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# Information Technology and Productivity Growth: German Trends and OECD Comparisons

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# Information Technology and Productivity Growth: German Trends and OECD Comparisons

## **Disciplines**

Databases and Information Systems | Growth and Development | Labor Economics

understanding of the past will be improved by cultivating a variety of approaches across many disciplines, instead of insisting on methodological uniformity.

Finally returning to the group of “receptive” historians to whom this volume is targeted, I wondered what their reaction would be to the parenthetical suggestion that natural experiments “preferably [be] quantitative and aided by statistical analysis” (p. 2). In an effort to be welcoming, the editors describe large sample sizes as “preferable.” But could it be that they are, in fact, necessary? After all, even if two subjects start with identical initial conditions, as is the case, for example, in studies of monozygotic twin pairs, researchers still compile large samples in order to extract causal signals from noise. Just as economists would not trust the results from a twin study conducted on a single set of siblings, should we as social scientists reject historical case studies that compare, for example, one city to another? If so, how can we ever hope to share methods with even the most receptive of historians?

One answer to this question is that historical case studies can generate hypotheses that can be further tested by gathering a large sample that can be subjected to statistical scrutiny.<sup>2</sup> Diamond’s essay in the volume offers an useful template of this approach. In the first half of the piece, he notes fundamental differences in the economic development of Haiti and the Dominican Republic; despite being located on the same island, GDP per capita in the Dominican Republic is six times higher than in Haiti, he observes, is also substantially more deforested than its eastern neighbor. But, deforestation is only a proximate cause for underdevelopment. Diamond digs deeper to search for underlying causes of this environmental outcome, suggesting that Haiti may suffer from a less suitable micro-climate or from a destructive colonial past. In order to

<sup>2</sup> Some economists may reject the idea of generating hypotheses from historical case studies, arguing that hypotheses should arise from models rather than from observation. While addressing this philosophical debate is beyond the scope of this review, I will simply say here that, to my mind, it is a mistake to view historical observation as “a-theoretical.” Rather, I believe that theory of some kind—whether explicit or implicit—will always determine the selection of historical cases, the variables to be compared, and the interpretation of evidentiary patterns.

determine the importance of these various factors, Diamond moves beyond the two-part comparison to a dataset of sixty-nine Polynesian islands, some of which also suffered from devastating episodes of deforestation. Haber’s essay on banking systems in the United States, Mexico, and Brazil provides another example of how this shared scholarly process could operate. Haber proposes various causal factors that can explain the emergence of a democratic banking system, including broad-based suffrage and political competition. Further tests of the “Haber hypothesis” would require collecting a larger sample in another setting, for example comparing across U.S. states.

Few of us, as individual scholars, have the time, resources, or aptitude to both perform in-depth case studies and collect large datasets to test hypotheses using statistical methods. As a result, conducting natural experiments in history will require an academic division of labor that includes historians and historically inclined social scientists. *Natural Experiments of History* offers a first step in this interdisciplinary conversation, providing a valuable primer in experimental logic for scholars amenable to the idea of controlled comparisons. However, I think that the conversation should go substantially further than it does in this volume and believe (hopefully not too naively) that historians of many persuasions can be persuaded that various methods can be complements to each other and that there can be substantial gains from trade across the disciplines.

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## O Economic Development, Technological Change, and Growth

*Information Technology and Productivity Growth: German Trends and OECD Comparisons.* By Theo S. Eicher and Thomas Strobel. Ifo Economic Policy series. Cheltenham, U.K. and Northampton, Mass.: Elgar, 2009. Pp. viii, 102. \$90.00. ISBN 978-1-84844-091-3.

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Between 1996 and 2000, labor productivity growth in the United States increased from its long-term rate of 1.4 percent per year to 2.6

percent. From 2001 to 2005, productivity accelerated further, averaging 3.0 percent growth per year. There is a near unanimous consensus in the literature that information and communications technology (ICT)<sup>1</sup> was responsible for these two surges in productivity growth. Although Germany had access to the same technologies as did the United States during that time period (in fact, the world's largest manufacturer of Enterprise Resource Planning software, SAP AG, is based there), it did not enjoy the same productivity improvements. In fact, Germany experienced two successive *declines* in productivity. From 1992 to 1995, annual productivity growth in Germany was 2.4 percent—almost a percentage point higher than U.S. productivity growth at the time. Yet German productivity growth fell to 2.0 percent from 1996 to 2000, and then fell again to 1.3 percent from 2001 to 2005.<sup>2</sup> In *Information Technology and Productivity Growth: German Trends and OECD Comparisons*, Theo Eicher and Thomas Strobel use their recently constructed industry-level dataset of the German economy to undertake an examination of why productivity differed so greatly in the two countries. As part of their analysis, they also examine the role of ICT and economic growth in other OECD economies.

This inquiry should be of interest to both economists and policymakers. Even small changes in productivity can matter enormously when compounded over decades. Take, for example, the fact that real GDP per capita in the United States has increased by a factor of more than thirty since 1800.<sup>3</sup> If it had grown 0.1 percentage points less per year, then there would only be a twenty-five-fold increase by today—or about 20 percent less GDP per person. Thus, productivity growth is a

critical issue because it determines living standards in the long run.

To perform their comparative analyses, the authors (along with Oliver Roehn) undertook a careful and painstaking effort to construct a database of investment and capital stocks that cover fifty-two industries spanning the German economy. Since the German Federal Statistical Office does not publish industry data at this level of detail, their database and the methodology used to create it (as detailed in chapter 2) is one of the major contributions of the book. In their analysis of the data, Eicher and Strobel find that the performance of ICT-intensive industries is a strong indicator of the productivity growth in a country. While (as the authors note in chapter 3) these industries were “a drag on German productivity growth due to their [total factor productivity] TFP growth declines post 2000” (p. 42), their counterparts in the United States significantly contributed to productivity growth during the same period. Expanding their analysis in chapter 4 to a sample of OECD countries over the same time period, they find that all of the high-productivity countries also had strong productivity growth in their ICT-intensive industries. Moreover, in chapter 5, Eicher and Strobel focus on software-intensive industries within OECD countries and find that these industries contribute the lion's share to labor productivity and TFP growth. These chapters clearly document the correlation between ICT and economic growth.

In later chapters, the authors explore other interesting relationships based on industry-level distinctions. When dividing the industries in their dataset by skill intensity in chapter 6, they note that while the United States demonstrated strong ICT-skill complementarities, the opposite was true for Germany. In chapter 7, Eicher and Strobel divide the industries into four different types of innovation activity. They determine which countries in the sample invest most in each type of R&D, and then examine the relationship between innovation activity and productivity growth.

While the different cuts of the industry-level data are revealing, I would have enjoyed the book more if Eicher and Strobel wove an integrated narrative that tied together the various findings. Because the industries were divided several

<sup>1</sup> To be consistent with the authors of the book, I will use the term ICT. Others use information technology (IT). The distinction is not important for the purpose of this review.

<sup>2</sup> The U.S. and German productivity growth rates cited in this paragraph are used by the authors and based on published numbers from the Bureau of Labor Statistics and the German Federal Statistical Office, as of October 1, 2008 (p. 22). It should be noted that productivity data is subject to continuous revision.

<sup>3</sup> Source: MeasuringWorth, 2010. [www.measuringworth.com](http://www.measuringworth.com) (accessed September 27, 2010).

times, the detailed nature of the analysis made it difficult to grasp the larger picture. The book also lacked a concluding chapter that summarized the key take-aways from their study. The inclusion of a few case studies (such as Walmart's innovative use of technology detailed in the McKinsey Global Institute's 2001 report) or a comparison of their research to studies conducted at the firm level would have provided more context for their industry-level findings.

For example, the authors carefully document the significant productivity deceleration in the ICT-intensive industries that occurred in Germany from 2001 to 2005. However, they are silent on *why* they believe this happened. Eicher and Strobel also describe the extent to which skill-intensive service industries in Germany "have not managed to leverage the innovation and TFP contributions usually associated with ICT capital-skill complementarities" (p. 70). Again, they do not provide a satisfying explanation of why that is the case or suggestions as to how this could change. While the authors examine the fine-grained details of industry contributions to ICT-skill complementarities and productivity growth, providing potential explanations would give policymakers more guidance as to how to help their economies make the most of ICT investments.

One possible explanation for the differences between German and U.S. productivity is that German firms did not make comparable organizational changes around ICT as did U.S. firms and, thus, did not yield the same benefits from ICT. The authors do not explore this issue or account for existing literature. Recent studies have established that complementary business practices

are necessary to get the full benefits from ICT (Timothy F. Bresnahan, Erik Brynjolfsson and Lorin M. Hitt 2002; Brynjolfsson, Hitt, and Shinkyu Yang 2002), and that such investments can take several years to yield significant benefits (Brynjolfsson and Hitt 2003).

In summary, this book and the dataset will be of special interest to those studying Europe's largest economy, and the short chapters on each of the topics described above can provide a useful starting point for more in-depth research by those who want to do a comparative analysis of the United States and Europe. While Eicher and Strobel make an important contribution by creating a German industry-level dataset and documenting the differences between German productivity growth and that of other countries, there is a deeper story waiting to be told that explains why those differences exist.

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