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BOOMS, SLOWDOWNS, AND RECESSIONS: CONCEPTS AND MEASURES

1. A boom is a phase of economic expansion proceeding at high rates of growth. It is typically driven by business investment in new plant and equipment with incentives provided by high expected profits from rising demand, productivity improvements from technological and market innovations, easy credit, and at least initially moderate risks and costs of labor, finance, production, and construction.

2. Fixed and inventory investment by business and investment in housing, furnishings, and major durables by households are highly cyclical along with profits and credit, while consumption of nondurables and services is much less so and more habit- and trend-dependent. The cumulative increases in business investment and profits reinforce each other and produce gains in consumer incomes and outlays, in part directly through increased employment and in part indirectly through wealth effects.

3. Long expansions are helped by the pervasive optimism they generate. In the 1960s and 1990s, for example, the always attractive vision of indefinite prosperity became a widespread belief confidently held by many. Yet history has so far regularly demolished the argument that the latest boom is different and permanent, suggesting instead that all booms must end.

4. In a boom, planned investment outruns saving causing overproduction in capital good industries. The supply of rewarding investments gradually declines and risks rise. As growth and profitability rates decline, the excessive or misdirected investments are identified and penalized in financial markets. In time, business and investor expectations fall, risk aversion rises, and credit gets much tighter. The collapse of investment spells the end of the boom, even if consumption holds up

fairly well. The U.S. developments in 1995-2001 are remarkably consistent with this "over-investment " theory of business cycles.

5. Past investment booms were followed by slowdowns and/or recessions. Table 1 lists the dates of peaks and troughs for nine business cycles and fourteen growth cycles in the United States for 1948-1996. Business cycles are sequences of expansions and contractions, that is, absolute rises and declines in (the level of) general economic activity. They are widely diffused but vary greatly in amplitude and duration (about 2 to 12 years see Table 2). Growth cycles are fluctuations in the same comprehensive series of production, employment, real income, and sales but after elimination of long-term trends, that is, they are sequences of major cyclical slowdowns and accelerations. Slowdowns often precede and develop into recessions. Some of these slowdowns are long (10 months before the 1980 recessions, 18 months before the 1990 recession).

6. In sum, endogenous developments play a large, probably a dominant, role in business cycles. Actions of firms, investors, and to a lesser extent consumers are subject to risk and uncertainty, misperceptions and errors, which at times result in widespread imbalances. Excess capacity and overaccumulation of debt act as major depressants when growth slows and risks and costs begin to loom large while prices weaken and profits wane. At such times, the economy is particularly vulnerable to adverse exogenous shocks. If not already in a recession, the U.S. economy was very close to one on September 11th, 2001 when the incredibly barbaric but expertly executed terroristic attack on America and the civilized world disrupted the U.S. economic activity. Subsequent data, though scanty, support a substantial additional deterioration.

7. The most valid and important use of comprehensive time series in business cycle analysis is for the leading indicators to signal and for the coincident indicators to track the motion of the economy as it grows and fluctuates. The principal coincident index components are real personal income (less transfer payments), real business (manufacturing, wholesale, and retail) sales, total (nonfarm) employment, and industrial (manufacturing, mining, and public utilities) production. Clusters of related turning points in these aggregates determine when recessions and recoveries began. While comovements of the levels of these series

help to define and date business cycles, comovements of the detrended values of the same series do the same for growth cycles.

8. Movements of the monthly coincident indicators may differ enough to make the task of reducing the clusters of their related turning points to single dates difficult (e.g. , employment at times lags output significantly). Unfortunately, no single measure of aggregate economic activity exists in adequate and consistent form over sufficiently long period of time. Real GDP comes closest but it is quarterly rather than monthly, subject to a long string of sizable revisions, and of relatively short historical coverage. Also, different aspects of economic activity need to be considered; comovement of different variables is an essential characteristic of the business cycle; and, given the data errors and revisions, evidence from a number of independently compiled indicators tends to be more reliable than the evidence from any individual series.

9. Cyclical declines in (real) GDP are generally smaller than those in the index of coincident indicators (CI) and also not as well articulated (Chart 1). But these declines associated with each of the nine business cycle recessions in the U.S. can be well discerned in both GDP and CI as the only significant interruptions of the prevailing growth trends. The trend in GDP is stronger than the trend in CI because GDP includes fast-growing services and CI includes employment which grows less fast than output (reflecting the rise in labor productivity). Despite all data revisions, CI continues to confirm the historical NBER business cycle chronology (Table 3). GDP does, too, but on the whole with somewhat larger deviations.

10. The composite index of leading indicators (LI) shows lesser growth than coincident index (CI) because some of the components of LI are essentially trendless or stationary whereas all components of CI have strong upward trends (Chart 1). There is little trend in the average workweek , the unemployment insurance claims, the vendor performance diffusion index, housing permits, the interest rate spread, and the index of consumer expectations. LI led CI at each of the nine business cycle peaks by an average of 8 months, and at each of the nine business cycle troughs by an average of 5 months (Table 4). Moreover, each of the ten components of LI (including, in addition to the six series listed above, stock prices, real money supply M2, real new orders for consumer goods and materials, and real new orders for nondefense capital goods) shows average leads of bot business

cycle peaks and troughs (Table 5). The leads at peaks tend to be longer than the leads at troughs.

Table 1. Chronologies and Relative Timing

	Peak (P) and Trough(T) in		Lead (-) or Lag (+) of G.C. or B.C. turns			Peak (P) and Trough (T) in		Lead (-) or Lag (+) of G.C. or B.C. turns	
	Growth Cycle	Business Cycle	Peaks	Troughs		Growth Cycle	Business Cycle	Peaks	Troughs
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
P	a Jan-48	Nov-48	-10		P	Aug-69	Dec-69	-4	
T	Oct-49	Oct-49		0	T	Nov-76	Nov-70		0
P	Jan-51				P	Nov-73	Nov-73	0	
T	Jul-52				T	Apr-75	Mar-75		1
P	Mar-53	Jul-53	-4		P	Mar-79	Jan-80	-10	
T	Aug-54	May-54		3	T	Jul-80	Jul-80		0
P	Feb-57	Aug-57	-6		P	Jul-81	Jul-81	0	
T	Apr-58	Aug-58		0	T	Dec-82	Nov-82		1
P	Jan-60	Apr-60	-3		P	Sep-84			
T	Feb-61	Feb-61		0	T	Jan-87			
P	Apr-62				P	Jan-89	Jul-90	-18	
T	Jan-64				T	Dec-91	Mar-91		9
P	Mar-66				P	Jan-95			
T	Oct-67				T	Jan-96			

1948-61	All Turns	P	T	1969-91	All Turns	P	T
Mean Lead or Lag	-2.5	-5.75	0.75	Mean Lead or Lag	-2.1	-6.4	2.2
Median	-1.5	-5	1.5	Median	0	-4	1
Standard Deviation	2.298	3.0957	1.5	Standard Deviation	5.751	7.668	3.834

1948 - 1991			
Mean	-2.28	-6.1	1.6
Median	0	-4	0
Standard Deviation		5.754	2.963

a: The date makes both the beginning of our sample period and the higher of the 1948 peaks in the detrended CI (June 1948 is the second somewhat lower peak. All this adds to the uncertainty of this estimate.)

Table 2. US Growth Cycles and Business Cycles, 1948 – 2000
Durations of Cycles and Their Phases

Growth Cycles Peaks (P) and Troughs (T)			Durations in Months of Growth Cycles and Phases			Business Cycles Peaks (P) and Troughs (T)			Durations of Months of Business Cycles and Phases		
P	T	P	P to T	T to P	P to P	P	T	P	P to T	T to P	P to P
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Jan-48	Oct-49	Jan-51	21	15	36	Nov-48	Oct-49	Jul-53	11	45	56
Jan-51	Jul-52	Mar-53	18	8	26						
Mar-53	Aug-54	Feb-57	17	30	47	Jul-53	May-54	Aug-57	10	39	49
Feb-59	Apr-58	Jan-60	14	21	35	Aug-57	Apr-58	Apr-60	8	24	32
Jan-60	Feb-61	Apr-62	13	14	27	Apr-60	Feb-61	Dec-69	10	126	116
Apr-62	Jan-64	Mar-66	21	26	47						
Mar-66	Oct-67	Aug-69	19	22	41						
Aug-69	Nov-70	Nov-73	15	36	51	Dec-69	Nov-70	Nov-73	11	36	47
Nov-73	Apr-75	Mar-79	17	47	64	Nov-73	Mar-75	Jan-80	16	558	74
Mar-79	Jul-80	Jul-81	16	12	28	Jan-80	Jul-80	Jul-81	6	12	18
Jul-81	Dec-82	Sep-84	17	21	38	Jul-81	Nov-82	Jul-90	16	92	108
Sep-84	Jan-87	Jan-89	28	24	52						
Jan-89	Dec-91	Jan-95	35	37	72	Jul-92	Mar-91		8		
Jan-95	Jan-96		12								
Mean			18.8	24.1	43.4				10.7	116.5	62.5
Median			16.5	15	36				11	45	56
Standard Deviation			6.2	11.1	14.1				3.4	182.3	34.7

Chart 1: U.S. Coincident Index and GDP, 1948-2001

BCP 11/48 7/53 8/57 4/60   12/69 11/73 1/80 7/81   7/90
BCT   10/49 5/54 4/58 2/61   11/70 3/75 7/80 11/82   3/91

Coincident Index, Index 1996=100 (vertical axis)

GDP (right vertical axis)

Gross Domestic Product

Coincident Index

BCP = Business Cycle Peak
BCT = Business Cycle Trough
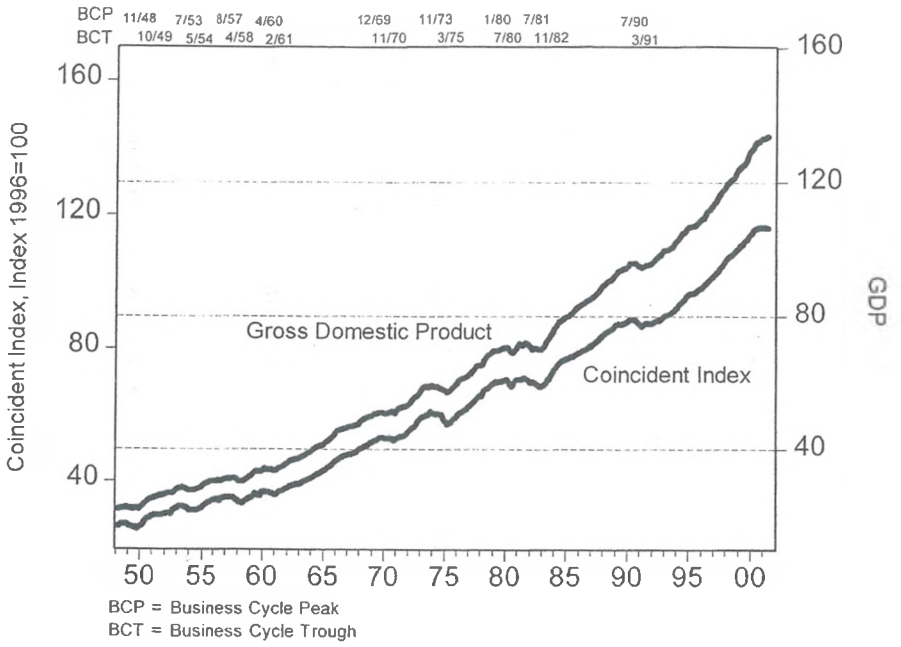
Chart 2: U.S. Leading Index and Coincident Index, 1948-2001

BCP 11/48 7/53 8/57 4/60   12/69 11/73 1/80 7/81   7/90
BCT   10/49 5/54 4/58 2/61   11/70 3/75 7/80 11/82   3/91

Coincident Index, Index 1996=100 (vertical axis)

Leading Index, Index 1996=100 (right vertical axis)

Leading Index

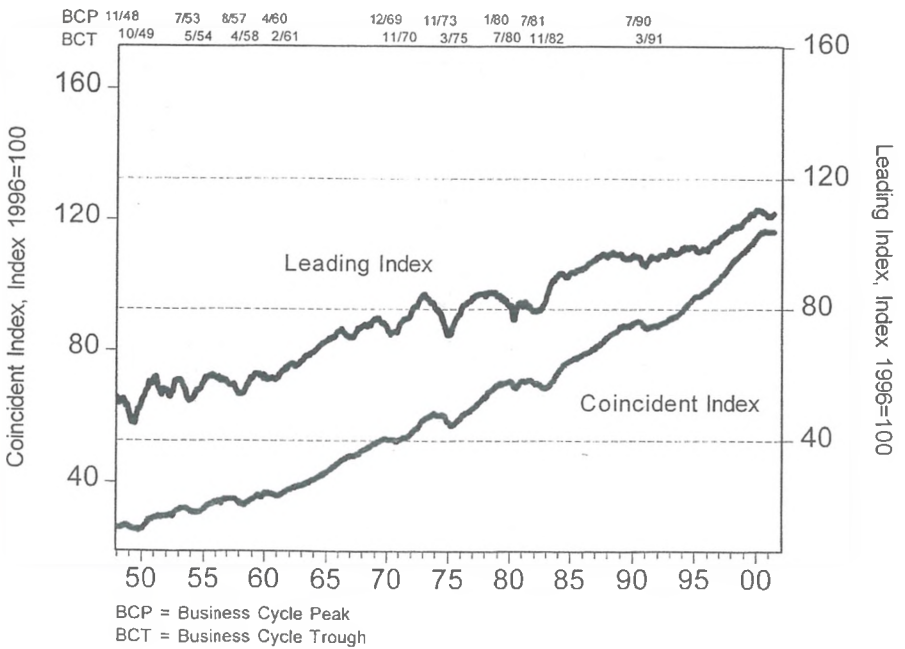Coincident Index

BCP = Business Cycle Peak
BCT = Business Cycle Trough

Table 3: U.S. Real GDP and Coincident Index, Data as of August 2001,
Timing at NBER-Designated Business Cycle Turns, 1948–1991

	Lead(-) or Lag(+), in months[b]					Lead(-) or Lag(+), in months[b]		
Business Cycle Peak[a] (1)	Real GDP, Quarterly (2)	Real GDP, Interpolated Monthly[c] (3)	Coincident Index Monthly (4)	Business Cycle Trough (5)	Real GDP, Quarterly (6)	Real GDP, Interpolated Monthly[c] (7)	Coincident Index Monthly (8)
Nov/IV 1948	0	+1	-1	Oct/IV 1949	0	-4	0
July/II 1953	0	-1	0	May/II 1954	-3	-2	0
Aug/III 1957	0	+1	-6	Apr/II 1958	-3	-1	0
Apr/II 1960	-3	missed[d]	0	Feb/I 1961	-3	missed[d]	0
Dec/IV 1969	-3	missed[e]	-2	Nov/IV 1970	0	missed[e]	0
Nov/IV 1973	0	+1	0	Mar/I 1975	0	0	0
Jan/I 1980	0	+2	0	July/III 1980	0	+2	0
July/III 1981	0	+2	0	Nov/IV 1982	-3	-2	+1
July/III 1990	-3	-1	-1	Mar/I 1991	0	0	0
Mean	-1.0	+0.7	-1.1	Mean	-1.3	-1.0	+0.1
Median	0	+1	-0.5	Median	-1.5	-1.0	0
Standard Deviation	1.50	1.25	1.96	Standard Deviation	1.58	1.91	0.33

[a] Month/quarter-year. Dates according to the reference cycle chronology of the National Bureau of Economic Research.

[b] In months, minus sign denotes leads while plus sign denotes lags. Based on quarterly data in columns 2 and 6, or monthly data elsewhere.

[c] Linear interpolation between the final months of the quarters. The computer program for identifying cyclical turning points found none in the instances shown here as "miss."

[d] Real GDP declined 0.5% in the second quarter (II 1960), rose 0.2% in III 1960, and fell 1.25% in IV 1960 (it increased steadily thereafter for several years). The corresponding entries to the left, in columns 2 and 6, effectively take I 1960 and IV 1960 as peak and trough in Real GDP, respectively.

[e] Real GDP shows two small declines in IV 1969 (-0.5%) and I 1970 (-0.14%), two rises in II 1970 (+0.2%) and III 1970 (+0.9%), and finally a larger decline (+1.1%) in IV 1970. The entries to the left in columns 2 and 6 are equivalent to taking III 1969 as a peak and IV 1970 as a trough.

Table 4: Timing of the TCB Leading and Coincident Indexes, 1948–1991

Line	Business Cycle Peaks	Leading Index	Coincident Index	Leading vs. Coincident
		(1)	(2)	(3)
		Leads (-) or Lags (+), in Months		
1	Nov-48	-4[a]	-1	-3[a]
2	Jul-53	-6	0	-6
3	Aug-57	-23	-6	-17
4	Apr-60	-11	0	-11
5	Dec-69	-8	-2	-6
6	Nov-73	-9	0	-9
7	Jan-80	-15	0	-15
8	Jul-81	-3	0	-3
9	Jul-90	-6	-1	-5
10	Mean	-9.44	-1.11	-8.33
11	Median	-8.00	0.00	-6.00
12	St. Deviation	6.27	1.96	5.07
	Business Cycle Troughs	Leads (-) or Lags (+), in Months		
13	Oct-49	-4	0	-4
14	May-54	-6	0	-6
15	Apr-58	-2	0	-2
16	Feb-61	-11[b]	0	-11[b]
17	Nov-70	-7	0	-7
18	Mar-75	-2	0	-2
19	Jul-80	-3	0	-3
20	Nov-82	-8	1	-7
21	Mar-91	-2	0	-2
22	Mean	-5.00	0.11	-4.89
23	Median	-3.50	0.00	-4.00
24	St. Deviation	3.20	0.33	-3.10
	Summary			
25	Mean	-7.22	-0.50	-6.61
26	Median	-6.00	0.00	-6.00
27	St. Deviation	5.34	1.50	4.45

[a] Tentative; based on the local high value of the leading index in July 1948.

[b] Based on the trough value of the leading index in March 1960; the value of the index in November 1960 was slightly higher.

Table 5: U.S. Leading Index. Timing at Business Cycle Peaks and Troughs, 1960–91

Line		Average weekly hours, manufacturing (1)	Avg. weekly initial claims for unemployt insurance (2)	Mfrs' new orders, consumer goods and materials (3)	Vendor performance, slower deliveries diffusion index (4)	Mfrs' new orders, nondefense capital goods (5)	Building permits, new private housing units (6)	Stock prices, S&P 500 (7)	Money Supply M2 (8)	Int rate spread, 10-yr Treasury bonds less fed. funds (9)	Index of consumer expectations (10)	Leading Index (11)
	Business Cycle Peaks (1)			Leads (-) or Lags (+), in Months						Leads (-) or Lags (+), in Months		
1	Apr-60	-11	-12	-13	-14	N/A[a]	-17	-9	miss	-21	-2	-11
2	Dec-69	-14	-7	-3	-4	-8	-10	-12	-10	-25	-10	-8
3	Nov-73	-7	-9	-8	0	4	-11	-10	-10	-21	-15	-9
4	Jan-80	-10	-21	-13	-9	-10	-29	miss	-24	-47	-38	-15
5	Jul-81	-7	-4	-2	-3	-6	-10	-8	miss	-11	-2	-3
6	Jul-90	-15	-18	-19	1	-12	-6	-1	-7	-33	-18	-6
7	Mean	-10.67	-11.83	-9.67	-4.83	-6.40	-13.83	-8.00	-12.75	-26.33	-14.17	-8.67
8	Median	-10.50	-10.50	-10.50	-3.50	-8.00	-10.50	-9.00	-10.00	-23.00	-12.50	-8.50
9	St. Deviation	3.39	6.55	6.56	5.71	6.23	8.23	4.18	7.63	12.37	13.39	4.13
10	Extra Turns[b]	7	7	3	8	4	7	6	2	6	7	4
11	Missed Turns[c]	0	0	0	0	0	0	1	2	0	0	0
12	Percent of Leads	100.0	100.0	100.0	75.0	80.0	100.0	83.3	66.7	100.0	100.0	100.0
	Business Cycle Troughs			Leads (-) or Lags (+), in Months						Leads (-) or Lags (+), in Months		
13	Feb-61	-2	0	0	-11	-3	-2	-4	miss	-10	-3	-3
14	Nov-70	-2	-1	-1	1	-1	-10	-5	-7	-15	-6	-7
15	Mar-75	0	-2	0	-1	0	0	-3	-2	-8	-1	-2
16	Jul-80	0	-2	-2	-2	-2	-3	miss	-3	-3	-4	-3
17	Nov-82	-1	-2	-1	-8	3	-13	-4	miss	-22	-8	-8
18	Mar-91	0	0	0	0	3	-2	-5	-4	-21	-5	-2
19	Mean	-0.83	-1.17	-0.67	-3.50	0.00	-5.00	-4.20	-1.50	-13.17	-4.50	-4.17
20	Median	-0.50	-1.50	-0.50	-1.50	-0.50	-2.50	-4.00	-3.00	-12.50	-4.50	-3.00
21	St. Deviation	0.98	0.98	0.82	4.85	2.53	5.22	0.84	6.03	7.52	2.43	2.64
22	Extra Turns[b]	6	6	2	7	4	7	5	2	6	6	3
23	Missed Turns[c]	0	0	0	0	0	0	1	2	0	0	0
24	Percent of Leads	75.0	83.3	75.0	75.0	58.3	91.7	83.3	50.0	100.0	100.0	100.0
				Summary						Summary		
25	Mean	-5.75	-6.50	-5.17	-4.17	-2.91	-9.42	-6.10	-7.13	-19.75	-9.33	-6.42
26	Median	-4.50	-3.00	-2.00	-2.50	-2.00	-10.00	-5.00	-7.00	-21.00	-5.50	-6.50
27	St. Deviation	5.66	7.14	6.48	5.10	5.47	8.03	3.48	8.76	11.94	10.47	4.06

[a] Series shows no clear specific-cycle peak in 1959, the first year for which the data are available

[b] Cyclical turning points in the series with no business cycle counterparts.

[c] Business cycle turns not matched by the series (as identified by the entries "miss" above).