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Comment Chris Forman

It was a pleasure for me to read and comment on this chapter, which highlights an important set of issues and also presents some interesting statistics using a data set that has not frequently been employed by the digitization community. Increasingly, researchers have access to fine-grained data that allow us to make precise statements about behavior online. This has allowed us to make advances in a great many areas related to economic activity that has been digitized, which are reflected in many of the other chapters in this volume. However, there have generally not been similar advances in data that allow us to measure behavior online and offline simultaneously. As a result, we know comparatively little about how our behavior online influences our behavior offline. This is particularly true for offline behavior that is not monetized and for which we have little means other than surveys to track what people are doing. It is therefore difficult to observe, for example, how use of online social platforms such as Facebook influence offline social interactions.

The chapter uses the American Time Use Survey (ATUS), a data set that was started in 2003 and that provides national estimates of how Americans spend their time. After documenting American time use online and offline, the main analysis of the chapter then examines how time spent on computer leisure—the chapter's primary measure of online activity—"crowds out" time spent offline. The ATUS is a repeated cross section, so the identification approach uses cross-sectional variation with time controls. There are an impressive array of regressions that study the association between computer leisure time and a wide variety of offline activities such as work, personal care, and travel, and leisure categories such as watching TV and movies, socializing and communicating, and relaxing and thinking. A nice feature

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of the data is that it uses survey panels from the Current Population Survey (CPS), which allow Wallsten to examine how his results vary according to a rich set of demographic factors.

The chapter makes an important point—that as you spend more time online, there are nonzero opportunity costs of foregone activity offline. This point may seem straightforward, but it sometimes receives little attention and its implications have not previously been measured across such a wide range of categories. There are two broad implications for this set of findings. First, as the author notes, welfare calculations that use time spent online and the opportunity cost of lost wages to measure the welfare benefits of online activity will, in general, be overestimates to the extent that they ignore the opportunity costs of foregone offline activity. Unfortunately, the ATUS may not be well suited toward making the appropriate adjustments to these welfare calculations for reasons related to its data collection methodology that I describe below.

Second, from the perspective of setting an agenda for digitization research, the study highlights the implications of online behavior for offline markets and encourages more work in this important area. To be sure, there has been important work in the digitization community and elsewhere that has studied user behavior in specific, relatively narrow contexts such as online and brick-and-mortar retail stores (e.g., Forman, Ghose, and Goldfarb 2009), online and offline newspapers (Gentzkow 2007), and many others. However, the chapter highlights three important gaps in our knowledge. First, online activity will have important implications for offline behavior that is frequently not monetized and so not easily measured, such as offline socializing and other types of leisure activities. Second, time spent online may crowd out a wide range of both related and unrelated offline activity. That is, time spent reading online newspapers may not only crowd out offline newspaper use but also time spent watching traditional TV and movies. Third, the chapter documents that the relationship between online and different offline categories of activity vary significantly with different demographic characteristics like gender, income, and age.

While these gaps in knowledge are significant, they are also difficult to address in large part because of an absence of data. While the ATUS are very helpful in getting first answers to some of these questions, they also have their limitations. The chapter is very clear about these limitations and also about what the analyses are able to tell us. Still, it is useful to document the specific challenges faced in an exercise like this because it may help future efforts in this area.

The primary explanatory variable is “computer use for leisure.” This variable includes estimates for a range of online activities. However, many online activities that were popular by 2003 are not included in this variable. As the chapter documents, this is because the ATUS focuses on activities rather than the tools used to conduct those activities, so many traditional online

activities are included in broader categories that include both online and offline behavior. For example, the time spent watching online videos is coded within the same category as that for watching traditional TV. As a result, one can think of the core explanatory variable as measuring the time spent on new online activities since 2003.

Since the variable represents only a subset of online activity, this limits our ability to use it for adjusting current estimates of the welfare gains from online activity for the opportunity costs of foregone offline economic activity. It also has important implications for how we view the regression results. A recent paper by Brynjolfsson and Oh (2012), using data from the Nielsen Three Screen Report, estimates that individuals spent about 13.8 hours per week on the Internet at home each week, or about 8.2 percent of total hours. In contrast, this chapter estimates that individuals spend thirteen minutes per day on computer leisure, or less than 1 percent of total time available during the day. The estimates of time spent online are similarly low compared to work on Internet use using data from Forrester Research over a much earlier period (2001) by Goldfarb and Prince (2008). This shows that the ATUS's measure of computer use for leisure may include only a fraction of total time spent online. To the extent that online activities included in computer leisure (e.g., online social networks) displace different activities than those that are included in other categories (e.g., online TV watching), the ATUS will provide an incomplete picture of how online behavior displaces offline activities.

The chapter candidly states that the results examining the implications of computer use for leisure for other activities cannot be viewed causally. The major challenge is that identification in the regression models comes from cross-sectional variation across ATUS respondents, so even with the extensive controls the relationships identified could reflect a causal relationship, reverse causality, or some other type of omitted variable bias. In future work, it might be useful to pursue other identification approaches. Prior work that has examined substitution between online and offline activities might provide some clues on how to do this. For example, one approach has been to use CPS data on computer use at work as an instrument for behavior online (Gentkow 2007). Another approach could be to combine individuals into cohorts and estimate pseudopanel models of how changes in time spent online influence offline behavior. This would, at a minimum, allow one to see whether the results continue to hold using a different source of variation in the data.

There are opportunities for future research using these data. The chapter shows there are considerable differences in the relationship between computer leisure time and offline activities based on demographic characteristics like age and income. These results are very interesting. However, more research could be done by exploiting geographic variation in the data. Offline leisure options differ widely by location; for example, the opportunities for

sports or eating and drinking differ significantly for urban and rural areas. These differences in offline opportunities may affect value of an online connection (e.g., Sinai and Waldfogel 2004). One might similarly expect that the relationship between computer leisure use and offline activities would vary significantly based upon the offline options available. This would be an exciting area for future research.

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