

# Classic Questions, New Context: Development in an Era of Bits and Bytes

*Taylor Boas and Thad Dunning*

Students of development have long granted a privileged role to technological change. For classical political economists such as Smith and Marx, technological advancement provided the ultimate driver of changes in the division of labor, with all of its economic, social, and political consequences. Modernization theory also accorded technology a central role: Rostow's (1960) famous five stages of growth were largely about increasing technological mastery over the environment, and scholars such as Lerner (1958) and Pye (1963) considered communication technology an essential engine of economic progress. For theorists of the global product cycle (Vernon, 1971), dependency (Cardoso and Falleto, 1979), and other schools of thought, the mode of technology transfer from rich to poor countries either constituted a limitation on national economic development in the South or significantly shaped the character and internal distribution of resulting economic growth (Evans, 1979). No matter what the theoretical perspective, one would be hard-pressed to give a comprehensive account of any episode of long-run economic development, political conquest, or social change without reference to the role of technology.

The recent rise of the "digital economy" therefore presents today's development scholars with important opportunities and challenges. Digitization, or the ability to store and transmit data in binary form as a series of 1s and 0s, is the common denominator that underlies such trends as greater interconnectivity and data replicability, increases in the speed and decreases in the cost of communication, and the rise of new industries such as the Internet and mobile telephony. With respect to the history of information and communication technologies (ICTs), digitization clearly constitutes a revolution, enabling people to connect with each other

---

Taylor Boas is a Ph.D. candidate in political science at the University of California, Berkeley, and co-author of *Open Networks, Closed Regimes: The Impact of the Internet on Authoritarian Rule* (Carnegie Endowment for International Peace, 2003).

Thad Dunning is a Ph.D. candidate in political science at the University of California, Berkeley. His previous work on international development has appeared in journals such as *International Organization*, *The Journal of Conflict Resolution*, *Studies in Comparative International Development*, and *Geopolitics*.

*Studies in Comparative International Development*, Summer 2005, Vol. 40, No. 2, pp. 3-8.

across time and space in fundamentally new ways. Yet it remains to be seen whether the economic, political, and social impact of this Digital Revolution will be comparable to that of the Industrial Revolution or other major periods of technological breakthrough in the past.

In this special issue, we take up the task of formulating specific questions that will help us to assess the significance of the Digital Revolution. While we must leave definitive answers to further research—and perhaps to future generations of scholars—the contributions to this issue shed light on the consequences of digitization for classic issues in the study of development. How will digitization transform the nature of the institutions, and particularly the property rights regimes, that govern the global distribution of property and wealth? What are the consequences of an increasingly digitized global economy for the character of relations between rich and poor countries, and how is digitization transforming the struggle to define winners and losers from particular types of technological change? How does digitization shape patterns of labor mobility, both within and across countries, and what are the consequences for economic and social welfare?

Given the magnitude of these questions, one might expect the global diffusion of digital technologies to figure centrally in today's development research. Among development practitioners, there has been no shortage of attention to ICTs, as witnessed by numerous reports from the World Bank<sup>1</sup> and from non-governmental organizations dedicated to bridging the "digital divide."<sup>2</sup> Technology specialists have also researched the diffusion of the Internet and mobile telephony in developing countries and sought to identify the determinants of cross-national variation in these processes.<sup>3</sup> While often unparalleled in their familiarity with technical details and on-the-ground realities, however, these studies tend to focus on the development of particular ICTs or the failure or success of specific ICT projects rather than the import of ICTs for development "writ large."

For its part, the theoretically-driven study of development in such disciplines as political science, sociology, economics, and geography has not maintained a sustained dialogue with the research on digital ICTs in developing countries.<sup>4</sup> While issues such as inequality, labor, migration, and property rights are well established within the mainstream of development studies, the analysis of ICTs and development mostly remains the province of specialized journals.<sup>5</sup> When sociologists, economists, or political scientists do examine digital technologies in the developing world, they are typically studied within the context of a particular industry rather than a crucial independent variable that may be transforming traditional dimensions of development. For one who believes that the Digital Revolution ultimately implies a revolution in international development, the situation at present would be akin to the earliest research on assembly-line production methods being grouped together under the narrow subfield of "automotive studies."

Posing and beginning to answer questions about digitization and development thus constitutes an important research agenda for development scholars. If, as Steven Weber and Jennifer Bussell argue in their contribution to this special issue, future economic and social historians "look back on the invention of the microprocessor and a few associated technologies as being revolutionary on at least the scale of the internal combustion engine and electricity" (62), it would be a shame for scholars who were present at the creation not to have at least asked large-scale questions

about the import of ICTs for development. Therefore, in an effort to unify cutting-edge research on digital ICTs with the theoretically-informed study of development in the global South, we have invited leading scholars in these two fields to contribute to “The Digital Revolution and International Development,” a special issue of *Studies in Comparative International Development*.<sup>6</sup>

In soliciting papers for this special issue, we asked contributors to address how specific technological changes enabled by digitization affect classic issues in the study of development, such as those mentioned above. While this particular framing treats technological change as an independent variable, the contributions we received forcefully remind us that it is never a truly exogenous one. On the contrary, the very nature of the Digital Revolution depends upon the social, economic, and political variables that it is also hypothesized to affect. We return to this issue of endogeneity below, following a brief synopsis of the contributions to this issue.

### The Contributions

Carolyn Cartier, Manuel Castells, and Jack Linchuan Qiu open the special issue with an examination of the rise of the “information have-less” in China, whose use of lower-end ICTs illustrates not only that the gains of digitization can be distributed unequally within countries of the South, but also that such stratification is more complex and nuanced than is suggested by the binary distinction between information “haves” and “have-nots.” Rural-to-urban migrants, laid-off workers, state-sector employees, pensioners, and other low-income groups that populate the have-less category constitute an enormous user base for a range of lower-end ICTs in China. These technologies include prepaid phone cards, short message service (SMS), Internet cafés run by small-scale private entrepreneurs, and “Little Smart” telephones—wireless extensions of the fixed-line telephone network that function like mobile phones within a delimited area. Yet the development of many of these technologies has been either neglected or restricted by the state and does not constitute a serious priority for China’s telecommunication firms, possibly because of the subordinate economic position of the information have-less and the inferior social image attached to rural-to-urban migrants. Despite these constraints, the group has proven adept at utilizing low-end ICTs to form “translocal networks” that span distinct urban localities and facilitate self-help solutions to everyday problems. In the context of informality and a general social atomization that characterizes the lives of many rural-to-urban migrants, ICT-enabled translocal networks serve crucial functions for the have-less, facilitating their mobility and helping them survive in the difficult environment in which the urban underclass in China continues to reside.

AnnaLee Saxenian’s contribution takes up the question of international rather than translocal networks, arguing that in certain sectors and countries, the familiar phenomenon of “brain drain” is being transformed into “brain circulation”—a two-way flow of human capital between North and South that challenges many assumptions of traditional core-periphery models of the global economy. Historically, the South’s most highly skilled elites have immigrated to the North in large numbers because of the superior education and employment opportunities. In recent years, however, scientists and engineers from Taiwan, China, and India have increasingly returned home after completing their training in U.S. universities and working for a

period of time in Silicon Valley firms. Many such elites move back precisely because of the new business opportunities in their home countries and their unique ability to take advantage of them, given a familiarity with local conditions. Their use of ICTs helps them remain embedded both in the business culture of Silicon Valley and the very different environment back home. Saxenian focuses on the case of returnees establishing domestic venture capital firms, which can have broader developmental benefits because they fund local innovation and entrepreneurship. Nonetheless, her analysis also raises questions about the distribution of these benefits and the generalizability of the brain-circulation model to other countries of the South. In particular, the developmental benefits of brain circulation in India and China may remain concentrated in particular sub-national regions. Moreover, the model may be difficult to extend to countries that lack well-developed high-tech education, relative economic and political stability, and active expatriate networks.

Moving from a meso- to a macro-level of analysis, Steven Weber and Jennifer Bussell propose two distinct scenarios of how the increasing economic importance of knowledge-intensive digital goods may reshape existing property rights regimes and, ultimately, the distribution of power in the global political economy. In their “imperialism of property rights” scenario, the United States and other rich Northern countries continue to exercise their power in international institutions, such as the World Trade Organization, to enforce U.S.-style intellectual property rights. Such a move might engender a major backlash against American hegemony—possibly an alliance led by China with the support of other major Southern economies such as India and Brazil—which could contribute to multiple incompatible systems of property rights in the global economy. In a contrasting “shared global digital infrastructure” scenario, freely-available open-source software code serves as the basic infrastructure for a global digital economy and as a model for property rights regimes in such industries as music and pharmaceuticals.<sup>7</sup> This second scenario is plausible because of the non-rival and often non-excludable character of digital goods, which makes monopoly control of patented technology increasingly difficult to enforce,<sup>8</sup> and also because of the economic and political advantages open source software may offer to actors as diverse as IBM, Merck, and the governments of Brazil and South Africa. As Weber and Bussell suggest, property rights regimes in digital goods will likely evolve to a point somewhere between the two ideal types that frame their analysis. What is clear, however, is that the ultimate outcome and the struggle to define it will carry profound implications for the global political economy of the twenty-first century.

Finally, Peter Evans offers a comment on the developmental and welfare consequences of each of Weber and Bussell’s scenarios. Control of digital goods may be elusive, but, given their characteristic network externalities,<sup>9</sup> such control is also extremely valuable. Thus, if Northern firms succeed in enforcing their politically-protected intellectual property rights and extending them to new realms, they will be able to appropriate the great majority of the returns from the digital economy. By stifling innovation and concentrating wealth, a “second enclosure movement” of this sort would have deleterious consequences for development. On the other hand, the emergence of a digital commons or shared global digital infrastructure could potentially shift the returns from digital innovation in favor of the South, while simultaneously promoting high levels of innovation and growth worldwide. While

enthusiastic about the possibilities offered by a digital commons, however, Evans remains somewhat skeptical. He argues that the emergence of a shared global digital infrastructure depends both on the unlikely strengthening of a political coalition in the North that opposes the continued expansion of the incumbent property rights regime, and on the ability of Southern states and private-sector actors to embrace and promote open source models of property rights. Whether one is skeptical or optimistic, however, the relative strength of actors on both sides of this emerging struggle is ultimately an empirical question. Thus, Evans points the way towards a new research agenda focused on the political struggle to define property rights in digital goods.

On the whole, the contributions to this special issue highlight the effects of digitization on a wide range of classic issues in the study of development, as well as the fact that the Digital Revolution is endogenous to many of these same traditional variables. Low-end digital ICTs both facilitate and transform social networks among rural-to-urban migrants and other city dwellers in China, yet the characteristics of the technologies used by the information have-less to construct these networks are a product of their own socioeconomic marginalization as well as struggles between state firms, state bureaucrats, and new economic elites. Digitization has facilitated the pattern of brain circulation and the establishment of venture capital industries in Taiwan, India, and China, but the strength of these countries' digital linkages to Silicon Valley has also depended upon their attractiveness as investment destinations and sources of inexpensive skilled labor. And while digitization raises the possibility of a new, profoundly different kind of "commons" that offers huge developmental opportunities to public and private actors of the South, the ultimate configuration of property rights regime for digital goods will depend heavily on the power and interests of current stakeholders.

Despite the complexity of the causal relationship between the growth of digital ICTs and classic issues in the study of development, the contributions to this special issue clearly illuminate new and intriguing connections. The articles jointly address a number of common themes: the role of the state in promoting development, the transferability and adaptability of technology and business models, the challenges and potential benefits of controlling digital information, the transformation of the meaning of social connectedness and community, and, perhaps above all, the future of the North-South divide. We return to each of these themes in the Conclusion to the issue, exploring points of debate and areas of agreement, summarizing generalizable findings, and proposing areas for future research.

## Notes

1. See, e.g., World Bank (1999) *World Development Report 1998/99* and Hanna, Boyson, and Gunaratne (1996).
2. See, e.g., InfoDev ([www.infodev.org](http://www.infodev.org)) and Bridges.org ([www.bridges.org](http://www.bridges.org)).
3. See numerous articles published in *Telecommunications Policy*, as well as various reports by members of the Mosaic Group (<http://mosaic.unomaha.edu/gdi.html>).
4. To be sure, there are exceptions to these characterizations—among them, the prior work of contributors to this volume (Castells, 1996–1997, 2001; Evans, 1995; Weber, 2004; see also Wilson, 2004).
5. It is much more common to find cutting-edge research on ICTs and development in journals such as *The Information Society* and *Information Technology and International Development* than in broader development journals such as *World Development* and *Studies in Comparative*

*International Development*, or in leading disciplinary journals in sociology, economics, or political science.

6. Drafts of the papers in this special issue were presented at a symposium at the University of California, Berkeley, on February 2, 2005. The symposium was co-sponsored by *Studies in Comparative International Development* and the Institute of International Studies, University of California, Berkeley.
7. "Open source" means that the source code—lines of written instructions to the computer that are the building blocks of any software program—is readily available for viewing and customization by users. The source code for a product like the Linux operating system is freely distributed (unlike the source code for Microsoft's Windows, which is a jealously guarded trade secret), and the product is maintained and upgraded by programmers working around the world. As Weber (2004) notes, "free" in this context does not necessarily imply "without cost"—open source software is free in the sense of "free speech" rather than "free lunch."
8. A good is considered non-rival if one's ability to consume that good is not diminished by the consumption of others; an example is a television program. A good is considered non-excludable if it is difficult or impossible to prevent others from using it. If a television program is broadcast over the air, it is non-excludable.
9. A network externality occurs when a product becomes more valuable to the user as more and more people use it. For example, the more people who use a word processor that is compatible with mine, the more valuable that particular word processor is to me, because we can easily exchange files.

## References

- Cardoso, Fernando Henrique, and Enzo Faletto. 1979. *Dependency and Development in Latin America*. Berkeley: University of California Press.
- Castells, Manuel. 1996–1997. *The Information Age: Economy, Society, and Culture*. 3 volumes. Malden, MA: Blackwell.
- Cartier, Carolyn, Manuel Castells, and Jack Linchuan Qiu. 2005. "The Information Have-Less: Inequality, Mobility, and Translocal Networks in Chinese Cities." *Studies in Comparative International Development* 40, No. 2: 9–34.
- Castells, Manuel. 2001. *The Internet Galaxy: Reflections on the Internet, Business, and Society*. New York: Oxford University Press.
- Evans, Peter. 1979. *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*. Princeton, NJ: Princeton University Press.
- Evans, Peter. 2005. "The New Commons vs. The Second Enclosure Movement: Comments on an Emerging Agenda for Development Research." *Studies in Comparative International Development* 40, No. 2: 85–110.
- Hanna, Nagy K., Sandor Boyson, and Shakuntala Gunaratne. 1996. *The East Asian Miracle and Information Technology: Strategic Management of Technological Learning*. Washington, D.C.: World Bank.
- Pye, Lucian, ed. *Communications and Political Development*. Princeton, NJ: Princeton University Press.
- Rostow, W. W. 1960. *The Stages of Economic Growth, A Non-Communist Manifesto*. Cambridge: Cambridge University Press.
- Saxenian, AnnaLee. 2005. "From Brain Drain to Brain Circulation: Transnational Communities and Regional Upgrading in India and China." *Studies in Comparative International Development* 40, No. 2: 35–61.
- Vernon, Raymond. 1971. *Sovereignty at Bay: The Multinational Spread of U.S. Enterprises*. New York: Basic Books.
- Weber, Steven. 2004. *The Success of Open Source*. Cambridge, MA: Harvard University Press.
- Weber, Steve and Jennifer Bussell. 2005. "Will Information Technology Reshape the North-South Asymmetry of Power in the Global Political Economy?" *Studies in Comparative International Development* 40, No. 2: 62–84.
- Wilson, Ernest J., III. 2004. *The Information Revolution and Developing Countries*. Cambridge, MA: MIT Press.
- World Bank. 1999. *World Development Report 1998/99: Knowledge for Development*. New York: Oxford University Press.