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PAUL A. DAVID. *Technical Choice, Innovation and Economic Growth: Essays on American and British Experience in the Nineteenth Century*. (London: Cambridge University Press. 1975. Pp. x + 334. £8.80; paperback £3.)

The historical economist, like Tolstoy, is a fox who would rather be a hedgehog: he knows many little things but would rather know one big thing, or, in Paul David's case, two big things. The first is that the capital-labour ratio is a poor guide to the history of technology in the nineteenth century, chiefly because it sets aside the third factor, land. The second is that economies of scale are pervasive. If land is T and scale S the six essays in the book fall into $T, S, S, (T-S), (S-T), S$, a pretty arrangement which gives the book unity not usually found in *selbstfestschriften*. When viewed this way a superficial paradox disappears, of a potion whose every element is neoclassical declaring itself poison to neoclassical economists. Little neoclassical things—homogeneous production functions, fully utilized capacity, and marginal productivity—here support big classical things.

Adam Smith would have no trouble appreciating the results, especially if probability

theory and calculus had been an accomplishment of the Scottish as well as of the French Enlightenment. He would be pleased to learn in the first chapter, for example, that when the writings of Samuelson on induced technological change and of Feller on random walks have been summarized at length, they prove in the end to be irrelevant to the labour-saving bias of productivity change in nineteenth-century America: when all is said and done, labour-saving changes just happened to be land-using or, as Smith said, "High wages of labour and high profits of stock . . . are things, perhaps, which scarce ever go together, except in the peculiar circumstances of new colonies . . . [Bk I, ch. IX]. The cheapness and plenty of good land encourage improvement" (Bk IV, ch. VII, pt II). He would be pleased to learn in the second and third chapters that in at least one industry, New England cotton textiles in the second third of the nineteenth century, irreversible economies of scale explain much of the growth of productivity, but because these economies could have been achieved in pilot plants and transferred thence to other plants the American tariff is nonetheless difficult to defend: such a finding resolves an inconsistency in his book, that on the one hand tariffs sacrifice consumption, "the sole end and purpose of all production", yet on the other an increase of demand (achieved, for example, by a tariff on cotton textiles) "encourages production [and] . . . new divisions of labour and new improvements of art" (Bk V, ch. I, pt III). Smith would also be pleased to learn in the fourth and fifth chapters that the scale of American and British farms determined whether or not they could buy mechanical reapers, and that ridge-and-furrow inherited from an earlier technique of drainage prevented British farmers from buying them so quickly as their American cousins: as a general principle the division of labour is limited by the extent of the market, yet the general principle must be modified by those details of history and circumstances so lovingly described in *The Wealth of Nations*. And he would be pleased, finally, to learn in the sixth chapter that Prof. Fogel's analysis of the advantages of carriage by rail over that by water, unlike his own of water over road, might go astray by ignoring the economies of scale inherent in a widening market, those "improvements of art and industry . . . made where this conveniency opens the whole world for a market to the produce of every sort of labour" (Bk I, ch. III). Paul David's book is neoclassicism in the service of classicism.

If Smith transported to the present were a reader of this *Review*, or of the *Journal of Economic History* or of *Explorations in Economic History*—as he surely would be—he would not be surprised by the essays, for all but the first have appeared in these and other places. Leaving the essays unaltered raises difficulties: the assertions in them have on occasion been attacked, and David disdains here to parry the attacks. The oldest essay, on the connexion between the adoption of the reaper and the scale of farms in the Midwest, first published in 1966, is the plainest example. For a decade the oral tradition of cliometrics in the United States has pointed out repeatedly that the high cost of a reaping machine could have been spread over a number of farms (by using sharing and rental contracts known, in fact, to exist) or that the land under grain on each farm could have been increased to suit the capacity of the machine (by using the substantial portion of the typical Midwest farm known, in fact, to be in other crops or waste), either of which casts doubt on the significance of farm scale. Even when such points have spilled into print, as they have, David does not answer them.

It is nonetheless good to have these essays collected in one place and put to work on large themes. Their style is charmingly ironic and elaborate, preferring the one-dollar word when the two-bit one would do, roundabout to the point of prolixity. If you love Veblen, you will like David. Often, it is true, Veblen gives way to Talcott Parsons: "Thus, it is suggested, a deeper understanding of the conditions affecting the speed and ultimate extent of an innovation's diffusion is to be obtained only by explicitly analysing

the specific choice of technique problem which its advent would have presented to objectively dissimilar members of the relevant (historical) population of potential adopters." Two guineas for the correct translation with the earliest postmark. Yet on the whole the essays are crude and entertaining.

They are important as well, more for raising than for proving the classical possibility that accidents of endowment and history dominate economic growth, that the economic history of the nineteenth century is incomprehensible without detailed knowledge of endowments of land and the history of scale. David fancies himself the defender of history against the timeless models of modern economics. Historians, as he admits, will find him a strange ally, not only because he is a modern economist and speaks in differential equations but also because he adopts the economist's rather than the historian's standard of proof. In the style of much economics, one learns from these essays a great deal about the logic of possible worlds (although the theorizing, it must be said, sometimes amounts to interlinear translation of other theorist's work), but often too little about the facts of actual worlds. When the reader has disentangled the diagram accompanying the review of Fogel's book he finds that it simply announced the possibility that economies of scale existed, with no evidence, in particular no evidence that the economies were larger in industries encouraged by the railroad than in those discouraged by it. When he has understood the econometrics of the study of cotton textiles he finds that the evidence for learning by doing rests on the size of one coefficient fitted to a small sample, with no evidence on exactly where or why experience raised productivity. Admitting the great subtlety with which it is manipulated, the new evidence in the book is unimpressive in volume and richness.

The neoclassical postulate of diminishing marginal productivity applies to intellectual as well as to most other productions. Historical economists, if only they will emulate more their colleagues in history than in economics, can begin showing economists the low marginal productivity of logic unassisted by fact in addition to showing historians the low productivity of fact unassisted by logic. Still, factor proportions are not the whole story. Some scholars operate on higher production functions than the general run, with higher productivities on all margins, and in this book Paul David, as much as he may dislike the neoclassical way of putting it, demonstrates that he is one of them.

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