Part One: DEBATES

CHAPTER TWO

The Long Wave Debate 1: Roots

The period of the long wave (Kondratieff cycle) debate from the time of Nikolai Kondratieff in the 1920s through the trailing off of interest in long waves in the 1950s constitutes what I call the first round of the debate.[1] It then died down in the 1950s and 1960s (an expansion phase in the world economy) but sprang to life again with the second round in the 1970s and 1980s (a stagnation phase). Interest in long waves in both rounds reflected contemporary problems in the world economy for which the long wave seemed to give a plausible explanation.

What is the basic idea of a long wave? There is no single answer to this—different scholars have adopted different definitions—but most would agree on a definition based on alternating phases of rapid expansion and stagnation in the world economy, taking about fifty years per cycle.[2] These phases have been synchronous across the major core countries and across different economic variables.[3]

The scope of long waves is a subject of divided opinion. They are variously claimed to exist in at least price series and at most a wide range of economic and social variables and to extend over at least the period from about 1790 to 1925[4] and at most the longer period from around 1500 (or even earlier) to the present. My study adopts the latter, broad approach covering the past five centuries and a variety of economic variables. Note that throughout I will use the year 1790 as shorthand to refer to the transition from preindustrial to industrial times.[5]

Liberal economists have, on the whole, been critical of long waves. Paul Samuelson is quoted as calling them "science fiction" (*Business Week* 1982), and the *Citibank Monthly Economic Letter* in 1978 defined long waves as "a myth perpetuated by people who—sharing the apocalyptic visions of Plato, Marx, Toynbee and

1. The publication of Kondratieff's (pronounced and sometimes written "Kondratyev") seminal article, "The Long Waves in Economic Life," in English in 1935 (9 years after its German appearance) marked the high point of interest in the first round of the debate, about 50 years ago.

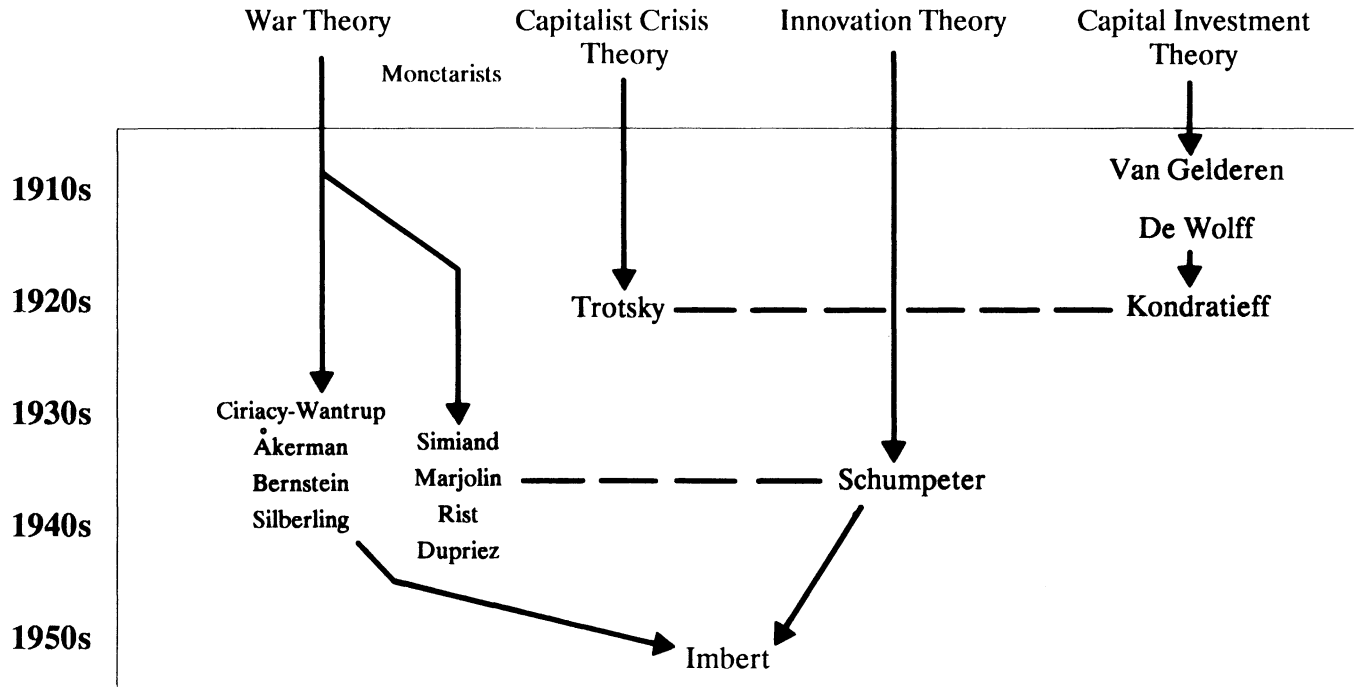
2. The long wave is generally conceived of as one of several economic movements ranging from shorter "business cycles" to longer "secular trends."

3. I will later suggest a lagged synchrony, rather than simple synchrony, among economic variables (chap. 8).

4. The period covered by Kondratieff's studies.

5. The year 1790 is the starting date of Kondratieff's studies, which were explicitly limited to industrial times.

Figure 2.1. The Long Wave Debate in Round One



others—believe that there is a mystical pattern of history that permits true believers to divine the future."[6]

The study of long waves has generated heated controversy, contradiction, and irresolution for over sixty years without making much progress in "cumulating knowledge." Knowledge cumulation implies an established body of knowledge in the field, the frontiers of which may be expanded by ongoing research. In the long wave field there is no such body of knowledge, and no consensus exists on the central issues: the existence of long waves, their scope, and their causal dynamics. Instead, isolated research traditions create "pockets" of theory that are accepted only within their own tradition.[7]

As Kitwood (1984:164) notes, "No clear means have yet been devised for classifying the major long-wave theorists." The past work on long waves has never been adequately cataloged, much less integrated into a unified framework. These chapters will try to pull together the disparate literatures of past work in this field, to make sense of them, to make the debate accessible, and to provide a framework in which the theoretical and empirical questions surrounding the long wave can be addressed in a logical and orderly manner.

The long wave debate has proceeded on two tracks—empirical and theoretical. Kuznets (1940:267) described both as necessary for establishing the existence of long waves: "First a demonstration that fluctuations of that approximate duration recur, with fair simultaneity, in the movements of various significant aspects of economic life . . . ; and second, an indication of what . . . factors . . . account for such recurrent fluctuations." In the past, empirical and theoretical work on long waves has not been well integrated. On the empirical side a number of studies have used quantitative data to try to prove or disprove the existence of long waves. These studies present little theoretical material and rarely attempt to test different theories against each other. On the theoretical side there is a much greater body of work, much of it quite speculative, that puts forward theories of the long wave with little grounding in empirical data. I therefore separate for review purposes the theoretical and empirical works. Chapters 2 and 3 review the theoretical debate, while chapter 4 presents the past empirical work.

Four Theories

The first round of the long wave debate was dominated by four theories, associated respectively with Nikolai Kondratieff, Leon Trotsky, Joseph Schumpeter, and a group of mostly European scholars. Figure 2.1 illustrates

6. Cited in Gordon (1980:9). Dupriez (1978:200), who is sympathetic to long wave theories, suggests that English and American economists have looked askance at the long wave mainly because of its association with the "simplistic and circumstantial" approach of Kondratieff and certain others. He criticizes this as "throwing the baby away with the bath."

7. Along the way, the debate over long waves has become entangled in other feuds—between Marxists and non-Marxists, between economists and political scientists, and between advocates of different empirical and theoretical approaches to social science.

the structure of the debate among these four theories before 1960—and hence provides a "road map" for this chapter. The four approaches may be summarized as follows:

1. The *capital investment theory* argues that long waves arise from the massive investment in, and depreciation of, such long-lived capital goods as railroads, canals, and factories. During an economic upswing, overinvestment in capital goods occurs; this causes a downswing in which excess capital is depreciated. The depreciation of capital on the downswing opens the way for a new period of massive investment, again overshooting as the upswing continues. Key variables are capital investment and production.

2. The *innovation theory* argues that long waves arise from clusters of innovations at particular times and in particular economic sectors. These clusters of related innovations create a new "leading sector" of the economy that grows rapidly and drives a general economic upswing. While that upswing continues, radical innovations are discouraged since existing investments in existing technologies are bringing good returns. However, the initial innovations eventually bring diminishing returns, and the economy slows down and slides into a downswing. The downswing encourages innovations, but there is a time lag before these can be developed. Key variables are inventions and innovations, production, and employment.

3. The *capitalist crisis theory* argues that long waves, defined by recurring major crises in capitalism, arise from the tendency of the rate of profit to decline. The recovery from such crises is not endogenous to the capitalist economy, but results from exogenous factors (such as imperial expansion, the discovery of new natural resources, or the suppression of labor movements) that intervene to restore favorable long-term conditions of accumulation.[8] The rate of profit increases, allowing a new upswing—but the next crisis follows inevitably. Key variables are the profit rate, class struggle, and production.

4. The *war theory* argues that the economic long wave results from, or is closely connected with, major wars. The effects of recurring major wars—primarily inflationary effects—act as periodic shocks to the world economy and create long waves. Key variables are prices and war incidence and size. A related group (monetarists) in the early decades of the debate developed a parallel theory in which gold production rather than war (or sometimes combined with war) affected prices. In both the war and gold versions, the economic long wave is mainly a monetary phenomenon.

While these schools shape the main lines of the debate, hybrid theories combine them in interesting ways. The work of Gaston Imbert in the 1950s contains an interesting synthesis of war and innovation explanations.

After the 1950s, the war school no longer played a role in the economic debate, reflecting the strong disciplinary border separating politics from economics in the

8. The outcome of a crisis is not predetermined but depends on class struggle and concrete historical conditions.

1950s and 1960s.[9] In political science and sociology it became a debate of its own, which I will take up in chapters 5 and 6.

Each of the three remaining schools was to form the seed of a research tradition over the subsequent decades, however. The three research schools growing out of the theories of Kondratieff, Trotsky, and Schumpeter, respectively, shape the lines of debate on long waves today (see chapter 3).

These three theories roughly reflect the three world views of chapter 1 (conservative, revolutionary, and liberal). The revolutionary world view is expressed in the "capitalist crisis theory" of Trotsky, which stresses qualitative change, stages of development, and indeterminacy of outcome. The liberal world view is represented in the "innovation theory" of Schumpeter and stresses evolutionary progress through human inventiveness. The conservative world view underlies Kondratieff's "capital investment theory," stressing quantitative change and repetition within a stable system structure.[10]

Nikolai Kondratieff: Capital Investment

Kondratieff, a Russian Marxist economist, ran an institute in Moscow in the 1920s concerned with the study of all types of business cycles in the capitalist economies. Kondratieff was not the first to entertain the idea of long-term cycles of about fifty years' duration.[11] But he was the first to marshal substantial empirical evidence for the idea and spark a sustained debate on the topic.

Kondratieff's principal interest in long waves was empirical, not theoretical; indeed in his most widely read article ([1926] 1935:115) he stated that he "had no intention of laying the foundations for an appropriate theory of long waves" but only of demonstrating their existence empirically. This he tried to do by accumulating data on a variety of economic variables from different countries and examining long-term moving averages in the series. Some of these synchronous long waves in moving averages of various indicators are shown in figure 2.2.[12]

Kondratieff could not, however, hold to a purely empirical position in the face of theoretical attacks from his critics in the Soviet Union. In 1928 he elaborated a *theory* of long waves in a book that included responses from some of his critics (see Kondratieff [1928] 1984).

Kondratieff's theoretical explanation centered on capital investment—the wearing

9. The arguments of the war school still occasionally resurface (e.g., Craig and Watt 1985); see chapter 5.

10. Kondratieff, himself a Marxist, hardly embodies the conservative world view. Yet his long wave theory, with its endogenous self-repeating and nonevolutionary cycles, is a conservative variant. Within the Marxist debate, Kondratieff's was a more "conservative" Marxism and Trotsky's a more "revolutionary" Marxism (see below).

11. Notable earlier work included that of Van Gelderen (1913). The early works are summarized briefly by Barr (1979) and discussed by Tinbergen (1981).

12. The figure shows the most promising series, not a random sample.

Figure 2.2. Kondratieff's Long Waves

Chart 1. Index Numbers of Commodity Prices *(1901-10 = 100)*

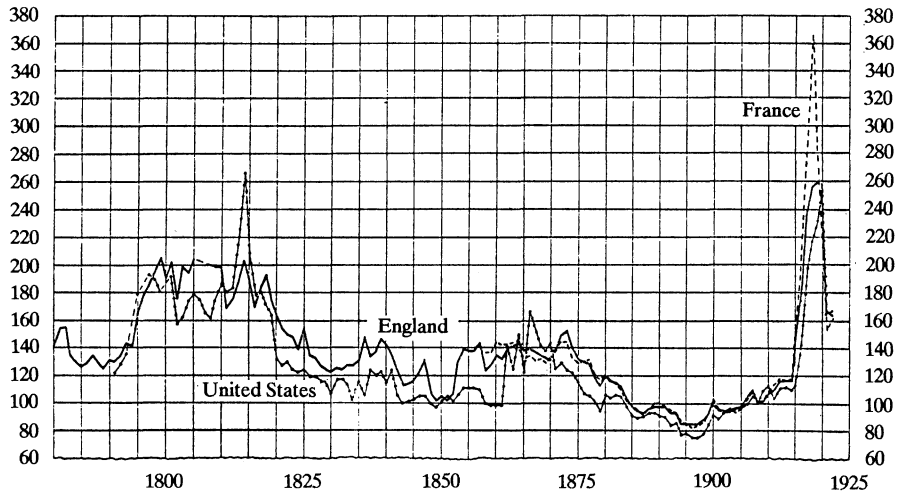


Chart 2. Quotations of Interest-Bearing Securities

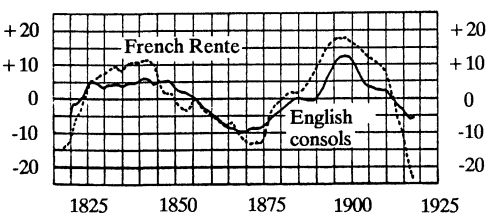


Chart 3. Wages in England

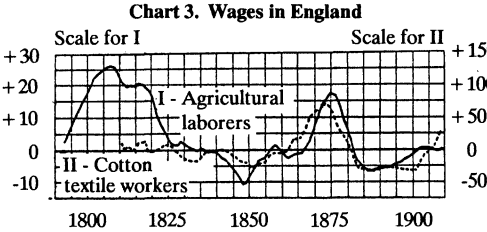


Chart 4. French Foreign Trade

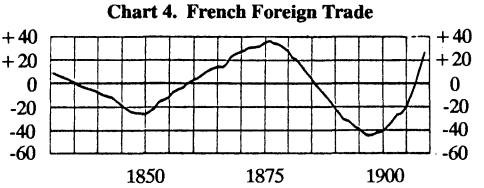
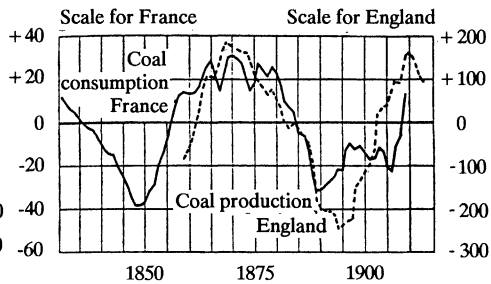
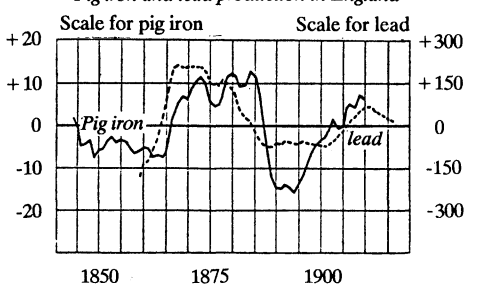


Chart 5. Consumption of Coal in France and Production of Coal, Pig Iron, and Lead in England

Coal production and coal consumption



Pig iron and lead production in England



Note: All graphs except prices represent moving averages
Source: Kondratieff ([1926] 1935: 106-9).

out of capital equipment and its concentrated replacement in waves of massive investment using savings accumulated during an economic downswing:

> Marx affirmed that the material basis for [seven-to-eleven-year business cycles] was the material wear and tear, replacement, and increase in . . . machines with a service life lasting ten years, one may assume that the material basis for the long cycles is the wear and tear, replacement, and increase in those basic capital goods requiring a long period of time and tremendous investments for their production. *The replacement and expansion of the fund of these goods does not take place smoothly but in spurts, and the long waves in economic conditions are another expression of that* (Kondratieff [1928] 1984:93; italics in original).

Thus increased construction of basic capital goods is the central feature of the upswing phase.

This increased construction requires the availability of capital for investment (p. 94). But "the investment of capital in big and expensive projects increases the demand for capital," which eventually raises the price of capital (p. 96). The high price of capital dampens investment and—notwithstanding long time lags—leads to the end of the upswing and the beginning of a downswing. In the downswing phase investment decreases, capital becomes cheaper, and hence "conditions favorable to an upswing are again created" (p. 97).

Kondratieff, under attack from Marxists around him, elaborated his theory within a traditional Marxist framework. He stressed that his analysis applied only to capitalist systems (p. 25) and only to industrial capitalism since the late eighteenth century (p. 32). He was careful to build on the work of Marx himself. Marx's view of short-term (seven to eleven years) business cycles with their recurrent crises stressed two points, according to Kondratieff: "First, that they are periodic; second, that they are organically inherent in the capitalist system" (p. 28). These quotations from Marx were a defense against Kondratieff's most prominent critic, Bolshevik activist-theorist Leon Trotsky, who saw Kondratieff's theories as far too conservative.

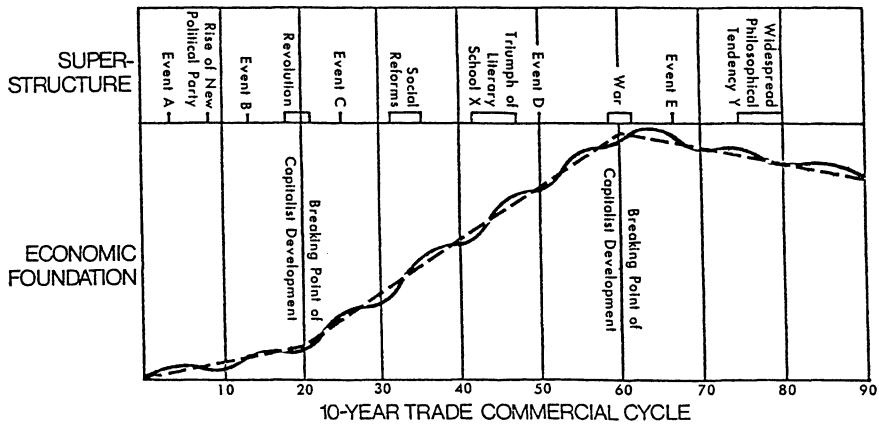
Leon Trotsky: Capitalist Crisis

Trotsky's first work on long waves, in 1921, was done independently and in ignorance of (rather than in response to) either Kondratieff's or J. Van Gelderen's (1913) work. From 1923 through the late 1920s in Moscow, however, Trotsky and Kondratieff engaged in a running debate on long waves.

Trotsky's initial idea, which remained central to his approach, characterized long waves as historical periods of accelerated and retarded growth in the development of capitalism (see fig. 2.3). Trotsky pointed to five "different and distinct periods" from 1781 to 1921—two periods of stagnation alternating with two of rapid growth, the fifth period, since 1914, being "the period of the destruction of capitalist economy."[13] These phases arose from "a process of adaptation" as capitalism reacted to events in the "superstructure": "It will depend upon great historical events—crises, revolutions, etc., whether the period will become one of accelerated

13. Speech of 1921 quoted in Day (1976:69).

Figure 2.3. Trotsky's Curve of Capitalist Development



Source: Trotsky ([1923] 1973: 278) (Pathfinder Press).

growth, stability, or decline. This is a cardinal trait of the process of capitalistic development."[14] Thus Trotsky claimed that long waves are not organically inherent in capitalism but result from the effects of factors exogenous to the capitalist system.

In 1923, responding specifically to Kondratieff, Trotsky elaborated his view of long waves as "epochs of capitalist development" (1923:275). He called Kondratieff's formulation of long waves, as cycles inherent to capitalism, a "symmetrically stylized construction" in which the "rigidly lawful rhythm" of shorter business cycles was extended to long-term periods—a case of an "obviously false generalization from a formal analogy" (p. 276).

Trotsky stressed that long-wave periods are not internal to the laws of capitalism:

> As regards the large segments of the capitalist curve of development (fifty years) which Professor Kondratiev incautiously proposes to designate also as cycles, their character and duration are determined not by the internal interplay of capitalist forces but by those external conditions through whose channel capitalist development flows. The acquisition by capitalism of new countries and continents, the discovery of new natural resources, and, in the wake of these, such major facts of "superstructural" order as wars and revolutions, determine the character and the replacement of ascending, stagnating, or declining epochs of capitalist development (p. 277).

Trotsky thus anticipated the neo-Marxists of some decades later in ascribing "relative autonomy"[15] to the "superstructure" of society. Trotsky agreed that Marxism "looks for the causes of changes in social superstructure in the changes of

14. Speech of 1921 quoted in Kuznets (1930:262).
15. Not his phrase, but used by Day (1976:71) in describing his position.

the economic foundation" but argued that "economics is decisive only in the *last analysis*" (p. 277; italics in original).[16]

The Kondratieff-Trotsky Debate

Kondratieff's response to Trotsky's argument was that Trotsky "takes an idealist point of view."[17] New markets and resources are drawn into the capitalist system "not by accident, but in face of the existing economic preconditions." That is, the internal dynamics of capitalism shape the long wave, which in turn shapes the superstructural factors such as innovation and war that Trotsky called "external." Specifically, Kondratieff argued that "during the recession . . . an unusually large number of important discoveries and inventions in the technique of production and communication are made, which, however, are usually applied on a large scale only at the beginning of the next long upswing" ([1926] 1935:111). Likewise, "the most disastrous and extensive wars and revolutions occur" on the upswing of the long wave (p. 111), because long-term economic expansion aggravates the international struggle for markets and raw materials while domestically sharpening the struggle over the distribution of the fruits of that economic growth ([1928] 1984:95). Wars, revolutions, and innovations are thus products, not causes, of the long wave.[18]

In asserting that long waves are self-generating and inherent in capitalism ([1926] 1935:115), Kondratieff conceded to Trotsky only that "each new cycle takes place under new concrete-historical conditions, at a new level in the development of productive forces, and hence is by no means a simple repetition of the preceding cycle" ([1928] 1984:99). On this question of distinct historical periods, Kondratieff responded to Trotsky's criticism by arguing that "crossing through different stages, capitalism remains capitalism and maintains its basic features and regularities."[19] Kondratieff stated that Trotsky, "while not denying the existence of long waves in economic conditions, refused to recognize their patterned, cyclical character" (p. 31.)

Trotsky's argument with Kondratieff thus centered on two related points: first, whether the long wave upswings and downswings are *cyclical* or just historical periods, and second, whether long upswings and downswings are generated *internally* to the capitalist economy or by external forces.

The Kondratieff-Trotsky debate reflects deeper divisions within Marxism that predate and underlie the question of long waves. The argument between Kondratieff

16. Trotsky begins his 1923 article with a quotation from Engels that begins: "In judging the events . . . of day-to-day history, it will never be possible for anyone to go right back to the final economic causes."

17. Quoted in Day (1976:78). Among other forums, Trotsky and Kondratieff debated long waves at a 1926 conference on the world economy in Moscow.

18. Kondratieff suggests, however, that although wars and revolutions are primarily an effect of the long wave, they also play a lesser role in *causing* the downturn by increasing nonproductive consumption, destroying existing capital plant, and increasing the demand for capital ([1928] 1984:96). See chap. 12.

19. Quoted in Day (1976:79).

and Trotsky parallels in important ways the debate between Karl Kautsky and Lenin (see Willoughby 1979), that is, between socialism and communism as competing Marxist traditions. Kautsky, a leading socialist theoretician, was a primary object of Lenin's (1917) attack. Kautsky argued that imperialism should be seen as a "policy" rather than a necessary phase or stage in the development of capitalism, a view that was "diametrically opposed" to Lenin's concept of imperialism as a stage of development based on the ascendancy of monopoly finance capitalism (Lenin 1917:238).

In Kautsky's view, international monopoly capitalism, through the internationalization of capital, opened the possibility for stable peace under capitalism without any inherent necessity for imperialism or war (Lenin 1917:225).[20] Lenin called this a "stupid little fable about 'peaceful' ultra-imperialism" (p. 243) and considered Kautsky an apologist for capitalism. In Lenin's view, monopoly capitalism was inextricably linked with imperialist expansion and wars among the capitalist powers.[21]

Kondratieff's theory of long waves, rightly or wrongly, was too closely associated with the approach of the socialist Kautsky to be acceptable to the Bolsheviks, including Trotsky. Kondratieff's work on long waves followed that of J. Van Gelderen (1913), a Dutch *socialist.*[22] Kondratieff's approach also closely paralleled that of Sam De Wolff,[23] another Dutch socialist, whose work on long waves (1924) appeared in a book published in honor of Karl Kautsky! Finally, Kautsky himself had given some discussion to long waves and, like Kondratieff, had stressed increases of capital investment on the upswing (although he thought them caused by gold discoveries).

The key issue in the Lenin-Kautsky and Trotsky-Kondratieff debates is the stability of capitalism—a central question in the Marxist approach. Kautsky viewed capitalism as relatively stable and could conceive of a capitalist world free of imperialism and war. He downplayed the development of "stages" of capitalism (imperialism being a final stage) in favor of a more static view in which imperialism and war were merely "policies." Lenin, by contrast, saw capitalism in dynamic and rapid development toward its own (dialectical) self-negation.

The Kondratieff-Trotsky long wave debate also revolved around the question of the stability of capitalism. Do "universal crises" threaten the survival of capitalism (as Trotsky thought), or are they only a phase of a more stable capitalist dynamic (as

20. Lenin argues that Kautsky, by defining imperialism in terms of territorial annexations, stresses only the political aspect of imperialism and misses the economic aspect (p. 239).

21. As a German Socialist Kautsky supported Germany's participation in World War I (which Lenin opposed), hoping to protect German socialism, which was then strong, from being defeated by Russian absolutism.

22. Trotsky, by contrast, originally developed his work independently and in ignorance of Van Gelderen's work, which was published only in Dutch, according to Kuznets (1930:261).

23. De Wolff's 1924 and 1929 publications follow (in content and timing) Kondratieff's 1922 and 1928 publications, respectively, but other scholars cite him as Kondratieff's predecessor. Imbert (1959:38) cites De Wolff's work in 1913, well before Kondratieff's work.

Kondratieff argued)? Kondratieff, like Kautsky, presented a picture of capitalism as more stable over the long term than either Trotsky or Lenin saw it. This parallel between Kondratieff's approach and that of the hated Kautsky may help to explain the very negative reception given to Kondratieff by his fellow Soviet Marxists.[24]

The issue of the stability of capitalism—central to this debate—came to a head with the deepening crisis of the capitalist economies in the West after 1929. Kondratieff's theory implied that the Great Depression might not be the "final crisis of capitalism" and that the capitalist economy might recover and begin growing again of its own internal dynamic. Although history would later prove this correct, in 1930 (under Stalin) Kondratieff was officially repudiated, arrested, and subsequently died in a Siberian prison camp. This, along with the exile and assassination of Trotsky, ended the Marxist discussion on long waves for the time being. Kondratieff has not been "rehabilitated" in the Soviet Union since that time.[25]

The Trotsky-Kondratieff debate exemplifies the fact that Marxism is not a monolithic entity but contains its own subdebates and divisions. Although both are Marxists, Kondratieff presents a more conservative and Trotsky a more revolutionary interpretation of capitalist dynamics.

Joseph Schumpeter: Innovation

As the debate on long waves was suppressed in Marxist circles after 1930, it began to catch on among some Western liberal economists, who found the concept of long-term capitalist stability more appealing than had Stalin and Trotsky.[26] Joseph Schumpeter was foremost in resurrecting Kondratieff and naming the long wave after him.[27] Schumpeter ([1934] 1951) argued that the depression of the 1930s resembled previous depressions around 1825 and 1873.

Schumpeter (1939) attempted to build a unified, although tentative, theory of business cycles (both short and long), based primarily on the concepts of innovation and of "leading sectors" of the economy. Innovation, in Schumpeter's view, consists not just of inventions but of any "change in the method of supplying commodities" (p. 84).[28] Innovations "turn existing factors of production to new uses" without being a direct consequence of any one of them (p. 86). Schumpeter

24. Further discussion of the Russian debate may be found in Kuznets 1930; Garvy 1943; Day 1976; and Barr 1979.

25. However, a long wave conference sponsored by the International Institute for Applied Systems Analysis (IIASA) in 1985 did bring participants from Eastern Europe and the Soviet Union (and one from China), so interest in long waves may now be reviving in communist countries.

26. The majority, however, never accepted long waves.

27. Ehrensaft (1980:69), from the point of view of the (Schumpeterian) innovation school, finds it "paradoxical" that Kondratieff's theory of long waves, "whose theoretical base derived from Marx," should find its principal advocate in Schumpeter, who opposed Marxism. But I find this no mystery. Schumpeter particularly opposed the communism of Trotsky, Lenin, and Stalin. The resurrection of Kondratieff was directed against Stalin, not Marx.

28. This includes the introduction of new commodities, technological changes in the production of commodities already in use, the opening up of new markets or sources of supply, new business organizations (such as department stores), or improved methods of work.

called innovation "the outstanding fact in the economic history of capitalist society" and designated the "changes in the economic process brought about by innovation . . . by the term Economic Evolution" (p. 86). Innovations result from the rise to leadership of particular individuals and the emergence of new firms (pp. 94–96). Schumpeter saw clusters of innovations as driving the irregular rhythms of business cycles of various lengths.[29]

In the case of the long wave, major innovations bring to the fore a new "leading sector" of the economy, supplanting the previously dominant industry or group of industries. The new leading sector drives a powerful expansion of the economy until it runs into diminishing returns and is eventually supplanted by another new leading sector. Each of the long wave upswings, then, is associated with a particular historical technological basis. Schumpeter identified these as: (1) the industrial revolution (1780s–1842); (2) the age of steam and steel (1842–97); and (3) electricity, chemistry, and motors (1898–).[30] Simon Kuznets (1940:261) elaborated these (with Schumpeter's advice) as the Industrial Revolution Kondratieff (cotton textiles, iron, steam power), the Bourgeois Kondratieff (railroads), and the Neo-Mercantilist Kondratieff (electricity, automobiles). Each of these periods began with an upswing and ended with a long downswing.[31]

Schumpeter's approach is grounded in a "liberal" framework. The key force in economic change is the individual (the individual entrepreneur who develops an innovation). The long economic cycle represents forward steps in an evolving system—"Economic Evolution," as Schumpeter calls it.

Nonetheless, many liberal economists rejected Schumpeter's long wave theory. Among the critics, Kuznets (1940:258–63) argued that entrepreneurs would not simply disappear while an innovation was being imitated and built but would "turn to new feats and thus initiate an uprush in another industry." Thus innovations would be conceived of not as "bunching" together but as "flowing in a continuous stream." The economy might move forward in a "jerky" sort of evolution but not with a cyclical character, according to Kuznets.

Johan Åkerman, Norman Silberling, and Others: War

Johan Åkerman, a Swedish economist, was among the first to argue (1932:79) that war rather than capital investment, capitalist crises, or innovation is the central cause of the long wave. The long wave is "a problem which goes far beyond the bounds of

29. Schumpeter's theory is not strictly periodic for any inherent reason. However, long cycles gain some regularity through their connection to shorter business cycles. "There is a theoretically indefinite number of fluctuations present . . . at any time" (p. 168), but for simplicity Schumpeter limited his analysis to three types of cycles: short (40 months), middle (10 years), and long (60 years). These three types tend to group in integral numbers (three short cycles in a middle cycle and six middle cycles in a long one), since the upswing or downswing of a longer cycle is initiated in the short term by a peaking or troughing of a shorter cycle. The deepest depressions in Schumpeter's study (1825–30, 1873–78, and 1929–34) were marked by synchronous depression phases among all three types of cycles (p. 173).

30. No ending date was clear as of 1939.

31. A fourth cycle, from the 1940s on, is often associated with the automobile, plastics, and electronics sectors.

economics."[32] Åkerman noted that long wave upswings have "culminated in general inflation during a war period" (p. 87–88). The end of the war period in turn is followed by a "deflation crisis" and a downswing period of falling prices ending with a crisis of credit institutions. In 1944 Åkerman wrote:

> We can draw the conclusion that it is the *frequency of wars—i.e. a political* phenomenon—that introduces the periodical element in the secular economic changes. The 'enigma of the long waves' in econometrics is thus in a first approximation nothing but a mirror of the enigma of the periodicity of wars."[33]

Thus what I call the *war theory* of long waves holds that recurrent major wars are central to economic long waves.[34]

Albert Rose, in a brief article in 1941, most concisely stated the response of the war school to Schumpeter's innovation theory:

> Modern war may be *the innovation* par excellence in the Schumpeterian system, and as such, the dominant cause of long waves in economic activity. Professor Schumpeter, of course, has virtually disregarded [this possibility] by means of the inadequate declaration that war is an external factor of declining significance to the cyclical processes of the capitalistic economy.
>
> It is significant . . . that Kondratieff's three long waves are centered upon major wars, while at the same time, those innovations which 'carry' Schumpeter's three Kondratieff waves reached their large-scale commercial application in the depths of the reaction from these major wars (p. 105).

Upswings "seem related in some fashion to the three major wars since 1787," according to Rose, and the three long downswings contained depressions (1820–25, 1873–78, and 1929–34) that might have been caused by the petering-out of postwar demands.

E. M. Bernstein (1940:524–27) studied "the economic disturbances initiated by war." He noted that "the whole level of demand, the propensity to consume, is raised by war" due to the heavy expenditure for war goods. At the same time, "the volume of production is certain to decline" in an extended war because of labor shortages, blockades of raw materials or export markets, shortages of foreign exchange, and/or the depletion of capital equipment resulting from the precedence given to war goods. For a belligerent country the initial effect of war may be a quick economic upswing initiated by war spending; but within a few years the economy will slow down due to the limitations on production. To summarize Bernstein's argument, during war periods consumption rises and production falls, leading to a

32. The "traditional answer" explaining long-term price trends, namely gold production, was unsatisfactory to Åkerman (1932:83). Rather, he saw gold production as a dependent variable in that mine owners will increase production when prices of goods are low (i.e., the price of gold is high). Åkerman (1932:86) also considered the argument that long waves arise from waves of population growth caused by birth rate increases after major wars. This explanation elucidates the "interdependence between economics and politics," but unfortunately is not well empirically supported, Åkerman concludes.

33. Åkerman (1944:125), quoted in Eklund (1980), emphasis in original.

34. Since these theories deal with war, they might seem more appropriate for chaps. 5 and 6. But these are economists seeking to explain economic cycles, not scholars of war cycles per se.

higher ratio of demand to supply and hence to higher prices. This inflationary jolt will tend to become globalized particularly in the event of prolonged wars involving the world's major powers and underlies the long wave price upswing.

Norman Silberling (1943:47) also subscribed to the war theory of long waves. Most long wave movements, Silberling argued, "have resulted from specific factors in the nature of exceptionally serious breakdowns in business activity and interruption of trade relations. Invariably such unusual interruptions in the progress of economic development have occurred following major wars." Silberling's analysis was limited to American economic history rather than that of the world system. Seeking to "examine the relationships between political disturbance and economic disturbance," Silberling examined the effects of wars on the U.S. economy (p. 50). "[E]very war that has directly involved American participation," Silberling noted, "has been marked by a more or less violent general rise in prices" (p. 51). But these inflationary periods do not correlate with changes in production or other physical measures, Silberling reported. The long wave is a price wave only and as such can be explained as a product of the timing of wars (pp. 53–55).

The connection of war and prices is evident in the history of the U.S. wholesale price index (see fig. 2.4).[35] Each sharp upsurge in the price index corresponds with a U.S. war: the War of 1812 (and Napoleonic Wars in Europe); the Civil War; World War I; and World War II followed by the Korean and Vietnam wars.

Silberling summarized the economic effects of wars as follows: Major wars spark a sudden and powerful increase in demand,[36] while the growth of supply cannot keep up.[37] This triggers the strong wartime inflation characteristic of each long wave upswing. War also creates long-term disequilibrium, leading to a dampening of growth over the decades following the war—that is, the long wave downswing phase (pp. 58–66).[38]

Silberling's comments on Kondratieff show that he was unaware of the debates within Marxism, both on whether long waves were inherent or exogenous to capitalism and on whether long waves caused the fluctuations in major wars or vice versa. Silberling saw Kondratieff as a "Marxist" who "attributes to the dynamics of capitalism most of the things that happen in the world" (p. 57). Silberling by contrast saw long waves not as inherent in capitalism but as "unnecessary and harmful" fluctuations whose removal would not be incompatible with continued capitalism

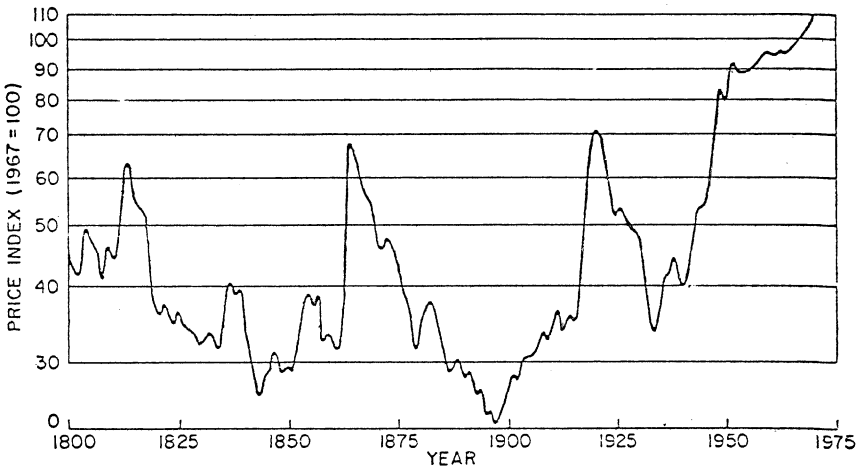
35. Not taken from Silberling but from Senge (1975), who does not mention war in discussing this graph (war is not part of Senge's "world" of economic dynamics).

36. "The Government enters the markets supplied with virtually unlimited funds and bids against the private consumer or business firm; the result is naturally a swift and more or less cumulative spiral of price advances" (p. 59).

37. The drafting of men from the labor force brings about a substitution of less highly trained workers. Faster depreciation and inadequate replacement of equipment occur. The expansion of agriculture and mining, to serve the urgent demand for food and minerals for war needs, is a slow process. Meanwhile, supplies of materials from abroad may be curtailed, leading to production bottlenecks.

38. This is true especially in agriculture, mining, and transportation, where wartime overexpansion leads to inflated fixed costs in the postwar period, according to Silberling.

Figure 2.4. U.S. Wholesale Prices



Note: The price data are derived by combining two time series for wholesale prices, one from 1800 to 1890 (series E52) and one from 1890 to 1970 (series E23). Data are from U.S. Department of Commerce, Bureau of the Census, *Historical Statistics* (1975 ed.).

Source: Senge (1982: 9).

(long-term progress, the maintenance of a high degree of individual initiative, and a legal framework of private property). Silberling was apparently unaware of the parallels between his theory (long waves exogenous to capitalism and caused by wars and other political factors) and that of Trotsky!

Tinbergen and Polak (1950:137) followed a similar line to that of Silberling in explaining the connection of war and inflation. "[A]ll the most pronounced instances of inflation in history have occurred in or shortly after great wars," they wrote. Other scholars also pursued the war-inflation link. A 543-year time series showing wheat prices in Europe and America, 1400–1942 (Valley Camp Coal Company 1942), indicated that periods of sharp price increases have historically accompanied periods of war since about 1562.[39]

Siegfried von Ciriacy-Wantrup (1936) was another scholar who connected wars with long waves. Frank G. Dickinson (1940:334) argued along similar lines that "the stimulus to investment of the shift from peace to war and back again . . . largely explains the long cycle." Thus the war theory had a number of proponents during the

39. This graph is not accompanied by the time series data, so I could not analyze the latter. Earl Hamilton (1977:13) cites data for grain prices in Frankfurt am Main and Leipzig (rather than the Strasbourg prices in the above) suggesting that grain prices actually fell during the Thirty Years' War, but he finds these data fragmentary and the interpretation suspect. Hamilton suggests, however, that a clear upward pressure on prices in Spain was evident only beginning with the War of the Spanish Succession (1702–11) and that even then inflation was less than 10%. Hamilton (1947:217) concludes that in 17th-c. Spain "wars had little effect upon commodity prices." My analysis of two of Hamilton's Spanish price series (chap. 9) failed to find long waves.

first round of the debate. After World War II, however, as the gap between economics and politics widened, this school died out as an explanation of long waves.[40]

Kuznets and other liberal economists who opposed the idea of long waves used the war argument to discount Kondratieff's long waves as existing not in production and other physical series but only in price and other monetary series "necessarily dominated by the price peaks of the Napoleonic wars, of the 1870s (not unconnected with the Civil War in this country), and of the World War" (Kuznets 1940:267).

Closely connected with the war school and from the same period is a set of long wave theories concerned with long waves as exogenously caused *monetary* phenomena. These theories focus on gold production or the release of gold stocks during war as the exogenous force that drives monetary long waves.[41] Gustav Cassel ([1918] 1932), the first central figure in the "monetarist" group, argued that gold production, by changing the amount of money in circulation, drives long-term price fluctuations (the quantity theory of money). Marcel Lenoir (1913) had made a somewhat similar argument. Others in this tradition include Simiand (1932a, b), Marjolin (1937, 1938, 1941a, b), Rist (1938), and Dupriez (1947, 1951, 1959).

The long wave debate in the 1930s and 1940s was thus dominated by the argument between Schumpeter's "innovation" approach and the war school (and monetarists), of which Åkerman and Silberling provide the best examples. The innovation school argued that long waves are inherent in capitalism and arise from the development of new innovations driving each new upswing. The war school (and in parallel, the monetarists) replied that long waves were economic reflections of "external" events, namely wars (and/or gold production), and did not arise from internal economic causes. This debate among liberal economists thus parallels the Kondratieff-Trotsky debate on this point.

Gaston Imbert: Innovation and War

Gaston Imbert (1956) provides the first example of what I call a "hybrid" theory, one that combines two theoretical schools in trying to account for long waves. Imbert, writing in the 1950s as interest in long waves was diminishing, integrated the war and innovation theories that had dominated the 1930s and 1940s.[42]

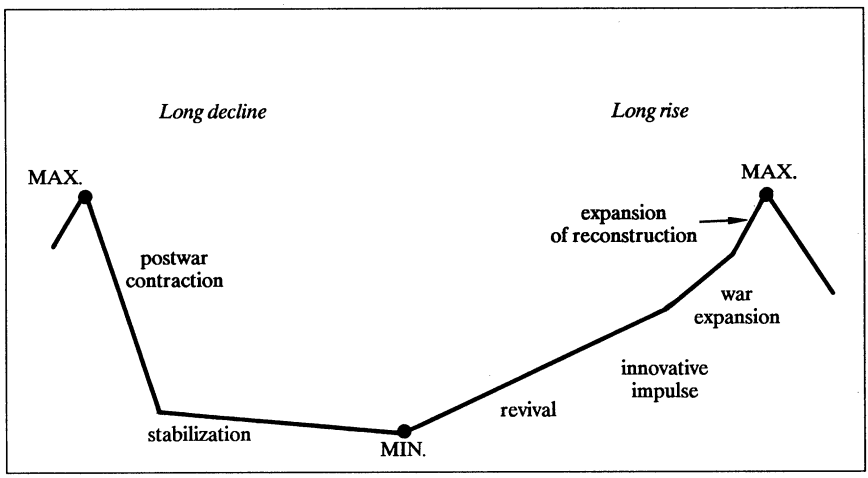
Imbert is noteworthy also as the first person to study in depth the question of long waves in the preindustrial age, claiming to identify long waves all the way back to the

40. The debate on war cycles became focused on longer-term cycles than the long wave, despite several unsuccessful attempts to link these longer cycles with long waves (see chap. 6). Some work continues to look at war and inflation (e.g., Thompson and Zuk 1982). Passing reference is occasionally made to the "sharp spikes in the price level . . . associated with wars" (Warsh 1984:73). Craig and Watt (1985) come closest to resurrecting the war school of Kondratieff cycles by restating the connection of war with long waves, an observation they support with graphs of battle deaths from Lewis F. Richardson's data.

41. Much of this literature is in French (see Marjolin, 1941b:1) and has not been translated into English, and this group has no real following in the current debate. I have not called it a separate school because of its theoretical affinity with the war school.

42. Imbert built on Hansen's ([1932] 1971:98) theory that "the up swing of the long wave tends to produce wars, and prolonged wars in turn tend, through the resulting upheaval in prices, to initiate the down-swing movement."

Figure 2.5. Imbert's Theoretical Long Wave Scheme



Source: Imbert, 1956, p. 477.

thirteenth century. In this respect he differs from almost all the long wave scholars discussed above, who date long waves only from the late eighteenth century (the industrial age).[43] This distinction will be considered further in chapter 4.

Imbert's theory is represented schematically in figure 2.5. Beginning at the trough of the long wave is a long economic recovery based on increased innovation. Production increases precede price increases. "Dynamic industries" lead the economic progress during the rising phase, incorporating innovations that allow expansion to continue despite the relative rigidity of factors of production (p. 480). Thus the expansion phase is based on innovation.

But economic expansion, according to Imbert (like Kondratieff), leads to war:

> The economic impulse of the long rising phase produces progressively the causes that engender . . . the period of war. The rise in economic activity, the strain on markets, the boom fever, the needs of the capitalist economies for raw materials, leads the economically dominant countries to a political and colonial expansion. . . . The unfolding of the rising phase creates an increasing competition between the capitalist countries which dispute the zones of colonial influence. . . . Finally the general tension provokes a war between the economically dominant countries (pp. 484–85; my translation).

This rising tension in international relations disrupts economic stability, bringing higher state expenditures on armaments and the military, heavier taxes, and state competition (against entrepreneurs) for loans. Arms expenditures gradually take precedence over public works (the two having roughly the same immediate effect on the economy). While innovative industries find more and more rigidities and obstacles to their dynamism, the economy becomes increasingly dependent on the "dope"

43. Simiand (1932a:17), like Imbert, claimed that long waves can be found since the 16th c.

of war spending. Military service absorbs part of the work force and helps maintain full employment. "The result of these measures is an augmentation of production, unless an invasion deprives the country of a part of its means, but the equilibrium of the economy is destroyed" (p. 486). "The total national revenue increases in general without the country necessarily being enriched" (p. 486).

Similar effects extend to neutral countries, where industries at first develop in response to increased demands from the belligerent countries for raw materials, war goods, and general consumption goods (as well as to fill neutral countries' import demands that had been met by the belligerents). Payments in precious metals from the belligerents augment the credit possibilities for the neutrals, creating a war boom (p. 486).[44]

But despite short-term "boom" effects, war lays the groundwork for the long wave stagnation phase. War " 'consumes' part of the human capital as it destroys physical capital. It destroys some of the combatants, the civilian population, brings epidemics and illness. It leaves behind a mass of invalids, misfits, and wounded people who increase considerably the expenses of the State" (p. 487). Thus "the causes created by the conflict . . . produce the reversal of the long [expansion] tendency and lead to the long decline of economic activity" (p. 487). Imbert (pp. 488–90) listed five causal links between the war economy and the ensuing economic stagnation phase:

1. War drains precious metal reserves of belligerents, forcing them to abandon the convertibility of currency and to print large quantities of paper money. Currency depreciates, prices rise, and gold accumulates in the neutral countries.
2. War creates disequilibrium in the system of production (sudden rise in demand, destruction caused by war), leading to stagnation after the brief postwar reconstruction boom.
3. War creates rigidities in economic production due to the control and direction of the economy by the state.
4. War brings an exceptional level of mortality among combatants and civilians. After the war, marriages and births boom. The addition of young children to the population (along with war invalids) at the same time the working population is reduced increases the load on the economy.
5. The trauma of war shapes the psychological atmosphere of the stagnation phase. The war generation remembers this painful experience and guards the peace. "Moreover, the financial and economic conditions of the declining phase make the explosion of a general conflict impossible."

The stagnation phase, according to Imbert, is characterized internationally by the absence of major conflicts among the economically dominant countries and domestically by the rise of "order," "reaction," and conservatism. "The economic

44. However, if they depend on raw materials from a country involved in the war (or depend on maritime imports that are disrupted), they may suffer depressive effects.

difficulties of the decline bring about insurrections and revolutions'' as well (p. 493). According to Imbert, the stagnation phase continues until the economy stabilizes itself on a nonwar basis with minimal state control, laying the basis for the next expansion phase.

Imbert considered himself to be following in the Schumpeterian tradition, and his theory seems opposite to Trotsky's in its view of capitalism. In Trotsky's theory capitalism tends inherently toward stagnation and crisis and can expand only with the intervention of external forces (including war). In Imbert's theory, capitalism tends inherently toward expansion (if government lets entrepreneurs do their job) and declines because of the intervention of war.

Imbert thus shows that the basic elements of the innovation and war approaches can be combined in a single framework. One major weakness with Imbert's theory is that it works poorly for the most recent expansion phase, which (if one accepts most economic datings) *began* with a major war (World War II). Imbert suggests that after 1929 the capitalist economy progressively gave way to ''new economic structures'' tending towards the formation of a new economic system in which the place of long waves is unclear. I will discuss the anomalous aspects of World War II further in chapter 11.