Time and Work in England, 1750-1830 by Hans-Joachim Voth. Oxford, Clarendon Press, 2001. Pp. viii, 304. £40.

Original and useful ideas are infrequent in economics or in history. Most of us have to make do by appropriating from others and repackaging. But this book develops an idea that is both novel and ingenious. The author deserves much praise. The idea is to extract information on time use in Industrial Revolution England from witness statements in criminal trials. His central conclusion is that average hours of work for male workers increased by 30 percent between the 1750s and 1800, and by 20 percent between the 1750s and 1830. Indeed his estimate is of 3,500 hours per male worker in 1800 is the all time high for England. Thus Voth finds evidence that the posited Industrious Revolution of Jan de Vries did accompany the Industrial Revolution. He concludes that even the meager productivity growth reported by Nick Crafts for the Industrial Revolution period is still too high, since some increased output was due to increased labor inputs. This reviewer has doubts, explained below, whether he has large enough samples of the appropriate types of workers to convincingly assert this central finding. But his method is correct in principal, and if extra data can be secured would tell us a lot.

Two court systems supply the witness statements used here: the Old Bailey in London and the Northern Assizes. But the number of observations from London is about nine times those from the North. This means the raw sample is heavily biased against farm workers, who were 50 percent of the male labor force in 1760. Observations where the witness described the time of their activity with insufficient precision, such as saying "at dusk," were excluded. A much larger fraction of activity statements were excluded for the earliest years, showing a developing awareness of time associated with the diffusion of watches. Using those statements which were sufficiently precise Voth estimates what the daily round of sleep, work and leisure looked like in pre-industrial England.

His first interesting and very clear conclusion is that in London <u>throughout</u> the years 1750 to 1830 the likelihood of being found at work increases though the week from Monday to Saturday. Workers observed the traditional pattern of St Monday, and not the new disciplined work week of the factory throughout these years. But there is no evidence ever for St Monday in the North. His second interesting and clear finding is that in the 1750s, but only in the 1750s, people reported much less work on the 46 religious and political holy days, and at Easter and Christmas, in both London and the North, though the effect is stronger in London. His third finding is that the length of the working day changes little between 1750 and 1830 in both London and the North.

Voth estimates implied national work hours in two ways. But here his results are murkier. His first method is to estimate how many days workers worked by subtracting an allowance for Sundays, Mondays and holy days in 1750, 1800 and 1830. He concludes that in London, for example, workers worked 208 days in 1750: they are assumed at leisure on all Sundays and Mondays, all holy days, and for an extra 7 days at Easter, Christmas and Whitsun. By 1800 he assumes everyone in London works all Mondays and all holy days, so that the year is 306 days (p. 123). But these assumptions do not follow from his regression findings. The regressions show that the likelihood of being at work on Mondays and holy days was lower, not that it was zero. Not do the regressions show the chance of being at work on Sunday was zero, or that the chance of being at work on Friday was one. This first method is invalid.

The second method is to calculate a weighted probability that at any time people are at work from the individual observations of activity. Voth's version of this calculation suggests that work hours peaked in 1800 at about 30 percent more than the 1750s, then fell about 10 percent from 1800 to 1830. Voth gets about the same conclusion under three different weightings. But here the only appropriate weighting, because of the great under representation of agricultural workers, is one that divides workers into agricultural and non-agricultural. When Voth does this he finds estimated hours for agricultural workers increase 45 percent from 2,867 in the 1750s to 4,171 in 1800, while for urban workers they increase only 21 percent. That is puzzling. Why did agricultural workers change their work habits just at the time of the Industrial Revolution? 4,171 hours is also a very large number of hours. 13 hours per day for every male farm worker for all days except Sundays. (Anyone who has lived through an English winter can tell you that the hours of daylight then are short.) Further the decline in national hours worked from 1800 to 1830 comes mainly from a decline in estimated hours of work by agricultural workers back down to 3,716 in 1830, as well as the switch of workers from high hours agriculture into lower hours urban occupations (p. 129).

Here Voth has into a problem that he does not make sufficiently clear to the casual reader, and that may explain some of these surprising results. That is the small numbers of agricultural workers he has in his sample. He has only 45 agricultural workers circa 1750, 54 for 1800, and 37 for 1830. With these modest numbers sampling error is an issue. There is, for example, one chance in ten that agricultural workers in 1800 worked less than 3,392 hours. Suppose that from 1750 to 1830 farm workers

actually put in a steady 3,300 hours per year. In that case national hours worked would have increased by only 8 percent from 1750 to 1830.

Thus while Voth's approach is imaginative and rich, the jury awaits more data from the agricultural sector before it can decide exactly how much work hours increased in the Industrial Revolution.

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