

Doganova, Liliana

**Article**

## Discounting the future: A political technology

economic sociology\_the european electronic newsletter

**Provided in Cooperation with:**

Max Planck Institute for the Study of Societies (MPIfG), Cologne

*Suggested Citation:* Doganova, Liliana (2018) : Discounting the future: A political technology, economic sociology\_the european electronic newsletter, ISSN 1871-3351, Max Planck Institute for the Study of Societies (MPIfG), Cologne, Vol. 19, Iss. 2, pp. 4-9

This Version is available at:

<https://hdl.handle.net/10419/175572>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# Discounting the future: a political technology

Liliana Doganova

## The political qualities of discounting

A recent article in the *New York Times* reported exciting news from research in psychology and neuroscience: what best distinguishes us from other animals is that “we contemplate the future” (Seligman and Tierney 2017). We should not call ourselves “Homo sapiens” but “Homo prospectus” (Seligman et al. 2016). Psychologists and neuroscientists have discovered that looking into the future, consciously or unconsciously, is a central function of our brain. The article mentions, for example, a study of 500 adults in Chicago that showed that they thought about the future three times more often than about the past; and even when they thought about the past, they could not help thinking about the future implications of the past events that they recalled.

This perspective stands in contrast with the arguments developed in the sparse but now burgeoning literature in economic sociology that has delved into the issue of the future. Sociologists and historians have shown that looking at the future is not an inherent characteristic of human beings, solidly anchored in their brains, but an ability, a habit, that they have acquired gradually, and sometimes painfully. The foundational work of scholars such as Max Weber (1930), Pierre Bourdieu (1963), or Sidney Pollard (1965) suggests that learning to look at the future, and envisaging this future as open-ended, distinct from the past, and ripe with opportunities, has been central to the development of capitalism. More recently, Jens Beckert (2016) has emphasized the ongoing relationship between the dynamics of capitalism and actors’ temporal dispositions – more precisely, their ability to form “fictional expectations” about the future. Studies of the economy that take inspiration from science and technology studies (Callon 1998; MacKenzie 2006) have shed light on how valuation devices and calculative

tools derived from management and economics shape the future we see (Giraudeau 2011; Pollock and Williams 2016) – and hence the future we will live in (the “present future” and the “future present” in Luhmann’s [1976] terms).

Looking at the future means making the future count in the present. Interestingly, when one examines precisely how the future is looked at, through what lens, and with what instruments, it appears that we tend to *discount* the future, rather than to make it count. Discounting the future is a stylized fact and a central tenet in economics. Because of individuals’ inherent preference for the present and the uncertainty and risk associated with the future, which by definition cannot be known, economists’ argument goes, the future is and should be (the descriptive/prescriptive line is often ambiguous in economics) worth less than the present. It is, and has to be, “discounted” when made commensurate with the present. The scale of discounting, the extent to which the value of the future is reduced in comparison with the present, is what economists call the “discount rate.” A discount rate equal to zero means that the future is given as much

**Liliana Doganova** is associate professor at the Center for the Sociology of Innovation, MINES ParisTech. At the intersection of economic sociology and Science and Technology Studies, her work has focused on business models, the valorization of public research, and markets for bio- and clean-technologies. She has published in journals such as *Research Policy*, *Science and Public Policy* and the *Journal of Cultural Economy*, and she is currently preparing a monograph on the historical sociology of discounting.

weight as the present. A discount rate equal to 4 percent means that the “present value” of 100 euros that one will receive in one year is no more than 96 euros. And the more distant the future is, the more it gets discounted.

Discounting the future is often presented as a neutral economic tool, which reflects the actors’ natural dispositions to prefer the present or resent uncertainty, and which enables us to make decisions based on rational calculation rather than on subjective judgments or even mere gut feeling. The argument developed in this article is quite different. Discounting the future, I will argue, is a political technology. Economic sociologists should approach instruments such as discounting like science and technology scholars have approached artifacts such as bridges (to take Langdon Winner’s [1980] famous – although since then contested – example): that is, like objects that have politics. The objective of this article is to delineate the key “political qualities” (Barthe 2009) of discounting the future.

The first and certainly most obvious political quality of discounting is related to its role in making collective decisions about resource allocation. Let me illustrate this with a fictitious example drawn from my

work on valuation practices in drug development (Doganova 2015). Imagine a pharmaceutical company faced with the following question: what is the value of a future drug that the company's research department is proposing to develop? Is it worth investing in research on the molecules that might, one day, lead to the envisaged future drug? Or is another development project more worthy? Such questions are addressed with the help of discounting. A formula, known as "discounted cash flow" (DCF) or "net present value" (NPV), is used to assess the value of a future drug and decide whether it should be developed. The future costs and revenues that the drug development project will generate during its life-span are estimated, and all of them are discounted, so that, say, the costs incurred two years from now are made commensurate with the revenues achieved in ten years' time. The sum of all these discounted future flows indicates the "net present value" of the future drug. The rule is then simple: if this value is positive, the drug is worth developing.

This fictional situation is certainly less complex than a real one: there would be many competing projects, resources may not be so scarce, and decisions hardly rely on economic calculations alone. Still, discounting techniques are the most widespread tool that firms use to assess projects. In a survey on the valuation practices of US companies operating in different industries, 70 percent of the respondents (chief financial officers) declared they used discounting (more precisely, discounted cash flow) "always or almost always" to decide which projects to finance (Graham and Harvey 2001). This is in no way surprising, since the discounting formula and the present value rule are one of the first things that a business school student learns. They are one of the first things that the reader of a corporate finance textbook is introduced to.

Governments, too, use discounting to make decisions about investments, but also about a number of other matters that are increasingly thought of as investments: for example, whether to pass environmental regulations or whether to provide social services. For example, the decision to pass environmental regulations relies on comparison of the costs that such regulation would incur for industry now, and the benefits that it will bring for society in the future (for example, the value of the human lives that it will help to save), with these benefits being discounted because they occur later in time.

Discounting is a political technology in so far as it assists collective decisions about resource allocation: which drug to develop, and more broadly, which project to invest in. Decisions about the allocation of resources are also decisions about the direction of innovation activities and hence about the groups whose needs will be taken care of and the new entities that will

be brought into existence in order to do so: the patients whose disease might be cured and the drugs, devices or other treatments that these patients will live with.

Three other political qualities of discounting will be discussed in the remainder of this article, which are related, respectively, to questions of ontology, government, and identity. Discounting is an economic tool that leaves an enduring imprint on the objects that it encounters and shapes the characteristics of the entities that compose our world. It is an instrument for governing behavior that guides decision-making in a myriad of places and instances through discrete but no less consequential interventions. It problematizes the very separation of the present and the future by framing the debates that link our actions in the present to those who will endure their effects in the future.

These three political qualities of discounting will be discussed through examples drawn from three key episodes in the history of discounting (Doganova, forthcoming). The first episode corresponds to one of the first applications of the financial technique of discounting to "real," that is non-financial, assets, in the writings of German foresters in the middle of the nineteenth century. The second episode takes place in the middle of the twentieth century, when discounting the future spread into the practices of corporations, in particular through the discipline of capital budgeting. The third episode is related to the increasing importance of discounting in addressing environmental issues; it will be sketched through two brief examples: the challenges of banning asbestos in the 1980s in the United States, and current debates on discount rates and climate change. None of these episodes will be treated with the rigor it deserves; the objective of this cursory glance at the history of discounting and its political qualities is to give the reader a sense of how we have come to look at the future in such a way – by discounting it – and why this matters.

## Valuing and managing

Forests were one of the first "real" objects to which the technique of discounting the future was applied (for a more detailed analysis of this episode, see Doganova 2018). To understand the reasons for this encounter between discounting and forests, and its implications, let us briefly examine two articles published in 1849 in the *General Journal of Forests and Hunting*, authored by two German foresters and mathematicians, Edmund Franz von Gehren and Martin Faustmann (von Gehren 1968; Faustmann 1968).

The problem that served as a starting point for these articles was how to "determine the money value

of bare forest land.” This problem was raised by the implementation of legislation requiring that areas of forest be converted into agriculture, and the need to ascertain the price that should be paid to the foresters who were to sell their land. To address this problem, von Gehren gave the following example. Consider bare land suitable for scots pine grown on a rotation of 80 years. The land will produce a series of yields, with thinnings every 10 years and the final cut in 80 years’ time. The volume of wood thus produced can be converted into monetary units, and then discounted at a rate of interest of 4 percent per annum to obtain its present value. The sum of these discounted future flows of money indicates the present value of the plot of forest land.

According to this reasoning, the value of forest land stems neither from the past (for example, the efforts put into caring for the land and trees) nor from the present (the current market price of wood), but from the future (the yields that the land will produce if put to a certain kind of use). This future, from which the land derives its value, is formed by a flow of money coming in and out, a series of costs and revenues expressed in monetary units. Thus depicted, forest land becomes comparable to a financial asset which consumes and generates money. The space of commensuration thus created introduces the possibility of an alternative scenario: instead of putting his money in growing a forest, the landowner could put it in the bank and obtain interest. The crucial operation of discounting is to factor this alternative scenario into the valuation of the forest land. It is because money is “locked in” the land that future flows should be discounted. The discount rate here is equal to the rate of interest (4 percent) because it encapsulates the alternative scenario of putting money in the bank.

Two implications of the form of reasoning involved in discounting the future should be highlighted. The first lies in transforming the forest owner into an investor, and transforming forest land into capital, whose value is comparable to that of other forms of capital. The second implication was expressed by one of the authors himself:

“The practical importance of this calculation is easy to see. From it we obtain the necessary information on the forest value in such cases as voluntary and enforced sales (expropriation), destruction of the forest by fire, insects, man, etc., and assessment of the most advantageous silvicultural system and length of rotation.” (Faustmann 1968)

Discounting the future thus allows us not only to calculate the value of a forest, but also to maximize this value by fine-tuning forest management and determining, in particular, the moment when trees should

be cut. It turned out that the lengths of rotation recommended by the discounting technique were shorter than the ones then being practiced. The immediate consequence of discounting, hence of giving time a cost, is precipitation and haste: the need suddenly appeared to cut trees earlier than previously thought, since the long term entailed a loss of value. This discrepancy raised vivid controversies and Faustmann’s discounting formula was not used for years, before it became a classic reference in forestry economics.

Focusing on the effects that discounting produces on the objects to which it comes to be applied, this example sheds light on another of its political qualities. A forest whose value is calculated by discounting the future is not the same forest as one whose, say, annual income is calculated. Statements about how much things are worth are statements about what things are, or what they should be. It is also in this sense that discounting is a political technology.

## Governing investment

Discounting the future remained a marginal and highly contested technique until the middle of the twentieth century. Its spread was related, among other things, to the development of a novel discipline called capital budgeting. Capital budgeting was born to address a novel problem: how to measure the value of capital and choose the right investments; in other words, how to employ capital so as to maximize its value. This problem was novel, in so far as capital itself was a relatively novel category in firms’ practices: it is only at the beginning of the twentieth century that investments were isolated from current expenditure and classified in a separate account (Haka 2006). Identifying investments as a specific category allowed for measuring the “return on investment,” which compared the profits generated with the amount of capital employed, and thus opened the way for rewarding capital with a specific price for its services, rather than with the generic rate of interest.

One of the first and most influential textbooks on capital budgeting was authored by Joel Dean, professor of economics at Columbia University and founder of the consulting firm Joel Dean Associates, who played a central role in the promotion of discounting as a tool for valuing investments (Doganova 2014). The first sentences of the textbook are illuminating with regard to the broader narrative in which discounting developed:

“This book is concerned with the economics of capital budgeting—that is, the kind of thinking that is necessary to design and carry through a systematic program for invest-

ing stockholders' money. Planning and control of capital expenditures is the basic top-management function, since management is originally hired to take control of stockholders' funds and to maximize their earning power." (Dean 1951, 51)

A novel conception of the manager emerges in these lines. For the manager whose duty lies in minimizing costs is substituted an "investing manager" whose duty lies in maximizing the value of the funds he has been entrusted with. He has to choose the right investments, so as to spend stockholders' money in the most profitable way. To make such choices, faced with the many investment proposals that are addressed to him, the manager is advised to rely on eleven principles that are clearly stated in the textbook, including: the focus on "future profit," "the comparison of future costs and profits with the relevant alternatives," and "the discounting of future flows, in order to take into account the decreasing value of revenues that are distant in time."

This example illustrates another political quality of discounting: its ability to serve as an instrument for governing behavior. Peter Miller (1991) has made this argument by showing how the UK government in the 1960s envisaged discounting as a means to act at a distance on firms' investment decisions. In the example examined here, discounting appears again as a means to act at a distance, but the agency to which it contributes is that of stockholders. Such action at a distance relies on (at least) two mechanisms.

First, discounting was promoted as a tool that can ensure rational decision-making. The managers that Dean describes in his textbook are left alone and take arbitrary decisions based on subjective judgment, with no other guide than "intuition" and "authority." They crucially lack "expert analyses and scientific control." Discounting is depicted as a promise to make the right decisions, based on rational calculation. This promise is at the heart of the project of "managerial economics"—a domain that Joel Dean, again, is credited with pioneering with another book published in 1951 and aiming to import economic theory into corporate practice in order to rationalize managerial decision-making (Zeff 2008). The requirement of rationality is supported by moral and political arguments: money belongs to stockholders; it is to them that managers are accountable; it is in their name that they have to act, that is, to invest.

A second mechanism lies in the definition of the discount rate. In the calculations of the German foresters discussed above, the discount rate was simply the rate of interest. When discounting became involved in the relationship between managers and stockholders, the meaning of the discount rate

changed. Future flows were to be discounted using a different number: not the rate of interest, but the "cost of capital," which reflects the cost for the firm of two types of capital (debt and equity); that is, the returns required by two types of stockholders (bondholders and shareholders). The key issue was no longer that time had a cost or that the future was distant and uncertain, but that capital should be rewarded for the services it renders, for the profits it generates. The future, in a way, disappeared. The redefinition of the discount rate went hand in hand with a rise in discount rates. By way of example, according to its annual report, in 2004 the pharmaceutical company Eli Lilly used a discount rate of 18.75 percent. The contrast with the nineteenth-century foresters' discount rate of 4 percent is striking. Is this rate too high? What is the right discount rate? This question is at the heart of the debates on discounting in environmental and climate policy, to which I will now turn.

## Problematizing the separation between the present and the future

In the early 1980s, the US Environmental Protection Agency drafted several proposals to ban asbestos, and then suddenly withdrew them. The Energy Committee of the House of Representatives commissioned a report, which revealed the role played by the White House Office of Management and Budget. The Office had recommended that the decision to ban asbestos should be based on a cost-benefit analysis: if the costs that regulation would incur for industry were higher than the benefits of saving human lives, regulation would not be justified. The Office had recommended, further, that estimates of the costs and benefits of regulating asbestos apply a discount on the value of a human life for the years it takes for cancer to develop. More precisely, the office assigned an arbitrary value of 1 million dollars to every life saved. But this value was to be discounted down to 22,000 dollars if cancer remains latent and causes death 40 years later. For the Office, explained an article in the *New York Times*, "the practice of discounting reflects the amount of time it takes to get a return for money spent now to protect lives" and "allows available resources to be used more rationally to save more lives" (Shabecoff 1985).

The report of the Energy Committee described this discounting theory as "morally repugnant." If widely adopted, the report added, the practice could "thwart regulation of many toxic substances through the application of cost-benefit criteria" and the nation would "fail to protect future generations from many serious chemical hazards." In 1992, the Office of Man-

agement and Budget published a circular revising its recommended discount rates, bringing them down from 10 percent to 7 percent. In 2003, another circular further revised recommended discount rates, distinguishing, in particular, between “intra-generational” and “inter-generational” discounting:

“Special ethical considerations arise when comparing benefits and costs across generations. Although most people demonstrate time preference in their own consumption behavior, it may not be appropriate for society to demonstrate a similar preference when deciding between the well-being of current and future generations. Future citizens who are affected by such choices cannot take part in making them, and today’s society must act with some consideration of their interest.”

How to deal with such “ethical considerations”? The circular proposed a first solution: use the same discount rates as in the intra-generational case, but “supplement the analysis with an explicit discussion of the intergenerational concerns: how future generations will be affected by the regulatory decision.” This solution, the circular admitted, does not take into account the arguments of those who believe that “it is ethically impermissible to discount the utility of future generations” and that “government should treat all generations equally.” The circular concluded that lower, but still positive, discount rates should be used even in inter-generational discounting.

The link between discount rates and future generations has been much debated, in particular following the publication of the Stern Review on the economics of climate change, which recommended the use of very low discount rates precisely for the purpose of giving weight to future generations (Stern 2006). These debates make visible the ongoing transformation of the discount rate: its definition translates new concerns and outlines a new entity – future generations – whose characteristics are gradually refined as the controversies unfold.

One of the reasons often put forward to justify discounting is that future generations will be richer and more knowledgeable, which would allow them to solve climate issues better than we can do today. This hypothesis is increasingly being called into question. Some argue that those future generations that will have more and know more are not necessarily those that will be most affected by the consequences of climate change. Some economists suggest using multiple discount rates, corresponding to different populations:

present and future, rich and poor. If it is today’s rich who pay the climate policies that will benefit tomorrow’s poor, discount rates should rather be negative, giving greater weight to the latter. Whose future generations are we talking about, some ask, the future generations of us, the rich who can pay, or the future generations of the poor, who will probably suffer most from the effects of our actions?

Of particular interest for our exploration of the political qualities of discounting is how in these debates the present/future distinction gets coupled with a rich/poor distinction. The discount rate thus appears in a new light: as a technology that produces inequalities, which are both temporal (a future individual is worth less than a present individual) and geographical (for a unique discount rate does not account for the differentiated impacts of climate change across the planet). It is also in this sense that discounting the future is a political technology: these debates engage collective decisions about the sacrifice that “we” are ready to pay for “our” future, or for the “present” of the “future generations” in the multiple forms that they can take. These decisions also relate to the investments that are worth making, and the new entities (drugs, forests, and so on) that are worth bringing into existence. They also question the novel forms of social organization that should, or should not, be invented so that we can make the future count in our everyday activities, rather than discount it. What is at stake here is the kind of “we” that such decisions shape.

This final example illuminates the specificity of discounting with regard to other technologies of the future that have been studied in the literature in economic sociology and science and technology studies, which take the form of promises, expectations, projections, models, plans, scenarios, and so on (for a few varied examples, see Brown and Michael 2003; Sunder Rajan 2006; Dahan 2007; Giraudeau 2011; Andersson and Prat 2015). The particular nature of discounting lies in the ways in which it problematizes the very separation between the present and the future. Varying the discount rate means moving the slider back and forth in time. The problem, then, does not have to do with projecting the present into the future, or with mobilizing the future in the present, but with balancing the present and the future and drawing lines between them. The present and the future are consubstantial to the instrument of discounting, and this is probably the most intriguing of its political qualities.

## References

- Andersson, J., and P. Prat. 2015. "Gouverner le long terme. La prospective et la production bureaucratique des futurs en France." *Gouvernement et action publique* 3, 9–29.
- Beckert, J. 2016. *Imagined Futures: Fictional Expectations and Capitalist Dynamics*. Cambridge: Harvard University Press.
- Bourdieu, P. 1963. "La société traditionnelle. Attitude à l'égard du temps et conduite économique." *Sociologie du travail* 1, 24–44.
- Brown, N., and M. Michael. 2003. "A Sociology of Expectations: Retrospecting Prospects and Prospecting Retrospects." *Technology Analysis and Strategic Management* 15(1), 3–18.
- Callon, M. (ed.). 1998. *The Laws of the Markets*. Oxford: Blackwell.
- Dahan, A. (ed.). 2007. *Les modèles du futur*. Paris: La Découverte.
- Dean, J., 1951. *Capital Budgeting. Top-management Policy on Plant, Equipment, and Product Development*. New York (N.Y.): Columbia University Press.
- Doganova, L. 2014. "Décompter le futur: la formule des flux actualisés et le manager-investisseur." *Sociétés Contemporaines* 93(1), 67–87.
- Doganova, L. 2015. "Que vaut une molécule ? L'utilisation de la formule des flux de trésorerie actualisés dans les projets de développement de nouveaux médicaments." *Revue d'Anthropologie des Connaissances* 9(1), 17–38.
- Doganova, L. 2018. "Discounting and the Making of the Future: on Uncertainty in Forest Management and Drug Development." In *Uncertain futures: Imaginaries, Narratives and Calculation in the Economy*, by J. Beckert and R. Bronk (eds). Oxford: Oxford University Press (forthcoming).
- Doganova, L. Forthcoming. *Discounted Future*. New York: Zone Books.
- Faustmann, M. 1968 (1849). "Calculation of the Value which Forest Land and Immature Stands Possess for Forestry." In *Martin Faustmann and the Evolution of Discounted Cash Flow. Two articles from the original German of 1849*, by M. Gane (ed.). Oxford: Commonwealth Forestry Institute, University of Oxford.
- Giraudeau, M. 2011. "Imagining (the Future) Business: How to Make Firms with Plans? In *Imagining Organizations: Performative Imagery in Business and Beyond*", by P. Quattrone, N. Thrift, C. McClean, and F.-R. Puyou (eds), 213–229. Abingdon: Routledge.
- Graham, J., C. Harvey. 2001. "The Theory and Practice of Corporate Finance: Evidence from the Field." *Journal of Financial Economics* 60(2–3), 187–243.
- Haka, S. 2006. "A Review of the Literature on Capital Budgeting and Investment Appraisal: Past, Present, and Future Musings." In *Handbook of Management Accounting Research*. C. Chapman, A. Hopwood, and M. Shields (eds). Oxford: Elsevier.
- Luhmann, N. 1976. "The Future Cannot Begin: Temporal Structures in Modern Society." *Social Research* 43(1), 130–152.
- MacKenzie, D. 2006. *An Engine, Not a Camera: How Financial Models Shape Markets*. Cambridge: MIT Press.
- Miller, P. 1991. "Accounting Innovation Beyond the Enterprise: Problematising Investment Decisions and Programming Economic Growth in the United Kingdom in the 1960s." *Accounting, Organizations and Society* 16(8), 733–762.
- Pollard, S. 1965. *The Genesis of Modern Management. A Study of the Industrial Revolution in Great Britain*. London: Edward Arnolds Publishers.
- Pollock, N., R. Williams. 2016. *How Industry Analysts Shape the Digital Future*. Oxford: Oxford University Press.
- Seligman, M. E. P., P. Railton, R. F. Baumeister, and C. Sripada, 2016: *Homo Prospectus*. New York, NY: Oxford University Press.
- Seligman, M. E. P., and J. Tierney. 2017. "We Aren't Built to Live in the Moment." *The New York Times*, May 19. <https://www.nytimes.com/2017/05/19/opinion/sunday/why-the-future-is-always-on-your-mind.html>
- Shabecoff, P. 1985. "Budget Office Attacked over Rules for Asbestos." *The New York Times*, October 4. <http://www.nytimes.com/1985/10/04/us/budget-office-attacked-over-rules-for-asbestos.html>
- Stern, N. 2006. *Stern Review on the Economics of Climate Change*. Cambridge: Cambridge University Press.
- Sunder Rajan, K. 2006: *Biocapital: The Constitution of Postgenomic Life*. Durham, NC: Duke University Press.
- Von Gehren, E. 1968 (1849). "On the Determination of the Money Value of Bare Forest Land." In *Martin Faustmann and the Evolution of Discounted Cash Flow. Two articles from the original German of 1849*, by M. Gane (ed.). Oxford: Commonwealth Forestry Institute, University of Oxford.
- Weber, M. 1930. *The Protestant Ethic and the Spirit of Capitalism*. London and Boston: Unwin Hyman.
- Winner, L. 1980. "Do Artifacts Have Politics?" *Daedalus* 109(1), 121–136.
- Zeff, S. 2008. "The Contribution of the Harvard Business School to Management Control, 1908–1980." *Journal of Management Accounting Research* 20, 175–208.