



Schumpeter and the
Endogeneity of Technology

Nathan Rosenberg

THE GRAZ SCHUMPETER LECTURES

Schumpeter and the Endogeneity of Technology

Joseph Schumpeter was, beyond doubt, one of the most creative and influential economists of the twentieth century. That influence has increased significantly since his death in 1950. Schumpeter directly addressed the central question of how some societies have managed to achieve substantial improvements in material wellbeing. His answer to this question, with its emphasis on conditions favoring innovation, has become even more persuasive given the course of world history post-1945.

Nathan Rosenberg argues that today Schumpeter speaks to economists in an even more authoritative way for yet another reason.

This book explores Schumpeter's views as an economist who was, long ago, committed to the notion of the endogeneity of technology. His mature writings offer illuminating historical analyses of how and why some social systems have managed to generate innovation. This element of his vision deserves far more attention than it has so far received, and this book redresses the balance. Moreover, bringing us up-to-date, Nathan Rosenberg explores the ways in which the concept of endogeneity illuminates recent American economic history.

Nathan Rosenberg is Professor of Economics at Stanford University. His publications include *How the West Grew Rich* (with L. E. Birdzell, Jr.), *Inside the Black Box*, *Exploring the Black Box*, and, most recently, *Paths of Innovation* (with David Mowery). He is the recipient of honorary degrees from the universities of Lund and Bologna, and he was awarded the Leonardo da Vinci Prize for his contributions to the history of technology. He is past chairman of the Stanford Economics Department, a fellow of the Canadian Institute for Advanced Research, and a member of the board of directors and the executive board of the National Bureau of Economic Research.

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Some American Perspectives

Nathan Rosenberg

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Contents

<i>List of tables</i>	vi
<i>Acknowledgments</i>	vii
1 Joseph Schumpeter and the economic interpretation of history	1
2 Endogeneity in twentieth-century science and technology	18
3 American universities as endogenous institutions	36
4 Innovators and “mere imitators”	58
5 Chemical engineering as a general purpose technology	79
<i>Notes</i>	105
<i>Index</i>	120

Tables

1	Share of academic R&D in a science and engineering field, 1973, 1980, 1990, and 1996	54
2	Breakdown of national expenditures on academic and related research by main field, 1987	56

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Chapter I

Joseph Schumpeter and the economic interpretation of history

Introduction

It is common to say of Schumpeter that he was a lover of paradox. Indeed, that statement has been made by no less an authority on Schumpeter than Schumpeter himself. In his preface to the first edition of *Capitalism, Socialism and Democracy*, he informs his reader that Part II of his book will deal with the “inevitable decomposition of capitalist society.” But he adds that, contrary to the views of Marx and others, his own analysis will lead the reader to the author’s “paradoxical conclusion: capitalism is being killed by its achievements.”¹

I do not intend, in this chapter, to evaluate the validity of that conclusion, even with the “easy” wisdom of a retrospective view of more than fifty years. I do, however, want to take this opportunity to examine Schumpeter’s views on the analysis of economic change, the forces that give rise to such change, and to the power of economic changes to generate other changes in the context of advanced capitalist societies.

I should emphasize that most of my attention to Schumpeter will be focused on his later writings (Schumpeter died in January 1950). Schumpeter’s views on a number of economic issues changed substantially over the course of his lifetime. Indeed, it would be astonishing if this were not the case, since Schumpeter’s adult years covered the whole of the first half of the twentieth century, during which time, to put it mildly, many things changed. Not the least of these is that, when Schumpeter published *Capitalism, Socialism and Democracy* in 1942, the Habsburgs and the Austro-Hungarian Empire were long since gone, and the economic universe looked very different from the vantage point of Cambridge, Massachusetts in

1940 than it did from Vienna, Bonn or Graz in 1910 or 1920. Indeed, it not only looked very different; it was very different.

To cite one very important change in perspective, the younger Schumpeter, and even the Schumpeter who wrote the massive, two-volume work on *Business Cycles* in the 1930s, went to great pains to distinguish between innovation and invention, and to insist that he had no analytical interest in the determinants of inventive activity. He saw invention as exogenous. But when he wrote *Capitalism, Socialism and Democracy*, he expressed a very different view, and forcefully argued that the modern corporation had, in effect, endogenized inventive activity. This issue is one to which I shall return in my second chapter.

It is obvious that Schumpeter's writings have not been neglected since his death. Indeed, I am confident that a citation analysis of the economic literature would show that Schumpeter is receiving far more attention today than he did in the last decade or so of his life. Perhaps, as a long-time admirer, I should not look this particular gift-horse (i.e., the gift-horse of Schumpeter's posthumous popularity) in the mouth. Nevertheless, it is my intention to do so, partly – but only partly – because the overwhelming bulk of the literature on the “Schumpeterian hypothesis,” written by people who are sometimes called “neo-Schumpeterians,” deals with only a very small portion of Schumpeter's writings, and neglects much else that is of great value.

One of Schumpeter's most enduring intellectual strengths is that he looked at economic activity from a larger frame of reference. This frame encompassed not only a sophisticated sociology of capitalist life and institutions (heavily influenced, I would note, by his central European origins) but was also specifically historical in nature. Indeed, I am tempted to argue that Schumpeter's historical perspective constituted one of his greatest strengths as an economist. Once again my authority for this statement is Schumpeter himself. Early in his monumental *History of Economic Analysis*, Schumpeter observed that a “scientific” economist is to be identified by the demonstrated command over three fields – history, statistics, and theory. He then went on to say:

Of these fundamental fields, economic history – which issues into and includes present-day facts – is by far the most important. I wish to state right now that if, starting my work in economics afresh, I were told that I could study only one of the three but

have my choice, it would be economic history that I should choose. And this on three grounds. First, the subject matter of economics is essentially a unique process in historic time. Nobody can hope to understand the economic phenomena of any, including the present, epoch who has not an adequate command of historical facts and an adequate amount of historical sense or of what may be described as historical experience. Second, the historical report cannot be purely economic; therefore it affords the best method for understanding how economic and non-economic facts are related to one another and how the various social sciences should be related to one another. Third, it is, I believe, the fact that most of the fundamental errors currently committed in economic analysis are due to a lack of historical experience more often than to any other shortcoming of the economist's equipment.²

I must observe sadly that, today, not even a minimal knowledge of history is regarded as essential to the training of professional economists at most American universities, although I am pleased to say that my own university, Stanford, still retains a history requirement for its graduate students in economics. Clearly, Schumpeter still has much to teach us, not just about the uses of economics to history, but about the uses of history to economics.

It should, I believe, be obvious that the author of a distinguished two-volume work on the history of business cycles had the qualifications to be called an economic historian. However, I wish to stake a much stronger claim with respect to the entire corpus of Schumpeter's work: in his view, the very subject matter of economics is history. Economics is about economic change as it has occurred over historical time. That is why he insists upon the importance of studying capitalism as an evolutionary process. It is also why he assigns such a limited importance to the study of stationary economic processes. (Parenthetically, I must admit that here Schumpeter presents yet another paradox: simultaneously holding the view that economics is about economic change while also ranking Walras as the greatest of all economists. I will say more about this later.) And Schumpeter's view, that the subject matter of economics is history, has a great deal to do with his very high regard for some of Marx's contributions to economic analysis. You will remember that the four chapters that make up Part I of *Capitalism, Socialism and Democracy* are devoted entirely to an examination of Marx's work.

I believe that the best explanation of Schumpeter's frequent expressions of admiration for and intellectual indebtedness to Marx is contained in the following statement:

There is . . . one thing of fundamental importance for the methodology of economics which he actually achieved. Economists always have either themselves done work in economic history or else used the historical work of others. But the facts of economic history were assigned to a separate compartment. They entered theory, if at all, merely in the role of illustrations, or possibly of verification of results. They mixed with it only mechanically. Now Marx's mixture is a chemical one; that is to say, he introduced them into the very argument that produces the results. He was the first economist of top rank to see and to teach systematically how economic theory may be turned into historical analysis and how the historical narrative may be turned into *histoire raisonnée*.”³

Invaluable working hypotheses

Now, although Schumpeter was indeed an admirer of Marx, he was also always careful to distinguish between the writings of Marx and what he liked to call “vulgar Marxism.” He defended Marx against some of the less-informed criticisms of the economic interpretation, such as the crudely reductionist view that it reduces all human behavior to narrowly-based economic motives, or that economic materialism was somehow logically incompatible with metaphysical or religious beliefs. With that distinction in mind, I want to suggest that Schumpeter, like Marx, believed in the economic interpretation of history. Indeed, I want to suggest that Schumpeter developed what an econometrician might call a “reduced form” of the economic interpretation, which amounted to two propositions, and in so doing eliminated the centrality of class warfare that dominated Marx's own writings:

- 1 “The forms or conditions of production are the fundamental determinant of social structures which in turn breed attitudes, actions and civilization.”
- 2 “The forms of production themselves have a logic of their own; that is to say, they change according to necessities inherent in them so as to produce their successors merely by their own

working.”⁴ Much earlier, in his *Theory of Economic Development*, Schumpeter had stated that “the economic world is relatively autonomous because it takes up such a great part of a nation’s life, and forms or conditions a great part of the remainder.”⁵

Schumpeter asserted that “Both propositions undoubtedly contain a large amount of truth and are, as we shall find at several turns of our way, invaluable working hypotheses.”⁶ His main “qualification,” if indeed one wishes to call it a qualification, is his insistence upon the importance of lags, i.e., social forms that persist long after they have lost their original economic rationale. It is far from clear that Marx would have disagreed with such a qualification, since Marx was, in my view, much too sophisticated a historian to believe that economic changes generated the “appropriate” social changes instantaneously. Indeed, in making the qualification about lags, Schumpeter himself absolves Marx of such possible naiveté, adding that Marx, although perhaps not fully appreciating the significance of lags, would not have taken the simplistic position involved in denying them a role.

Social structures, types and attitudes are coins that do not readily melt. Once they are formed they persist, possibly for centuries, and since structures and types display different degrees of this ability to survive, we almost always find that actual group and national behavior more or less departs from what we should expect it to be if we tried to infer it from the dominant forms of the productive process. Though this applies quite generally, it is most clearly seen when a highly durable structure transfers itself bodily from one country to another. The social situation created in Sicily by the Norman conquest will illustrate my meaning. Such facts Marx did not overlook but he hardly realized all their implications.⁷

The capstone of Schumpeter’s own articulation of the economic interpretation of history appears in the closing paragraph of Chapter 11 of *Capitalism, Socialism and Democracy*, “The Civilization of Capitalism.” In that paragraph Schumpeter declares:

However, whether favorable or unfavorable, value judgments about capitalist performance are of little interest. For mankind

is not free to choose. . . . Things economic and social move by their own momentum and the ensuing situations compel individuals and groups to behave in certain ways whatever they may wish to do – not indeed by destroying their freedom of choice but by shaping the choosing mentalities and by narrowing the list of possibilities from which to choose. If this is the quintessence of Marxism then we all of us have got to be Marxists.⁸

In these chapters I will argue that we all of us do indeed have to be Marxists, at least in Schumpeter's carefully restricted sense in the paragraph just quoted. In subsequent chapters I will attempt to demonstrate the enduring value of this Schumpeterian perspective. And also, as it should hardly be necessary to add, this restricted form of Marxism has nothing to do with the centrally directed economies of eastern Europe, whose collapse we have recently had such good cause to celebrate. The two propositions of Schumpeter's economic interpretation of history need to be regarded as nothing more nor less than what Schumpeter said they were, i.e., they are "invaluable working hypotheses."

If it is correct, as I have asserted, that Schumpeter shared a "stripped down" version of Marx's economic interpretation of history, it must also be true that Schumpeter shared with Marx a common vision of capitalism as a social system that possessed its own internal logic, and that, consequently, also underwent a process of self-transformation. Indeed, it is precisely this internal logic that renders the economic interpretation such an invaluable working hypothesis. This self-transformation resulted from certain "laws of motion," as Marx called them, which were inherent in capitalism as a social system. Thus, it was possible to understand the dynamics of capitalism as the system actually behaved over the course of historical time if one could only grasp these laws of motion. In other words, Schumpeter believed that it was possible to develop an economic theory that would account for the broad contours of economic change. This stood, of course, in stark contrast to the static equilibrium model prevailing in academic economics during Schumpeter's own mature years, a model that examined how the economy re-established itself, rather mechanically, to its equilibrium position after being displaced by some small disturbance.

This is an appropriate place to make a rather dogmatic statement – dogmatic because I do not have the time to marshal fully