

inviting business associations and unions into the dynamism debate, and encouraging long-term investment. Yet it should be remembered that institutional investors presently managing pensions are influencing company policies toward stable, longer-term investment prospects, and that there has been a growing trend to take public corporations private.

Phelps masterfully utilizes aggregate data on cross-comparative national economic productivity and adeptly complements it with international individual employee satisfaction survey results give the reader a rich empirical tapestry that support his theme. His focus on the philosophic underpinnings of the modern economy, even though he believes it is now restrained by corporatist ideology, is a clarion call to leaders of less-dynamic Western economies. Specifically, Phelps is spot-on in his indictment of the “new corporatism” in the American polity, which, from Obamacare to “green” energy subsidies, has become all too common. These policies have significantly contributed to the sick pallor cast over the U.S. market economy.

In conclusion, Edmund Phelps has written a convincing narrative of why modern economies have been the most successful economies in the 19th and 20th centuries, and why they need to regain their dynamism if they wish to continue into and throughout the 21st century.

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Falling Behind? Boom, Bust, and the Global Race for Scientific Talent

Michael Teitelbaum

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In Washington, doomsday prophets tend to be effective motivational speakers. They successfully persuade the electorate that their cause is worthy and prompt Congress to take action. In his book *Falling Behind? Boom, Bust, and the Global Race for Scientific Talent*, Michael Teitelbaum takes on a particular brand of doomsday prophet: those who see impending shortages in the science and engineering workforce. Teitelbaum walks his readers through five postwar cycles of boom and bust in the science and engineering

workforce, which he argues have been driven to a large extent by political machinations set in motion by labor shortage claims (claims that have been almost universally rejected by economists studying the issue). The institutions that currently shape the science and engineering workforce are largely the product of policy responses to these booms and busts. As a result, *Falling Behind?* is more than just a work of policy history. It is also a cogent analysis of contemporary R&D funding mechanisms, high-skill immigration policies, and PhD program structures.

Teitelbaum is well placed to write this book. Although he's a demographer by training, through his work on immigration policy and his time as vice president of the Alfred P. Sloan Foundation, he has a long history of rubbing elbows with a wide variety of social scientists who are concerned with the science and engineering workforce. Teitelbaum's service on several distinguished immigration reform commissions in Washington enables him to provide a first-hand account of the political wheeling and dealing described in the book.

Falling Behind? is organized around five cycles of boom and bust in the science and engineering workforce. The first three are uniformly instigated by government and strongly resemble political business cycles, which have been studied by economists. In the political business cycle literature, opportunistic politicians engineer booms (which end in busts) to improve their electoral prospects. Similar forces are identified by Teitelbaum in the science and engineering workforce during the first 50 years of the postwar period (rounds 1 through 3). These will be considered first. Rounds 4 and 5 are characterized by private-sector actors lobbying government and will be considered subsequently.

Round 1 (1948 to 1957) is the postwar boom in the physical sciences stimulated by concerns about the lost generation of scientists from the war and the growing threat of the Soviet Union. The atomic bomb proved that prowess in physical science was the key to national power but that the United States could not rest on its laurels. Congress responded by creating the National Science Foundation (NSF), although the most dramatic increases in the number of physical scientists came as a result of Department of Defense funding. The forces unleashed in round 1 were bolstered in round 2 (1957 to 1973) by the launch of Sputnik, the formation of NASA, and Kennedy's pledge to put a man on the moon. The buildup of the

physical science workforce during rounds 1 and 2 came crashing down in the 1970s, when job prospects and federal mega-projects became scarce relative to their postwar peaks. Teitelbaum's round 3 (1975 to 1995) was instigated by a wide variety of federal initiatives, including the "war on cancer," the Reagan administration's defense buildup, and public investments in science and engineering education. This boom came to an end with the end of the Cold War and the 1990 recession.

Rounds 1 through 3 are distinct from rounds 4 and 5 in that they principally emerged as a result of political priorities and the growth of the national security state. Although the stimuli underlying these early booms varied in validity, the alarm and the response uniformly came from government. Teitelbaum's account of rounds 1 through 3 is strongly consistent with the political business cycle literature, where incumbent politicians opportunistically engineer economic booms to ensure reelection, leaving subsequent administrations to take the blame for the long-run consequences. In contrast to traditional work on the political business cycle, Teitelbaum is concerned with a specific and narrow labor market. Yet the dynamics are the same: Politicians rustle up a science and engineering boom that is well received by voters, but in the end it's always a bust.

The gap between Soviet and American scientific capacity and the production of scientists and engineers was wildly inflated by the political class, who had an aggressive policy response that was consistently popular at the polls. In the case of Sputnik, Teitelbaum reminds his readers that efforts to launch an American satellite may have been deliberately delayed (or at least not actively rushed along) because the drama of a race to catch up with the Soviets had a greater political payoff than an earlier Project Vanguard success. The sense of crisis that Sputnik incited gave rise to the Advanced Research Projects Agency (ARPA, the predecessor of DARPA) and the National Defense Education Act. It also generated a legal precedent for the overflight of orbiting satellites that was in the interest of the Eisenhower administration, and which the Soviets had resisted. Similarly, the Apollo program and the Reagan military buildup also galvanized public opinion, pushing the costs of unsustainable booms in the science and engineering workforce into the future.

Rounds 4 and 5, in contrast, emerged as a result of lobbying of government by the private sector due to pressures from tight labor

markets that were often interpreted as “shortages.” In round 4 (1995 to 2005), information technology (IT) and telecommunications industry booms led to heavy corporate lobbying for expansive specialized temporary visa categories. In 2001, those booms famously turned to busts, but only after Congress had accepted the shortage narrative and taken action on immigration policy. Round 5 (1998 to 2008) was a biomedical industry boom coinciding with the rapid buildup of the IT sector that resulted (again through heavy lobbying) in a doubling of the National Institutes of Health (NIH) budget over five years. This boom coincided with the publication of many widely cited but analytically weak reports claiming scientist and engineer shortages, particularly the 2005 report “Rising above the Gathering Storm” from the National Academies. After the NIH doubling, the biomedical research sector experienced what has been called a “hard landing” due to changing political fortunes and a tighter budget environment. Shortage concerns in mid-2000s resulted in further infusions of money into NIH and NSF budgets through the stimulus funding package of 2009.

If the first three rounds of boom and bust highlighted the political business cycle perspective—when policymakers orchestrate booms to generate political support—the last two rounds highlight the pitfalls of interest-group politics, regulatory capture, and public choice. Lobbying by the IT industry especially exerted pressure in an otherwise reasonable policy space—immigration liberalization and reform—resulting in a set of high-skill work visa categories so carefully tailored to industry needs that the inspector general of the Department of Homeland Security called one (the L-1) “the computer visa.” The lobbying effort for temporary work visas restricted to high-skilled workers reflects what Bruce Yandle called a “bootlegger and Baptist” dynamic, whereby pecuniary interest (the “bootlegger”) combined with moral suasion (“the Baptist”) achieves a jointly desired policy outcome (Yandle was referring to the strange bedfellows that supported blue laws). Teitelbaum’s list of prominent groups advocating for changes to the L-1 and H-1B visas is a veritable “Who’s Who?” of the relevant bootleggers and Baptists in recent policy debates. Industry associations and tech companies joined with pro-science and pro-immigrant groups to reshape the temporary visa system. The special advocacy of sitting senators—Arlen Specter in the case of the NIH budget doubling and

Spencer Abraham in the case of immigration policy—was also essential.

Teitelbaum's policy recommendations are refreshingly restrained. Most of the book is directed toward identifying problems with the current system of public and private institutions that structure the science and engineering workforce, but Teitelbaum does not confuse his strong grasp of the problem with a foolproof prescription for policy. Marginal adjustments away from the most pernicious elements of the current system are proposed, but little more. Teitelbaum insists on a Hippocratic Oath for policy: Despite the dire claims of pessimists, American scientific enterprise has a successful record, so above all we should do no harm to that enterprise. Many of Teitelbaum's suggestions are common sense, but they take on new relevance in the context of the history of boom and bust that he presents. For example, he argues that we should let evidence and sound economics guide our immigration policy rather than the pleadings of high-tech companies for specially carved-out visa categories. Other recommendations are grounded in the minutiae of R&D funding mechanisms, such as the suggestion that OMB regulation of indirect costs on research contracts and grants should not provide additional incentives for universities to use debt financing to expand research facilities. Certain substantial problems identified by Teitelbaum, such as the perverse incentives professors face to overproduce graduate students, do not appear to have any easy solutions.

Those who want to push government out of the scientific enterprise will not be completely satisfied with Teitelbaum's discussion of policy options. Teitelbaum believes that the public sector has a vital role to play in supporting American science. But as a seasoned policy analyst he is deeply skeptical of claims about public-mindedness in the actual implementation of science policy, making him an ideal guide for understanding a workforce that is lionized, but not well understood by either the public or most policymakers. Despite policy differences that readers may have with Teitelbaum, the concerns he raises about booms and busts in the scientific workforce (due in large part to failures of public policy) should command broad interest.

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