

*The Past and Future of America's Economy: Long Waves of Innovation that Drive Cycles of Growth (Edward Elgar, 2005)*

Book Summary

1990's boom. 2000's bust. E-commerce. Enron. Downsizing. Offshoring. China. It seems as if abrupt and earthshaking change is what today's economy is all about. But is this new? Isn't the economy always evolving? Economists conventional wisdom holds that the economy evolves at a relatively steady pace (albeit undergoing short business cycles of growth and recession), with modest and sustained changes leading to constant improvement. According to this view there has been no recent economic disjuncture, no transformation in economic structure, no New Economy. For example, economic columnist Robert Samuelson notes, "There are no long cycles driven by technology ... technology is always advancing." So are rivers, but once in a while there is a flood.

What if the conventional wisdom is wrong? What if these recent changes are part and parcel of a cycle of broad transformation from one kind of economy and society to another? What if they are part of a cycle of change we've been through before, with predictable effects? If this is the case then it means that if we are to control our future, we must understand this process of change. To paraphrase George Santayana, it means that "those who understand the past realize that they will repeat it."

Drawing on the work of Joseph Schumpeter, the mid-twentieth century economist from Austria who coined the term "creative destruction," it is possible to construct a more compelling story of how change takes place in the economy and, by extension, in society. According to this analysis, economic history is best understood as a set of fundamental transformations from one kind of economy to another. These transformations are powered by the emergence of swarms of new "disruptive technologies systems that periodically emerge to sweep through and transform the entire economic order.

According to this story, four great waves of technological change have broken over the United States in the last century and a half, each leading to major transformations and the demise of one kind of economy and the emergence of another. Each in turn changed the nature of work, the organization of enterprises, the role of government, the shape of urban form, and even the structure of social organization and attitudes. And as each transformation from an old economy and old society to a new one was underway, each spread

confusion and conflict, but each ultimately led to vast improvements in the quality of life for Americans. As noted economic historian Robert Wiebe argued: “Americans have responded to each wave of technological advance in similar stages of protest and reform: diffuse criticism, attempts to patch the old order, [and] then efforts to modernize the social and political framework.”

In the 1840s a host of local small-firm manufacturing industries such as iron and textiles began to emerge, but differed significantly from the economy that was to come in the 1880s and 1890s. That transformation, fueled by the development of cheap steel, precision machine tools, and electricity, enabled the rise of a factory-based manufacturing economy in the 1890s. Likewise, the rise of the national corporate, mass production economy in the 1940s and 1950s, fueled by industries such as electronics, chemicals, and mass consumer goods, represented a turning point from the regionally based, manufacturing economy of the first half of the century. Indeed, that mixed economy was so different from the one that preceded it that an issue of *Fortune* magazine in October 1955 was devoted to the “New Economy” and dealt with the “American breakthrough”, and the “new management, and new economy.”

Another new economy began to emerge in the early 1990s, powered by the information technology revolution, including the Internet, software, the microprocessor and telecommunications. This New Economy represents a fundamental change from the national corporate, mass production economy that was in full force from the 1940s to the 1970s. Instead, it is a global, entrepreneurial and knowledge-based economy in which the keys to success lie in the extent to which knowledge, technology and innovation are embedded in products and services. This New Economy is as different from the old corporate economy as the prior two economies were different from the economies they preceded. And just as these prior economic transformations led to major changes in the organization of industry, work, governance, and politics, today’s New Economy is doing the same.

These recurring technological revolutions do more than transform industries and leading to renewed periods of robust growth, they transform the broader society. If the underlying technology of the production system is the skeleton upon which an economy is formed, and if that technological skeleton changes in waves every half century or so, then this suggests that the economy transforms from one type of economy to another. In fact it is not just the economy that transforms, it is the whole of society, including the type of jobs, the organization of companies, how we organize our education system, social relations, how and

where we live, cultural beliefs and attitudes, and the prevailing governing system and politics that supports it. In other words, as the substructure of the technology production system transforms, so to does the "superstructure transform to fit the new realities. Just as Thomas Kuhn talked about the emergence of paradigms in science, we can speak of paradigms in the economy and society.

At their heart these transformations are propelled by, on the one hand, the stagnation of the existing new techno-economic production system and, on the other hand, by the emergence of a new production system that enables a new period of robust growth and innovation. Thus, in each period of American history, a new key technological factor has emerged at the core of a new system of technological, organizational, and social innovations. The "techno-economic" paradigm involves not just new technologies, but also new products, new and better forms of economic organization and managerial practices (in the private and public sectors), the dominance of new sets of skills in the labor force, and even dramatic changes in where and how we live. But this is not a period of permanent revolution, to use Leon Trotsky's term. These transformations ebb and flow, as transformation occurs, only to be followed by a period of consolidation and then exhaustion.

If the prevailing technology system indeed sets the parameters in which a society operates, how does technology, and by extension society, change and evolve? then this would suggest that economic history should also be relatively linear, changing incrementally. In fact, most conventional economists hold to this position and reject the notion of technology-driven long waves.

Indeed, the coming together of the rapid economic, social and political change that we are in the midst of today is by no means unprecedented. This series of transformations, occurring roughly every fifty years, from one kind of economy and society to another has in fact been the dominant, if unappreciated, story of America.

One might reasonably ask "so what? Why does it matter if economic change occurs in long waves driven by waves of innovation. It matters for two reasons. First, it helps explain recent economic history and project how the next decade's economy will unfold. One of the real puzzles faced by economists is why productivity growth all of a sudden stagnated beginning in the mid-1970s and why it was rejuvenated in the mid-1990s. Conventional neoclassical economics with its overriding focus on prices and interest rates has provided little guidance

for figuring out this major set of economic ups and downs. A focus on long waves provides a more compelling explanation.

By the mid-1970s, the old corporate, mass production economy had exhausted its potential for innovation and growth. Growth in demand for the products had slowed as the market was saturated and innovation stagnated. For example, patents issued fell from a high of 78 000 in 1971 to 48 000 in 1979 and did not exceed the 1971 levels until 1987. Eking out further productivity gains from the electro-mechanical production system proved difficult, as the technologies had been taken as far as they could go, particularly in the 75 percent of the economy not involved in goods production. Big, inflexible institutions were increasingly unable to cope with the new realities of a diverse and volatile market environment. The result of the exhaustion was approximately 20 years of slow economic growth from the mid-1970s to the mid-1990s.

While the old economy was reaching its limits, there was no new economy to replace it. Microchips, computing, the Internet and telecommunications were still too costly, slow, and limited to drive a revolution. It is easy now to forget how feeble these technologies were as late as the late 1980s. For example, desktop computer processing speed in 1990 was only about 25 MHZ, compared to over 3200 MHz today. It was only by the mid-1990s, when these technologies coalesced into a powerful and networked information technology and telecommunications system, that the New Economy began to emerge.

If we are in fact in the early phases of the emergence of a new techno-economic system, analogous to the periods of the 1910s and early 1960s, then, if history is any guide, we can expect strong productivity and economic growth as the new technology system expands throughout the economy. Just as the driver of productivity in the old economy was mechanization, by automating a large share of functions involving the routine processing of information, digitization promises to be the major engine of productivity in the New Economy.

Second, it matters because if this is true then it means that understanding past economic transformations will help provide a road map to understanding the rapid changes and turmoil of today's era. To the extent that societies go through similar types of processes at similar stages of economic transformation, understanding the course of past transitions allows us to better understand today's context as we yet again enter into a New Economy and new society.

If technology is the skeleton upon which an economy is formed, and if that

technological skeleton changes in waves every half century or so, then this suggests that the economy transforms from one type of economy to another, and that these changes are not steady, but rather are intensely clustered in particular periods. In fact, it is not just the economy that transforms, it is the whole of society - politics, social relations, how and where we live, how we organize our education system, and how our culture shapes our beliefs and attitudes. Just as Thomas Kuhn talked about the emergence of paradigms in science, we can speak of paradigms in the economy and society.

Thus, in each period of American history, a new key technological factor has emerged at the core of a new system of technological, organizational, and social innovations. The techno-economic paradigm involves not just new technologies, but also new products, new and better forms of economic organization and managerial practices (in the private and public sectors), the dominance of new sets of skills in the labor force, and even dramatic changes in where and how we live.

As new techno-economic production systems emerged during the prior two major economic transformations of the late 1800s and mid-1900s, they changed more than the economy, they changed economic policy, business organization, markets, governance, and even politics and society as a whole.

The progressive reforms of the early twentieth century were a response to a factory economy that presented a vast new array of challenges. The creation of the New Deal and later Great Society reforms of the 1960s were a response to a new mass production, managerial economy that required a stronger and more centralized federal government role. Today, we are at a similar point: in order to prosper in this New Economy, we need to develop a new approach not just to economic policy, but also to the organization of government itself.

For starters this means abandoning the outdated legacy economic policy systems and thinking. John Maynard Keynes once wrote that “practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.” As Chapter 7 details, that is exactly the situation among today’s economic policymakers on both the left and the right who remain rooted in earlier eras. Many liberals remain in a reactive mode defending the old economy Keynesian, Great Society economic framework. Conservatives are even more backward looking, seeking though their doctrine of supply-side economics to resurrect the economic policy system of the early 1900s factory era.

Chapters 8 and 9 argue that breaking free from these legacy policy frameworks will require embracing a new economic framework of growth economics. This requires government to move beyond its almost exclusive focus on managing the business cycle and its economic prescriptions rooted in the old economy. Instead, the true measure of economic success in growth economics is productivity growth. As Chapter 9 details, the tools by which government boosts productivity are not the traditional ones -- fiscal and monetary policy -- relied on in the old economy to manage the business cycle. Rather, they are policies that support the digital revolution, boost technological innovation, enhance workforce skills, promote entrepreneurship and ensure competitive and open markets. The New Economy also requires a fundamentally new approach to government, one that relies more on networks than hierarchy, more on civic and private sector actors than bureaucracy, and more on technology than on rule-based, bureaucratic programs.

Finally, if the productivity promise of the New Economy is real, it suggests that the output and real wages will grow at a robust pace over the next decade or two. The challenge for public policy will be to facilitate this growth on the one hand, and to enable workers to benefit from it on the other. This will mean taking steps to create a more humane economy that enables workers to have more rewarding work but less of it. In other words, the next agenda must incorporate not just getting wealthier but helping Americans live better lives.