in this kind of work, supported by OVPR through its support for the Beam Line of Argonne National Laboratories and the Nuclear Magnetic Resonance Group in the Department of Chemistry biophysics group.

Finally, any new chemical entities or biologics that are discovered will eventually need to be taken to clinical trials. The newly created Michigan Institute for Clinical and Health Research is building an infrastructure that will allow our faculty members to submit applications for investigational new drugs to the FDA. Even with all this being done, there are still gaps that exist within the University environment that should be filled. As we continue to address these gaps, we will have more efficient processes in terms of drug discovery. **S&D**

TIGHT TIMES

CONTINUE FOR RESEARCH



The news about federal funding of research is not all bad, but certainly not good, either. Federal research funding trends continue to challenge the ability of U-M researchers to accomplish all that they can. Most agencies which support research—such as the National Institutes of Health (NIH) and the National Science Foundation (NSF)—face flat or shrinking allocations from Congress and the White House for the current fiscal year. Furthermore, recent policy changes stand to impact the progress of our researchers and their students. Whether and how all this will change may depend on the outcome of the upcoming presidential election.

The final result of last year's appropriations battles brought shock to the higher education community. Increases promised as part of the American Competitive Initiative (ACI) for agencies such as the NSF, the Department of Energy (DOE) Office of Science, and the National Institute of Standards and Technology in the Department of Commerce never materialized. Thus, the expected doubling of these agencies' budgets over ten years became derailed. Consequently, scientists lost grants promised to them, Fermi Lab faced layoffs and significant project delays, and the U.S. contribution to the international fusion reactor project, ITER, was zeroed out. Some relief came with the inclusion of research provisions in the recent FY 2008 war supplemental. Of the \$62.5 billion total in the war funding bill, \$400 million was split between the NSF, DOE Office of Science, NIH, and NASA.

Recent stonewalling by Congress and the White House, however, has once again raised the specter of at least non-defense research spending remaining frozen at current levels—this time until after a new president comes into office. With leaders of the Bush Administration and the House and Senate refusing to compromise on all domestic spending bills, scientists working with federal research agencies face flat funding of current efforts and the postponement of new initiatives for the next six months or possibly longer.

For NIH-supported research, this may mean continued bleak times. As biomedical researchers can attest, the virtually flat funding of the agency since the “doubling” ended in FY 2003 has significantly increased the difficulty of securing NIH funding. The President's FY 2009 budget request dealt another blow by calling for little or no budget increase. Congressional leaders have rallied in support of the agency. With the start of the appro-

priations process, House members have called for an increase of \$935 million, while the Senate has suggested an increase of \$790 million.

Congress also has initially taken steps to put the NSF and the DOE Office of Science back on track for doubling in the physical sciences with both houses supporting a 13 percent increase for the NSF. The House advocates for more than a 22 percent increase for the Office of Science, and the Senate proposes a 16.8 percent increase. Whether these increases become realities will most likely be determined after the 2008 presidential elections.

Even as funding decisions are stalled, policy decisions impacting university researchers continue. For example, the White House has adopted a new information classification category called “controlled but unclassified” which might change the conduct of federally-sponsored research on a university campus. At the Department of Commerce, a review of “deemed export policy” is underway. The NIH has made changes to both its peer review process and open access policy for Institute-sponsored research results. Senator Chuck Grassley's (R-IA) investigation into financial conflicts-of-interest at the NIH also has resulted in a full review of oversight at the agency. Finally, in coordination with the NSF, the Pentagon has started the Minerva Initiative to promote research in the humanities and social sciences—with a focus on issues such as terrorist networks and perspectives.

Table 1: University of Michigan Research Expenditures by Sponsor, FY 2007-2008

Source	FY 2007	Percent of Total	FY 2008	Percent of Total	Percent Change
FEDERAL SOURCES					
National Institutes of Health	387,738,690	47.1%	393,033,824	44.9%	1.4%
Other Health and Human Services	17,919,045	1.7%	18,304,222	2.0%	2.1%
National Science Foundation	65,319,711	7.9%	64,800,692	7.4%	-0.8%
Department of Defense	51,075,003	6.2%	59,378,407	6.8%	16.3%
Energy	16,794,966	2.0%	17,476,457	2.0%	4.0%
N.A.S.A.	16,041,111	1.9%	15,888,114	1.8%	-1.0%
Transportation	15,418,486	1.9%	14,803,527	1.7%	-4.0%
Education	6,043,934	0.7%	7,967,594	0.9%	31.8%
Commerce	6,713,205	0.8%	5,905,347	0.7%	-12.0%
Other Federal	12,486,907	1.7%	13,812,364	1.6%	10.6%
Total Federal Government	595,551,058	72.4%	611,370,548	69.8%	2.7%
NON-FEDERAL SOURCES					
Industry	38,594,118	4.7%	42,888,528	4.9%	11.1%
Foundations	18,689,966	2.3%	21,343,396	2.4%	14.2%
Universities and Gifts	8,225,379	1.0%	8,464,140	1.0%	2.9%
Public Charities	10,914,176	1.3%	10,994,717	1.3%	0.7%
Endowment	6,079,306	0.7%	9,587,624	1.1%	57.7%
Trade and Professional Associations	6,600,277	0.8%	6,136,882	0.7%	-7.0%
State of Michigan	7,003,489	0.9%	5,096,990	0.6%	-27.2%
Other	619,781	0.1%	949,286	0.1%	53.2%
Total Non-Federal Sponsors	96,726,491	11.8%	105,461,564	12.0%	9.0%
Total Sponsored Research	692,277,549	84.1%	716,832,111	81.9%	3.5%
UNIVERSITY OF MICHIGAN SOURCES					
University of Michigan Funds	130,690,125	15.9%	158,921,396	18.1%	21.6%
Total Research Expenditures	796,965,386	100.0%	875,753,507	100%	6.4%

New accounting standards adopted for FY 2008 call for accrual of post-employment benefits, such as health care, dental, etc. As a result of the new standard, the University's internally funded research increased by \$14,764,106 in FY 2008 and was responsible for just over half of the year-to-year increase in internal research spending, since the FY 2007 amount did not include post-employment benefits.

Table 2: University of Michigan Technology Transfer Indicators FY 2005-2008

Fiscal Year	License revenue (from royalties and equity sales)	Disclosures	License agreements	Start-up companies formed	U.S. patent applications filed	U.S. patents issued	Total research spending
2008	\$25,000,000	306	91	13	132	75	\$875,753,507
2007	\$12,800,000	329	91	7	144	87	\$822,967,675
2006	\$20,400,000	288	97	9	136	79	\$796,965,386
2005	\$16,700,000	287	86	7	135	80	\$778,061,728

U-M research expenditures for FY 2008 (Table 1) grew by \$18 million, or 4.6 percent, to nearly \$861 million, compared to \$823 million FY 2007. However, the three major sources of research funding—the federal government, non-federal sponsors, and internal funds—contributed to the growth in different ways. Federal support for U-M research, which comprises 70 percent of the total, increased by only 2.7 percent. Non-federal sponsors funded about 12 percent of the U-M research portfolio last year, but increased by 9 percent over the previous year's expenditures. Likewise, internal funds devoted to research grew by just over 10 percent, to \$144 million in FY 2008 from \$131 million in FY 2007.

On the federal side, the spending by NIH-funded projects rose by just 1.4 percent, reflecting the stalled support for this agency in Congress. NSF expenditures dropped by 0.8 percent, while the most significant growth in federally supported research spending is found for Department of Defense projects, which rose 16 percent from the previous year. Among non-federal sponsors, the upward trend in industry support continues, with spending from these projects up by 11 percent and now comprising 5 percent of the U-M portfolio.

Ties between faculty and the private sector are also reflected in statistics from the U-M Office of Technology Transfer (Table 2). Startup companies based on U-M technologies jumped to 13 in FY 2008. Faculty disclosures of new intellectual property remain strong, as do the number of new license agreements, patent applications, and patents issued for U-M inventions. The \$25 million in revenue comes half from royalties and half from the sale of equity or paid-in-full royalty agreements. Overall, the indicators show strong activity by the University and its faculty in working with industry to move ideas to the marketplace.

In these uncertain times, the key to success will continue to be the strong efforts of the University's world-class faculty. ...Even in times of tight federal funding, U-M continues to maintain its leadership position. The implication is that where funds are available, U-M will win its share, but that growth may increasingly need to come from non-federal sources in the future.

No matter which presidential candidate wins in November, several items affecting university research should receive attention from the new administration. First, the stalemate between the executive and legislative branches is likely to end, and both presidential candidates are expected to bring new perspectives to scientific research funding and policy. Their evolving platforms hint at some of the directions that they may pursue if elected into office. Senator Barack Obama (D-IL) and Senator John McCain (R-AZ) both agree on the need to make the R&D tax credit permanent and to provide more money for biomedical research at the NIH. In most other areas, however, they differ in policy and focus.

At a June 16 campaign stop at Kettering University in Flint, Michigan, Senator Obama outlined much of his research agenda. "At a time when technology is shaping our future, we devote a smaller and smaller share of our national resources to research and development. It's time for America to lead. I'll double federal funding for basic research, and make the R&D tax credit permanent. We can ensure that the discoveries of the 21st century happen in America—in our labs and universities, at places like Kettering and the University of Michigan, Wayne State and Michigan State."

Within the doubling of basic research dollars, the Senator has called for \$1 billion for autism research, \$150 billion over ten years for biofuels research and a focus on alternative energy, and more attention to preventing an avian flu pandemic. He also has advocated for relaxed federal restrictions on embryonic stem cell research. Finally, to speed medical research results, Senator Obama has recommended creating an independent institute to guide reviews and research on comparative effectiveness of medical treatments.

Senator McCain's platform to date contains insights into directions his administration would take. In addition to a well-funded NIH, the Senator has said that a strong space program "is of major importance to America's future innovation and security" and has called for adequate investments in aeronautics research. He also has called for allowing first-year deductions of investments in equipment and technology, and has proposed a \$300 million award to the inventor of a better battery to power electric or hybrid cars.

In contrast with Senator Obama, Senator McCain supports federal funding for stem cell research as long as it does not involve harvesting human embryos and is subject to strict federal guidelines. Several of his proposals for running the federal government also may affect research across the country. According to his campaign, Senator McCain has proposed a one-year domestic spending "pause" to evaluate the effectiveness of these programs. Such an action would freeze federal research programs at FY 2008 levels into 2010.

In these uncertain times, the key to success will continue to be the strong efforts of the University's world-class faculty. As the overview of FY 2008 research expenditures performance reflects, even in times of tight federal funding, U-M continues to maintain its leadership position. The implication is that where funds are available, U-M will win its share, but that growth may increasingly need to come from non-federal sources in the future.

While U-M continues to remain competitive, all indications point to the need for strong investment in our research infrastructure and faculty excellence if we are to maintain our relative leadership as a national research university. Other states have been investing heavily in specific technology areas, notably alternative energy and stem cell research, and have forged strong alliances with industry to further leverage federal and private investment. Thus, while U-M may rely on its dedicated and entrepreneurial faculty to maintain its standing, other universities may be getting more of a "bounce" as a result of significant co-investment by states with a more robust economy than Michigan's. The University will need to continue to be creative and aggressive in the year ahead in promoting a campus climate that optimizes our rich intellectual resources.

S&D

SARAH WALKLING
Director of Federal Relations for Research and

MARVIN PARNES
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DOORS OPEN ON BUSINESS ENGAGEMENT CENTER

The University of Michigan is stepping up its ability to collaborate with industry, and the formal opening in May of the Business Engagement Center (BEC) adds momentum to this effort. Located near the center of campus on South University Avenue in the Galleria Building, the BEC will provide “one-stop shopping” for businesses seeking student talent, university expertise, professional development for employees, and research partnerships.

“With OVPR and the Office of University Development working jointly on the Business Engagement Center, we’ve created a new model that is unique in the country,” he adds. “We’ll be able to form win-win partnerships on many fronts that benefit both the companies and the University.”

The new center is next door to the newly relocated U-M Office of Technology Transfer (OTT). The two offices are working together to strengthen the University’s



DARYL WEINERT,
EXECUTIVE DIRECTOR,
BUSINESS ENGAGEMENT
CENTER

Transfer. “Working alongside the BEC, there’s a strong sense of teamwork in applying the resources of the University to benefit our communities and our state.”

The OTT transfers research discoveries to make

existing businesses more competitive and to create new startups that stimulate economic growth. The BEC will be able to provide OTT with the names of potential licensees and business partners, Nisbet says.

“In return, our existing licensees and new startups can become future clients of the BEC,” he adds. “So there’s a tremendous synergy between us.”

Weinert describes most of the employees at the BEC as relationship managers, or “matchmakers,” who link private-sector partners with appropriate campus experts. The center will work with the entire range of companies, from small and medium-size companies to the Fortune 500. The center is also forming strong ties with critical community partners like Ann Arbor SPARK, the Michigan Economic Development Corporation, and local chambers of commerce.

The University’s efforts already are showing benefits for the state. A little over a year ago, Grupo Aernnova of Spain selected Ann Arbor over Atlanta or Austin, Texas, for its new U.S. aerospace engineering center and the U-M was cited as an important factor in the decision primarily because of the University. Aernnova has hired nearly two dozen engineers for the Ann Arbor center, and many are recent U-M graduates. Further cementing the ties with the University is the recruitment of two Aernnova executives as members of U-M engineering advisory committees. **S&D**



AREA BUSINESS PEOPLE MEET U-M FACULTY AND STAFF AT THE BUSINESS ENGAGEMENT CENTER OPEN HOUSE IN MAY.

It’s a novel approach that’s likely to be emulated by other U.S. universities, says Daryl Weinert, the center’s executive director. “At pretty much every university around the country, corporate relations is handled exclusively by the Office of Development,” Weinert says. “While corporate gifts enable many exciting things on campus, there is so much more we can do with industry.

ties to business and community partners, while helping to revitalize and diversify the state’s ailing economy.

“The objective is to make our large and complicated university more friendly to outsiders in such a way that the U-M can have the maximum impact and influence in accelerating the transformation of our region into a knowledge-based economy,” says Stephen Forrest, vice president for research.

“Moving to the Central Campus and being co-located with the Business Engagement Center makes us more effective and demonstrates that the U-M is serious about expanding business and entrepreneurial activities,” says Ken Nisbet, executive director of the Office of Technology



U-M Wins Solar Car Race for Fifth Time

The University of Michigan's Solar Car Team won the North American Solar Challenge, crossing the finish line in Alberta, Canada on July 22 after more than 50 hours of racing over nine days. *Continuum*, U-M's entry, defended the University's title from 2005, the last year the race was held. This is the fifth time Michigan finished first in this competition.

"The students of the U-M Solar Car Team have come from all corners of our campus to show that teamwork and innovation are critical to success," exclaimed U-M President Mary Sue Coleman. "They have also demonstrated the promise of alternative energy and new technologies with the championship run of their car, *Continuum*. The campus community applauds such an impressive performance in this year's race."

The car averaged around 45 mph and led from the first day, besting 15 university teams that raced the 2,400-mile course from Plano, Texas to Calgary. *Continuum* finished about 10 hours before the second-place team.

"This is a testament to the dedication of all the people who came back after the World Solar Challenge (in October 2007) and rebuilt the car. Many of the systems were completely redesigned. We did a lot of testing and that, coupled with a strong team, got us this far. We strived for perfection," said race manager Jeff Ferman, who graduated in May from the College of Engineering with a computer science degree.

Brian Gilchrist, one of the team's advisers, is proud of the students. Gilchrist is interim chair of electrical and computer engineering in the Department of Electrical Engineering and Computer Science. "This team has handled adversity and challenges well. The students have maintained composure and a level of professionalism and high standards that is inspiring for all of us," Gilchrist said.

The Michigan team's legacy is as old as solar car racing itself. With its first solar car, *Sunrunner* in 1990, U-M won the inaugural North American race, then called the SunRayce. The car called *Maize and Blue* finished first in 1993. *M-Pulse* won in 2001 and *Momentum* did in

2005. Michigan teams have finished third in the World Solar Challenge three times: in 1990, 2001, and 2005.

The Michigan team had an advantage in the 2008 North American race because it already had a car built in September 2007 when race officials announced they would hold the challenge in July 2008. Other teams that hadn't competed in the World Solar Challenge in 2007 had only 10 months to design, build, and test a car. But Michigan could instead spend time tweaking *Continuum*.

The North American Solar Challenge normally takes place every other year in the same year as the world race, but in 2007 its previous sponsor backed out. The race's future was in question until Toyota took over the sponsorship.

With more than 100 members, Solar Car is one of the largest student organizations on campus, including students from the College of Engineering; the College of Literature, Science, and the Arts; the Ross School of Business; the School of Art & Design; and the School of Education. [S&D](#)

What Does the Mona Lisa Really Look Like?

Descriptions of materials scientists analyzing the *Mona Lisa* and other works of art captivated an overflow audience in the Rackham Amphitheatre in August. Michel Menu, head of the research laboratory at the Louvre in Paris and co-author of *Mona Lisa: Inside the Painting* (Harry N. Abrams, Inc. 2006), addressed art lovers and engineers alike as he spoke about the use of transmission electron microscopy, ion beam techniques, and synchrotron radiation spectrometry to delve below the surface of the *Mona Lisa*. He and his colleagues use these tools to better understand the history of artistic techniques, provide valuable data on the composition and stability of paintings for conservators, and bring to light new information on authentication of works of art. “Today, conservation science is really a scientific discipline, combining equally history of art and materials science,” said Menu.



1000pitches.com

Throughout the month of September, students, staff, and faculty at the University of Michigan were invited to pitch their ideas for new inventions, businesses, and nonprofit organizations in the **1000 Pitches Initiative**. In something of an innovation of its own, the initiative accepted entries only as three-minute web videos, like those posted to YouTube or other video-sharing sites, submitted at 1000pitches.com. Organizers sought ideas in seven categories—Environmental and Cleantech, Global Business, Green Campus, Health, High-Tech, Local Business, and Social Change.



Judging went through two stages. First, volunteer U-M students received training from the Zell-Lurie Institute for Entrepreneurial Studies (which is also a co-sponsor of the initiative). Teams of three to four students screened entries and selected the top 25 in each category. Experts in each category then judge the top videos (after signing non-disclosure agreements to protect the intellectual property rights of the entrant). For the same reason, no entrant's video will be posted on the initiative website or distributed in any other way unless the individual or team gives permission.

According to the organizers, the best pitches should demonstrate the idea's feasibility and need, that a plan to implement the idea has been established, and the resources needed to put the plan into

place has been considered. The winner in each of the six categories receives a prize of \$1,000. (*Search & Discovery* will report the winners in its next issue, as final selection was not finished at press time.)

In addition to the Zell-Lurie Institute for Entrepreneurial Studies, other partners in the 1000 Pitches Initiative include the Center for Entrepreneurship, the Medical Innovation Center, the Office of the Vice President for Research, the Office of Technology Transfer, the Rackham School of Graduate Studies, the School of Information, Detroit-based Bizdom University, and MPowered Entrepreneurship, together with Greek Life. Awards are sponsored by RPM Ventures, MacBeedon Partners, and Arboretum Ventures, as well as MPowered Entrepreneurship.

Cyberinfrastructure Leader Joins OVPR

Professor Daniel E. Atkins has been named Associate Vice President for Research, Cyberinfrastructure (AVPR-CI), an appointment made jointly by the Office of the Vice President for Research and the Office of the Provost. Atkins has extensive research experience and expertise in this area. He served as Chair of the National Science Foundation Advisory Panel on Cyberinfrastructure. The Panel issued a landmark report in February 2003 recommending a major Advanced Cyberinfrastructure Program intended to revolutionize science and engineering research and education. The report catalyzed new priorities and the new Office of Cyberinfrastructure at the NSF, where Atkins served as the inaugural Director.



DANIEL E. ATKINS

In this newly established position, Atkins will lead institutional planning for the integration of existing and future cyberinfrastructure resources. The University's goal is to maximize our research computational capabilities to make U-M a leader in computationally rich areas of research. As AVPR-CI, he will direct efforts to inventory our current resources,

coordinate with all University stakeholders to determine resources that need to be developed, identify funding sources and develop models for growth and operation of these computing resources. Professor Atkins will coordinate large-scale efforts pursued in collaboration with peer institutions and will serve as the University's point of contact on cyberinfrastructure matters with the State of Michigan, federal government, and private sector. Professor Atkins will work with the Vice Provost for Academic Information in addressing the University-wide cyberinfrastructure needs and opportunities.

Atkins, Professor in the School of Information and in the Department of Electrical and Computer Engineering and W. K. Kellogg Professor of Community Informatics, began his research career in the area of computer architecture and did pioneering work in parallel computer architecture and high-speed computer arithmetic that is widely used in modern processor chips. He also conducts research and teaching in the area of distributed knowledge communities and open learning resources. He has directed several large experimental digital library projects as well as projects to explore the socio-technical design and application of "collaboratories" for scientific research.

Faculty Honors

The National Academy of Sciences (NAS) elected to its membership **Conrad Kottak**, the Julian H. Steward Collegiate Professor of Anthropology, as one of 72 U.S. citizens honored for their distinguished and continuing achievements in original research. Kottak joins 19 other U-M faculty as NAS members, considered one of the highest honors to be accorded to scholars and scientists.



CONRAD KOTTAK

The American Academy of Arts and Sciences will induct in October five University of Michigan faculty among the 212 scholars, scientists, artists, and civic, corporate, and philanthropic leaders recently elected to this prestigious society.

The five are: **Elizabeth Anderson**, Arthur F. Thurnau Professor and John Rawls Collegiate Professor of Philosophy and Women's Studies; **L. Ross Chambers**, Marvin Felheim Distinguished University Professor Emeritus of French and Comparative Literature; **Susan Gelman**, Frederick G.L. Huetwell Professor of Psychology; **John Jackson**, M. Kent Jennings Collegiate Professor in Political Science; and **Margaret Jane Radin**, professor of law. "The Academy honors excellence by electing to membership remarkable men and women who have made preeminent contributions to their fields and



ELIZABETH ANDERSON



SUSAN GELMAN



JOHN JACKSON

to the world,” says Academy President Emilio Bizzi. The current society membership includes some 200 Nobel laureates and more than 60 Pulitzer Prize winners.

Two University of Michigan faculty are among the 42 men and 14 women

appointed to the latest class of Howard Hughes Medical Institute investigators. **John V. Moran**, associate professor of human genetics at the U-M Medical School, and **Mercedes Pascual**, associate professor of ecology and evolutionary biology at the U-M College of Literature, Science, and the Arts, are among these top scientists nationally to receive this recognition and the research funding that accompanies the selection.

Ashutosh Varshney, professor of political science at the U-M College of Literature, Science, and the Arts, is one of 20 individuals to be named a 2008 Carnegie Scholar for his research about peace, conflict, and Muslim communities. The Carnegie Corporation of New York, sponsor of this award, seeks to support thoughtful and original scholarship that encourages the development and expansion of the study of Islam in the United States. Varshney was one of seven U-M faculty members recognized earlier this year with a Guggenheim Fellowship, a coveted national honor recognizing distinguished achievement.



JOHN MORAN



MERCEDES PASCUAL

Three members of the University of Michigan research faculty will be honored this fall with awards from the Office of the Vice President for Research.

Douglas Miller, research professor of radiology, has been selected to receive the Collegiate Research Professorship to recognize exceptional scholarly achievement and impact on advancing knowledge. He will add the title of William H. Beierwaltes Collegiate Research Professor as a result of his selection. **Gabor Tosh**, associate research scientist in the Space Physics Research Laboratory, has been chosen to receive the Research Faculty Achievement Award. **Jimmy Irwin**, assistant research scientist in the department of astronomy, and **Vinay Parikh**, assistant research scientist in the Department of Psychology, are the recipients of the Research Faculty Recognition Award

In each issue of Search & Discovery, we list a few of the faculty who were recently recognized for their outstanding achievements in research and scholarship. Please send information about these achievements for future issues to <searchanddiscovery@umich.edu>.

Staff Receive Awards

Four University of Michigan staff were honored for their outstanding research service at a May reception in the Michigan League. **Kate Blakeman**, Life Sciences Institute business manager, and **Denise DuPrie**, research process manager/research lab administrator at the Advanced Computer Architecture Laboratory, received the Distinguished Research Administrator Award for recognition of service exemplifying the highest goals of professional research administration. **Eve Gochis**, business administrator associate at the Functional Magnetic Resonance Imaging Laboratory, and **Patricia Smith**, business administrator at the Institute for Research on Women and Gender received the OVPR Excep-

tional Service Award for outstanding contributions to their units. “The research administration staff have important roles to play in maintaining our very large and very successful operations,” says Stephen Forrest, vice president for research. “These awards are one way we can acknowledge the special contributions of these professionals.”

Marian Krzyzowski, director of the Institute for Research on Labor, Employment and the Economy, was named the Diversity Business Leader of 2008 by *Corp!*, Michigan’s largest business magazine. Along with *Corp!*, sponsors for the Diversity Award include GM, DTE, Compuware, and Troy Marriott.

Innovator Award Nominations Sought

The Office of the Vice President for Research is pleased to announce it is accepting nominations for the Distinguished University Innovator Award, established in 2006 to recognize individuals at the University of Michigan who have distinguished themselves through their involvement in the innovation process. The nomination deadline is November 14, 2008. The award winner will be announced in January, 2009 and the recipient receives an honorarium of \$5000 and will be invited to deliver a lecture in the spring of 2009. Previous winners of the award are Professor Mohammed N. Islam in 2007 and Professor James R. Baker, Jr. in 2008. Details are available at www.research.umich.edu/contacts/ovpr/innovator_award. **S&D**

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