EXTERNAL APPENDICES TO CHAPTER 1

Appendix X-1.1: SHIFTS IN THE COMPOSITION OF THE LABOR FORCE

The theory of the post-industrial society focuses considerable attention on the distribution of the labor force between various industries and occupations. In this appendix I present some data providing support for several propositions mentioned in Chapter 1.

A. Shifts in the Composition of the Labor Force by Industrial Sectors

An important pillar of analyses of post-industrial society is Petty's law, the proposition that over the course of economic development the labor force shifts away from agriculture toward manufacturing and thence to services. It is often attributed to the 17th century polymath, William Petty, but this parentage is dubious, as shown by Alessandro Roncaglia (1988). The law should really be named after Colin Clark (1940), who provided statistical evidence for its validity and who invoked Petty's name to give his own brain child a more distinguished pedigree.

Some recent empirical evidence for Petty's law appears in Panel A in Table X-1.1, which presents some rough estimates on the distribution of full-time equivalent workers by industry in the U.S. for two-thirds of a century.

One problem with this traditional approach (and classification) is that "services" are undifferentiated, a failing which various economists have tried to remedy. For instance, Foote and Hatt (1953) divide the service sector into three groups: the "tertiary industries," which include personal services (domestic and quasi-domestic services, such as restaurants and hotels, barber and beauty shops, laundry and dry cleaning shops, repairs and maintenance businesses, small handicrafts); "quaternary industries" (which facilitate or effectuate the division of labor (commerce, transport,

Table X-1.1: Distribution of Full-Time Equivalent Workers by Industry in the U.S.

	1929	1950	1975	1998
Panel A: Traditional Classification				
Primary sector	**11.1%**	**6.2%**	**2.9%**	**2.1%**
Agriculture	8.4	4.3	1.9	1.6
Mining	2.7	1.9	1.0	0.5
Secondary	**34.6**	**37.2**	**29.1**	**21.2**
Construction	4.1	5.0	4.6	5.1
Manufacturing	29.1	31.1	23.6	15.5
Utilities	1.4	1.1	0.9	0.7
Tertiary	**54.3**	**56.6**	**68.0**	**76.6**
Transportation and communication	9.7	7.1	4.8	4.5
Trade, wholesale and retail	17.6	17.5	19.6	21.4
Finance, insurance, real estate	4.1	3.6	5.4	5.9
Other services	14.0	13.1	17.7	29.3
Government	8.9	15.3	20.5	15.5
Total	100.0	100.0	100.0	100.0
Panel B: Revised Classification				
I. Production, movement of goods, services at a distance	56.9%	51.1%	38.6%	29.1%
II. Services to business, usually local	6.3	6.7	9.6	16.2
III. General local services to consumers	27.4	26.1	29.2	35.3
IV. Collective services including government	9.5	16.1	22.6	19.4
Total	100.0	100.0	100.0	100.0

Note: The data may not add to the subtotals or to 100 percent because of rounding.

Panel B: Group I includes agriculture, mining, manufacturing, transportation, radio and TV, motion pictures, wholesale trade, government enterprises, and that branch of the telephone and telegraph industry dealing with business communications; Group II includes business services plus some branches of utilities, construction, finance, insurance, real estate, hotels and lodging, miscellaneous services, and legal services. Group III includes retail trade, personal services, auto repair, miscellaneous repair services, amusement, health services, private household services, and some branches of construction, telephone and telegraph, utilities, finance, insurance, real estate, hotel, legal services, and miscellaneous services. Group IV includes educational services, social services and membership organizations, and all general governmental services.

The estimates for both panels were made from data on full-time equivalent workers. Problems arise in making such comparisons because major changes in the classification of industries occurred in 1948 and 1987. I made some rough adjustments to make the data more comparable.

The data come from Table 6.5 of the national income and product accounts. The sources are: Department of Commerce, Bureau of Economic Analysis (1998) and also their web site (http://www.bea.doc.gov/bea/dn1.htm). In some cases the labor force data in a specific industry had to be divided into several industrial groupings. These estimates were made using data from the 1972 input-output table (Department of Commerce, Office of Business Economics, 1979). Experiments with alternative methods of dividing these industries between the major industrial groups showed that the results were relatively insensitive to the particular methods of estimation which were used.

communications, finance, and administration); and "quinary industries," which refine and extend human capacities (medical care, education, research, and recreation, including the arts). Unfortunately, neither the Foote-Hatt nor the traditional classifications take into account where, or for what purposes, particular services are performed. If, for instance, research and development is carried out in a manufacturing industry, it is classified as "manufacturing." If, however, the same R and D unit becomes independent and carries out exactly the same work for the same company, as a subcontractor, it is classified as a service.

One way to circumvent this location problem is to divide the various industries according to whether the business units have primarily a profit-making motive (in contrast to a social or political motive) and also whether they primarily deal directly with other businesses or with consumers. Within the business-to-business category, we can also distinguish between industries where the business units primarily produce goods and services or move them at a distance to their customers and those which produce local goods and services to other businesses. Panel B shows some rough estimates according to this classification. From data presented in these two panels, several past trends, which will undoubtedly continue for some decades into the future, are immediately apparent.

* Between 1929 and 1998 the share of labor engaged in the production and movement of goods at a distance fell considerably. Within this category, the decline in the share of the full-time equivalent workers engaged in agriculture, manufacturing, and transportation was particularly important.

* In the same period the share of the labor force engaged in producing services to businesses, usually local, rose dramatically. This increase was particularly apparent in business services and miscellaneous professional services (which increased 6.4 and 2.1 percentage points respectively). In this category of business services, only the share of the labor force in utilities declined (0.4 percentage points).

* Between 1929 and 1998 the relative increase in full-time equivalent workers in localized services to customers was led by the rise in the relative share of workers in health services and retail sales (respectively 6.4 and 4.0 percentage points). Part of this increase, however, was offset by the fall in domestic servants (5.9 percentage points).

* In the same period the rise in the relative importance of full-time equivalent workers in collective services was led by the rise in employment of state and local governments (5.0 percentage points). The federal government accounted for only a small part (1.3 percentage points) in this aggregate.

B. Shifts in the Proportion of Occupations: The White Collar and Information Revolutions

A second pillar of the theory of post-industrial society is the analysis of shifts in the occupational distribution of the labor force. In the middle 1950s this proposition was tied closely to discussions of the change in the distribution of industries, since the declining importance of agriculture, manufacturing, and mining pointed to a fall in the share of traditional blue-collar workers and a rise in the share of service workers. But in the 1960s and 1970s, the distinction between workers producing information, in contrast to goods or personal services, came into general usage and it is useful to separate out these workers when considering changes in the classification of occupations.

Panel A in Table X-1.2 presents the standard data of the labor force according to conventional categories. Several problems, however, arise in interpreting these results. The classification and

Table X-1.2: Distribution of the Labor Force in Various Occupations

Panel A: Official definitions	1930	1950	1975	1995
Managers, officials and proprietors excluding farm	11.0%	13.8%	20.8%	28.3%
Professional, technical, and kindred workers	17.4	22.8	29.8	30.0
Service workers including private household	9.5	10.5	13.6	13.6
Craftsmen, foremen, and kindred workers	12.3	14.0	12.8	10.8
Operators and laborers	22.5	23.3	18.3	14.5
Farm proprietors, managers, workers	27.3	15.6	4.6	2.9

Panel B: Classified by detailed occupation	1950	1960	1970	1980	1990
1. Excluding military and homemakers					
Workers producing goods	50.5%	43.3%	34.7%	30.1%	26.6%
Workers producing services	49.5	56.7	65.3	69.9	73.4
Workers producing information	37.5	41.5	50.3	54.6	56.6
Workers producing other services	11.9	15.2	15.0	15.3	16.8
2. Including military and homemakers					
Workers producing goods	32.0	28.5	23.8	22.9	22.0
Workers producing services	68.0	71.5	76.2	77.1	78.0
Workers producing information	23.8	27.5	34.6	41.6	46.9
Workers producing other services	7.5	10.1	10.3	11.7	13.9
Armed services	1.1	1.6	1.5	1.6	1.2
Homemakers	35.6	32.4	28.7	22.3	16.0

Note: The estimates of Panel A must be considered only as rough approximations. Because of definitional changes, I was able to make only crude adjustments to the data in the six categories to correspond to the definitions for 1995. The underlying data come from the Census Bureau (1975), series D182-198, U. S. Department of Labor (1983), p. 44; and Jacobs (1997), p. 60.

The estimates for Panel B come from Pryor (1996), p. 77. The data were estimated on an occupation-by-occupation basis, but they also employ only rough estimation techniques to take account of changes in the occupational nomenclature.

definition of occupations have changed considerably over the years, so that the data are not always comparable. For highly aggregative data, simple adjustments can be made to make them comparable; for disaggregated data, more complicated methods must be employed (Pryor and Schaffer, 2000, Appendix Notes 3.1 and 3,2). Moreover, the current classification of occupations does not take into account the distinction between producers of personal services and producers of information, so that additional estimates must be made.

The data from Table X-1.2 show clearly two trends, which we can reasonably expect to last into the future:

* Blue collar workers (defined as craftsmen, foremen, operators, laborers, farm proprietors and farm managers) have been rapidly declining as a share of the labor force and are being replaced by white collar workers (managers, officials, professional, technical, and service workers).

* The workers in occupations classified within the service sector who produce or process information has been increasing much faster than those workers who produce personal services. This reflects both the rise in the share of office workers within enterprises and a rise in the share of workers in the service industries catering to the business sector.

Unfortunately, the data tell us little about the extent to which such occupational changes are a result of economic development or the economic system. For instance, with regard to systemic influence, David M. Gordon (1996) conjectures that special aspects of U.S. capitalism have led to a much higher share of managerial and administrative employees to production workers in the non-farm labor force than in any other advanced industrial nation. This bureaucratic burden on the workers is further enhanced by a higher ratio of top-executive salaries to production-workers salaries in the U.S. Richard A. Epstein (1995) also

hypothesizes that the growth of government and governmental regulation in the U.S. has been a major cause for the rise in the number of lawyers.

I have not found in the economics literature any systematic and detailed international comparisons of the industry/occupation distribution of the labor force to highlight differences between the U.S. and other advanced industrial nations. Thus, none of the various hypotheses about the special nature of the distribution of the labor force in the U.S. could be tested.

Although the data presented in Tables X-1.1 and X-1.2 have considerable importance for projecting the future of the economy, they seem to tell us little about how the economic system will evolve. That is, such data seem primarily to reflect changes in technology and productivity, rather than features of the institutional structure, since similar trends can be found in other nations with quite different economic systems.

Appendix X-1.2: THREE POPULAR VIEWS ABOUT SYSTEMIC CHANGE

Three quite different views about systemic change are often expressed, and I briefly discuss each.

A. Stasis

Some analysts proclaim the triumphant idea that in the U.S. liberal capitalism in its present form will continue indefinitely in the future, that in an important sense the U.S. has reached the end of history, and that no alternative economic system is or will be viable. Moreover, the old ideological debates will be muted, and, although other ideological clashes will occur, they will be less interesting and will focus on secondary, rather than primary concerns of the economic system. Although Francis Fukuyama (1992) argued such views in a particularly compelling and interesting manner, they are implicit in a much less

nuanced form in many of the writings in the popular business press.

As noted in the text, I can find no credible historical evidence that economic systems are permanent or that they are impervious either to internal or external causes of change such as those discussed in Chapters 2 through 8.

B. Acceleration

Others argue quite differently, that economic change is accelerating, and both the economy and the economic system will experience radical mutations. The evidence to support such a view is, however, usually sketchy, since it is usually "proven" with a few anecdotes about the enormous impact on our way of life brought about by television, the computer, and the internet. Depending on the disposition of the writer, the accelerationist view comes in two popular flavors.

The pessimistic flavor is apocalyptic. For instance, in the authoritative pages of Science, the distinguished British scientist and formulator of the "Ghia hypothesis," James Lovelock (1998), informs us that civilizations are ephemeral and we must take expensive measures to pass on our heritage to successor civilizations. The biologist David Ehrenfeld (1999) is even more specific, pointing out that history is a record of the collapse and disintegration of complex civilizations, that "techno-economic civilization . . . is self destructing," not just because of environmental degradation and resource exhaustion, but also because the ever greater complexity of the system is accompanied by increasing fragility.

The optimistic flavor focuses on the benefits of the acceleration of growth ("the new economy"). The real economic impact of the revolution in information technology and the development of the internet was finally felt in the second half of the 1990s, and the increased rate of technological improvement will continue at the same pace thereafter. Our present era is characterized, using the phrase coined by Peter

Drucker (1969), as the age of discontinuity; but whatever happens, the new economic system will lead toward a better and more prosperous future for all.

Marxism-Leninism incorporates both flavors of the accelerationist view. Liberal capitalism will change through a bloody political revolution, but will be replaced by a much better and more just economic system. With the downfall of Soviet socialism, this view no longer attracts much intellectual support, but even when the argument is stated in more acceptable terms, the theoretical evidence of an impending systemic collapse in the U.S., in which totally new economic institutions would emerge, leaves something to be desired.[1]

The argument about the acceleration of change between the half century. let us say, from 1885 to 1935, and the half century from 1935 to 1985 seems dubious. In this earlier period, for instance, scientific and technological changes in the U.S. brought about new products that radically changed our way of life: radios, electric motors, electric lights, telephones, automobiles, airplanes, and synthetic materials. At the same time, the nation experienced a massive shift of population from the farm to the city; the development of a nationwide system of paved roads, the widespread upgrading of the level of education; the partial emancipation of women and, to a lesser extent, racial minorities; the rise of big business and nationwide trusts, and the beginning of big government and the welfare state. In the later half-century period other changes occurred, but whether they were qualitatively more important is debatable. In these two half

[1] See External Appendix X-1.3, where I look from an abstract point of view at some of the analytical difficulties in forecasting the collapse of an economic system. To point out these problems in a more concrete context, I then discuss some of the causal factors that underlay the collapse of the centrally-planned Soviet economy.

century periods, I should add, the average annual growth of per capita GDP was roughly the same.[2] Advocates of this view also give a short shrift to the kind of empirical evidence brought forward in Chapter 2 about the limited nature in the 1990s of the technological changes which are supposed to characterize the "new economy."

In brief, the accelerationist view also seems dubious to me because I can find no convincing empirical evidence to support it. As in the case of stasis, the accelerationist view seems to be primarily based on faith, not reason.

C. Convergence.

A final view is the argument that all of the different economic systems, including the various models of capitalism, will converge toward one model.

Systemic convergence implies a metasystemic mechanism that selects the most efficient system. Unfortunately, it is far from clear which type of capitalism is superior. For instance, in the 1990s, when many in the U.S. media began to proclaim the alleged superiority of the Anglo-American economic system, the U.S. ranked only 8th out of 21 leading OECD nations in terms of GDP growth and 13th in terms of per capita GDP growth.[3]

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[2] Historical GDP and population data come from U.S. Department of Commerce, Census Bureau (1975, series A-6, A-7, F-32 and F-98). Recent GDP data come from national account statistics from the website of the U.S. Department of Commerce, Bureau of Economic Analysis. Table 1.2. For the earlier period I calculated growth of per capita GNP for 1885 - 1929: since using 1935 as an end year introduces some distortions, because of the impact of the Great Depression. For a similar reason, I calculated growth for the latter period from 1940. Using a more recent half-century period, for instance, 1950 - 2000, does not change my generalization in the text.

[3] The data come from the growth triangles presented in OECD (1999). The UK ranked 9th in GDP growth, but 6th in per capita growth. On other criteria, such as unemployment, the U.S. ranked closer to the top, at least in the last years of the 1990s.

Barring external influences, quite different types of capitalism seem to be able to coexist at the same time in different nations; since each has its particular strengths and weaknesses (Groenewegen, 1997; Soskice, 1999). Freeman (2000) argues this proposition in a more rigorous fashion and focuses his empirical analysis on the labor market. Moreover, each economy is embedded in a certain social and political matrix that hinders such convergence, at least in the short to middle run.

Appendix X-1.3: NOTES ON SYSTEMIC COLLAPSE IN GENERAL AND ON THE SOVIET CASE IN PARTICULAR

A. Some General Remarks about Systemic Collapse

Collapse of an economic system simply means the disappearance of key economic institutions or characteristics. In feudalism, for instance, these included the estate system and either the labor duties of tenants or payments in crops to their landlords in return for use of the land for their own farming. In the Soviet Union these included the apparatus for central planning and administration of the economy. Any future collapse of the U.S. economic system would include the current system of private property and relatively free markets for the allocation of goods and services.

Collapse of an economic system can be quite dramatic. For instance, in the Soviet Union, central planning and administration of the production of all major goods and services simply evaporated between 1988 and 1992 and there was little question in the minds of those both within and outside of that nation that the system had collapsed, even though the outlines of the new economic system were not clear and were constantly shifting.

Systemic collapse can be relatively violent and quick, especially when it is the result of a revolution or coup d'etat which leads to forced change of key economic institutions, as in the case of Czechoslovakia

in 1948. Collapse of an economic system can also be relatively peaceful and slow, so that few are fully aware of what is happening. For instance, the collapse of feudalism took several centuries and few contemporaries seemed very conscious of the overall changes in the economic system. Part of this lack of awareness was due to the slowness of the change and part was due to the fact that few had conceptualized the feudal economic system in a manner to allow them to view in perspective the changes in key economic institutions.

Creeping collapse can also mean that a key characteristic of the system disappears, even while the basic institutions remain, so that the institutions do not retain their original meaning. This raises an interesting possibility: It is commonly argued - even by Marx in the Communist Manifesto - that an essential characteristic of capitalism is its dynamism, which is manifested by long-term economic growth. What happens if per capita income stagnates or declines over a long period? Even though in a declining economy certain "capitalist institutions," such as private property and the market, may remain, their content has subtly changed and they become empty shells. The economic system has collapsed, even though most observers and participants may be unaware of what is happening.

Economic systems can collapse not just from internal but also from external causes, and these can be quite varied. German fascism fell because of Germany's military defeat. The medieval Sinhalese irrigation economy ("hydraulic society") collapsed, in part because of the increase of malaria, in part because of the social chaos resulting from foreign and civil wars (Indrapala, 1971). Many argue that Viking farming economic system in Greenland collapsed in the 16th century because of climatic change and the general worsening of agricultural conditions.

The most common approach toward analyzing systemic collapse is to explore dysfunctionalities

(sometimes called "contradictions") that occur as side-effects of the operation of the economy. In certain agricultural economies in the past, for instance, farming practices led to salination of the land, or desertification, or loss of soil fertility, and these, in turn, made impossible the continuation of such an economic system, situations discussed by Hyams (1952).

Once we move from such simple technological causes of systemic collapse to those arising from more subtle economic or social causes, the analysis becomes more problematic. For instance, Marx's analysis of the contradictions of capitalism focused on particular types of dysfunctional behavior manifested by rising unemployment and increasing severity of the business cycle.

Isolating particular aspects of an advanced economic system which could it bring down raises three analytic problems: First, a dysfunctionality may be correctable through particular types of governmental actions. For instance, the government might build into its fiscal system certain automatic stabilizers to reduce tax collections and increase expenditures during recessions, so as to modify the severity of the business cycle. It is necessary for us, therefore, to determine whether the perceived dysfunctionality is correctable and, if so, whether the political will is available to implement such a policy measure. Second, the dysfunctionality may not be sufficiently severe to have much political influence. It is necessary, therefore, to determine how these problems are perceived by policy makers. Third, motivation for systemic change seldom occurs without a compelling vision of a better alternative, and this may be lacking. It is necessary, therefore, to assess the strength of such competing visions.

Economic systems can, of course, collapse for reasons other than long-term dysfunctional elements. Countries can fall into certain short-term policy traps that result in deteriorating economic and political performance and this, in turn, may also lead to collapse.

The case study below of the collapse of the Soviet centrally-planned economic system is presented as an exercise in thinking about the change of economic systems. Although I do not predict any collapse of the U.S. economic system, this case study of the USSR allows a greater awareness of the signs that might point toward such a dramatic systemic change.

B. Short-term Causes: The Role of Policy Traps in the USSR[4]

By the end of 1991 both the centrally planned and administered economy of the Soviet Union and the nation itself had collapsed. The economic situation was becoming desperate and, by estimates I consider reasonable, per capita production had fallen between 10 and 20 percent between 1988 and the end of 1991; the store shelves were bare and essential goods were rationed; the governmental budget deficit was massive; and the economy was spinning into hyperinflation.

1. Background

The most immediate cause of the collapse of the Soviet Union was the bungled coup d'etat by the generals and the political maneuvering that resulted in the displacement of Mikhail Gorbachev by Boris Yeltsin. But such an event was the result of much deeper social and economic forces. Certainly a series of adverse shocks that weakened the economic and political system can be isolated: The lack of success in the Afghanistan war weakened support for the government. The continued military pressure by NATO and President Reagan's Strategic Defense Initiative acted to divert funds from needed civilian purposes to defense expenditures. The Chernobyl disaster in 1986 created a crisis of confidence of Soviet citizens both in their nation's technology and the ability of their government to deal with such problems in an effective

[4] For this brief discussion I draw heavily on analyses found in a special issue of The National Interest (No. 31, Spring 1993) on the topic, and, in addition, Ellman and Kontorovich (1994) and Åslund (1995).

and open manner. Most agree, however, that deeper causal forces underlay the collapse, factors that weakened the system so that it was vulnerable both to the bizarre political maneuvering and to various internal and external shocks.

In the mid 1980s some Western specialists of the Soviet Union contended that the Soviet economy or the Soviet Union would eventually collapse, basing their arguments on some evident signs of long-term troubles. Even since the 1950s, growth rates in the USSR (and all of the other European communist nations as well) were declining (data are provided by Pryor, 1994) and growth in productivity (as well as growth of the capital stock) were decelerating. During the late 1970s and early 1980s, per capita income in the Soviet Union was stagnant so that the nation was certainly not meeting its goal of "catching up to the West" anymore. The quality of life, as reflected in such indicators as life expectancy, was also falling.

Nevertheless, when Gorbachev took power in March 1985, few predicted either the coming economic crisis or the collapse of the system in the next decade. On the contrary, the vast majority of Soviet specialists in the West believed that the Soviet Union was only experiencing short-term economic difficulties and, although the economic system was vulnerable to external shocks, would probably last at least several more decades. The majority of informed opinion in the West generally attributed the Soviet economic stagnation to the policy measures taken - or not taken - by Leonid Brezhnev, a tired and sick old man who was the General Secretary of the Communist Party of the Soviet Union (CPSU). Many Western specialists also noted that increasing corruption and labor indiscipline were accompanying the economic stagnation, but they placed little long-term significance on these changes.

Brezhnev finally died in November 1982 and, thereafter, the cast of leaders of the nation changed rapidly. Yuri Andropov, an intelligent and dynamic leader succeeded Brezhnev, and started a cautious

program of changes. The problems of introducing economic reform in the Soviet Union were quite different from those facing the Chinese leaders, because China had several relatively self-contained economic sectors, such as agriculture, which allowed political leaders to instigate reforms in a single sector without great worry about the impact of such changes on other sectors. By way of contrast, the Soviet Union was more highly developed and its various economic sectors were more highly interconnected, so that reform had to take place in many sectors at the same time. As a result, Andropov began his reorganization of the economic system cautiously by changing personnel, increasing accountability of industrial administrators, and taking measures to reduce labor indiscipline, corruption, and alcoholism. Aggregate production slowly began to rise. In July 1984, before more extensive changes could be undertaken, Andropov died of kidney failure. He was succeeded by Konstatin Chernenko, an unimaginative, but seemingly durable apparachik. Chernenko, however, took few important policy initiatives and lasted a little over a year in power before dying of liver problems. Finally, Mikhail Gorbachev became First Secretary of the CPSU.

In the years leading up to the abortive coup in August 1991, the Soviets experienced a series of additional difficulties, some due to shocks, others due to the ill-conceived policies of Gorbachev. Of the latter, four economic and political traps seem particularly important in explaining the Soviet collapse:

2. The Deficit Trap

Revenues and expenditures in the governmental budget became seriously out of balance in the latter part of the 1980s. On the revenue side, a major source of government taxes, namely from liquor sales, declined sharply after May 1985, when Gorbachev began a campaign against alcoholism by severely restricting the legal production and sale of alcoholic beverages. Oil export profits provided another important source of government revenues, but these fell with the fall of international oil prices at that time.

Taxes on other profits of enterprises, another key revenue source, also declined as a result of certain policy changes (see below) that encouraged companies to reduce their profits by increasing wages. Finally, by 1991 the constituent republics of the Soviet Union were not forwarding certain taxes which they had collected.

On the expenditure side of the governmental budget, strains on the budget increased as Gorbachev raised governmental investments in order to meet the goals of his ambitious social-economic acceleration program. His government also substantially raised subsidies on food and, in 1990, social benefits (especially pensions).

According to Michael Ellman (1994), the budget deficit, which was roughly 2 percent of the GDP in 1985, ballooned to about 10 percent in 1988. (Ellman also presents several variants of this estimated deficit, but all show roughly the same picture). By late 1991 the budget deficit had risen to roughly 20 to 30 percent of the GDP, and was the major source of upward pressure on prices and the scarcity of goods on the store shelves.

3. The Institutional-flux Trap

Gorbachev was an impatient leader, who often made abrupt policy changes whenever his previous policies did not achieve immediate results. This can be seen by tracing briefly the three phases of his reconstruction ('perestroika") policies, which led to a break down in the rules of the game by which actors in the economy played.

a. *Early perestroika* in 1985 and 1986 represented a type of centralization. A number of ministries were merged into super-ministries, independent sources of control such as the quality control office were established, labor discipline was tightened, and private trade and other initiatives were

discouraged. A bizarre example of the latter was "the pogrom of private greenhouses," when state agents destroyed these buildings used by private flower growers. During this time Gorbachev also pushed through an ambitious five-year plan that featured both a reordering of investment priorities and high levels of economic growth, a combination allowing no room for error on the part of subordinates in the economic hierarchy.

b. *Middle perestroika* from 1987 through 1989 represented an attempt to obtain the benefits of increased authority by managers of state enterprises and by "cooperative entrepreneurs," who created pseudo-private enterprises under the legal forms of cooperatives. The government reduced the number of plan goals and required deliveries. Enterprise profits were supposed to become the key indicator of success. For the factories, these measures were combined with measures to ease wage regulations, to allow selection of managers by the workers, and to increase the power of industrial managers to control both what was produced, the methods of production, and to whom such production was sold. In response, wages increased considerably, which led to a reduction in profits and the taxes on profit without new wage taxes offsetting this decline. .

In this situation, however, prices remained fixed but few central controls were in place to direct what goods and services should be produced or where they should be sent; and, as a result, markets could not function markets to allocate production. Producers had few incentives to produce what was most needed or, indeed, any good or service that was unprofitable. As a result, serious bottlenecks arose because of inconsistencies between supply and demand of particular goods and services; economic chaos accelerated; and both physical production and tax revenues to the state declined.

At the same time on the political front, Gorbachev curtailed both the economic and political role

of the party by requiring multiple candidates for party elections, by reducing the number of party officials, and by forbidding the extensive meddling by local party officials in the economic management of the state enterprises.

c. *Late perestroika* lasted from 1989 to Gorbachev's fall in 1991. In this period the government began to encourage the first sprouts of private ownership and markets. Together, ten different, comprehensive reform programs were worked out, all of which pointed toward an economically more liberal system. Gorbachev, however, adopted none, veering toward and then dropping support for each that was presented. By trying to forge compromises in order to achieve a consensus, he ended up with a system riddled with inconsistencies - an attempt Boris Yeltsin characterized as "trying to marry a hedgehog with a garter snake."

In brief, the rules of the economic game became increasingly unclear, the central bureaucratic apparatus was weakened, and the economy was on a downward trajectory. Major institutional changes such as greater authority to the enterprise managers were made without the necessary complementary institutions, such as markets. Production no longer corresponded to what was most needed and production bottlenecks became more frequent. Conflicts of laws increased in severity, and the uncertainty arising from such institutional chaos dominated decision-making. Clearly the institutional flux was dysfunctional.

4. The Loss-of-Authority Trap

Accompanying the restructuring of the economy was an attempt to increase freedom of expression (glasnost') in order to tap the ideas and expertise of the population for restructuring the economy. Among other measures taken, Gorbachev also downgraded the teaching of Marxism-Leninism in order to reduce the power of the party conservatives. The Soviet media featured increasing public denunciations of past

and present governmental policies. In debates in party congresses and legislative assemblies, which began to be broadcast on television, the delegates contributed to such criticisms. Such policies, combined with the increase of the relative power of industrial managers vis-à-vis party officials, led to a considerable weakening of the party and of the party's ideology. As a result, the ideological glue holding the system together began to dissolve.

Accompanying this loss of party and government authority was a rise in social indiscipline. More political players also entered the game and their actions were increasingly at cross-purposes with those of the government. As a result, by the late 1980s the Soviet Union began to experience strikes, the shutdown of chemical and power plants by environmental protests, increasing corruption, and a rising crime rate.

5. The Nationalism Trap

A completely unexpected consequence of glasnost' was the rise of nationalism in the various constituent republics of the nation, ideas which had been suppressed during the 70 years of Soviet power. This nationalism was the result of a variety of specific grievances, their resentment of domination by Russia, and disgust toward the central government's policy errors. For instance, the handling of the Chernobyl incident in Ukraine was a key factor in the growth of nationalistic fervor in that republic.

The economic difficulties, which had accelerated during middle perestroika, contributed to additional problems. Officials of the republic governments began to withhold the tax revenues they collected from going to the central government and also to prevent certain key products produced in their republic from being exported to other republics. By the beginning of 1991 five republics out of fifteen had declared their independence (the three Baltic republics plus Georgia and Armenia) and the others had proclaimed their sovereignty. Although the legal meanings of "independence" and "sovereignty" were ambiguous, the

republics began to pass legislation quite at variance with national laws and regulations. This, of course, contributed to the institutional chaos discussed above.

6. An Overall View of Policy Traps

It is important to realize that although all four of these policy traps had economic aspects, they were primarily political. Moreover, it is possible that these traps could have been avoided if Gorbachev, an intelligent and well-meaning leader, had handled matters differently. Certainly some communist nations such as China were able to guide their economic reforms in a more astute manner so as to minimize chaos and to maintain at least some of the key institutions such as considerable public ownership and continued power of the Communist Party.

Because Gorbachev could not implement satisfactorily solutions to avoid these four traps, many have convincingly argued that they were the chief causes of the dramatic collapse of the Soviet Union. According to this view, the Soviet Union ultimately fell because of the malfunctioning of Andropov's kidneys and Chernenko's liver, which, in turn, led to Gorbachev's bungling.

But two major analytic problems arise at this point. First, at least one of these traps, namely nationalism, might actually have been a long-term dysfunctionality of the system and unavoidable by any means under any Soviet leader. Second, the fact that China successfully managed its economic transition should not mask the crucial fact that the Maoist economic system had also collapsed, but that collapse was abetted and guided by party officials who followed with a more consistent set of ameliorating policies. In sum, both the old Soviet and Chinese economic systems might have faced fatal problems that were independent of any short-term traps.

C. Long-term Causes: The Role of Dysfunctional Elements in the USSR

Isolation of possible dysfunctional elements that might have led to the collapse of the Soviet economy, even if Gorbachev had not taken power, require us to take into account some tightly linked political and economic factors. Before beginning the analysis, however, I must rule out one possible element that certainly made the Soviet Union produce less than its economic potential, namely economic inefficiencies inherent in central planning.

Critiques of economic wastage in a communist society date back to Aristotle's discussion of Plato's version of these ideas in his Republic. An economic literature starting with analyses of Ludwig von Mises and Friedrich Hayek has emphasized that a centrally-planned economy has no satisfactory method of measuring costs and achieving economic efficiency without functioning markets to set prices according to the relative forces of supply and demand. Over the years Western empirical analyses of the Soviet economy have documented inefficiency in a static sense, but, contrary to expectations, the results of such studies did not show that such economic inefficiencies accounted for a significant fraction of total output. Although Soviet intellectuals were certainly aware of such economic inefficiency, there is no evidence that popular discontent with such inefficiencies was a major force for the collapse of the system. We must, as a result, turn to other long-term causes of which three seem particularly important: the increasing problems of maintaining effective central control in an increasingly complex economy, the growing gap between promises and reality, and the slowdown in economic growth.

1. Problems in Maintaining Effective Central Control of an Increasingly Complex Economy.

As instruments of control of the economy, Stalin used terror and forced labor to encourage managers and workers both to follow the plan, to anticipate what the government wanted, and to take

appropriate actions whether they were explicitly specified or not. As long as an economy remained simple so that the necessary decisions were relatively clear, such a system could work.

The effectiveness of terror, however, declines over time, especially as an economy grows and becomes more complex. More goods are produced, more production technologies must be considered, and more consumer demands must be taken into account. As the labor force in the state enterprises increases, more supervisors are required, and more middle managers are needed to oversee the work of the supervisors. As a result, the organizational hierarchies grow higher.

Such complexity, of course, brings greater problems in deciding what are the best decisions to meet the challenges of the future. The amount of information necessary for proper decision-making by the central-planning apparatus greatly expands. Moreover, the necessary information can, for the most part, only come from the enterprises, whose performance, in turn, is judged on the basis of information which it sends to the center, so additional problems arise. In brief, using some modern jargon, the principal/agent problem becomes increasingly severe as the economy becomes more complex.

In a market economy, of course, the market makes the ultimate decision about whether a manager has made the right decisions or not, so that the principal/agent problem does not arise at that level. Rather, it arises in the control of the managers by the stockholders or their enterprises, and the control by managers of their subordinates. Nevertheless, the stockholders and managers in a capitalist market economy deal with a much narrower range of information than a central planner - one indicator, profits, plays a particularly important role - so that, in this crucial respect, the principal/agent problem is much less severe.

Mikhail Gorbachev seemed to recognize that the increasing complexity of the economy and the rising costs of information to the center pointed toward the necessity of decentralizing the command

structure of the economy. But any mechanism allowing an effective coordination of the enterprises without central control would, in essence, lead to a collapse of the old system of central planning and allocation, fixed prices, and suppression of the market.

2. The Increasing Gap Between Political Promises and Economic Performance.

Under most circumstances, radical thought does not necessarily flourish and revolutionary mobs seldom take to the streets if the economy is inefficient or is growing more slowly than others. An important exception arises when a government has continually justified the economic system as a necessary means to achieve a higher standard of living (and overtake competing nations) and when such a goal has not been achieved. More specifically, economic growth was a raison d'être of the Stalinist economic system. During the 1950s and early 1960s, such a promise was fulfilled, but by the late 1960s growth began to decelerate. As I show elsewhere (Pryor, 1994), the deceleration of economic growth was much more marked in East than in West Europe, so that the gap in the standard of living in East and West widened.

Accompanying a political detente between East and West was a growing communication between the citizenry of these two blocs. With this contact came a rising awareness of the increasing economic gap between the two areas, a gap that contributed to the loss of political legitimacy of the governments of the USSR and East Europe.

3. The Slowdown in Economic Growth

The slowdown in economic growth that led to the growing gulf between economic promises and reality can be attributed to several important factors:

* Increasing loss of central control over personnel. The increasing complexity of the economy discussed above led not only to greater difficulties in managing production, but also to increasing

problems of evaluation by the central planners of managerial performance. As a result, managerial accountability declined. Brezhnev's policy of the "stability of the cadre," that is, keeping managers in their positions for a long time, allowed these executives to make decisions in a manner that made their own lives easier and more comfortable. This meant, of course, less urgency, less change, and less hustling in the economy and, as a result, aggregate economic growth of the economy was bound to suffer.

* The exhaustion of easy investment opportunities. An important aspect of the Soviet strategy of economic growth was placing a greater share of investment into industry and agriculture than in the West and, simultaneously, investing less in services, housing, and transportation. The results, as we know, were fewer services, very small apartments or homes, poor rural roads, and railroads operating at their maximum capacity. For living standards to rise, investment priorities had to change, but these neglected sectors require much greater investments to produce a unit of output than the favored sectors. Keeping investment levels the same, any change in investment priorities would result in slower growth.

* The need for isolation combined with the lack of outside stimuli. A centrally-planned economy dominated by a communist party requires a tightly circumscribed private sector combined with a relatively self-contained economy and society. Thus, it is important that exports and imports be tightly controlled and that multinational firms not be allowed to invest locally unless they are willing to allow all important decisions to be made by the government. The centralization of political power and the legitimization of the party also requires that international travel be limited, that access to foreign sources of information be circumscribed, and that the flow of ideas, economic and political, be controlled. An important consequence of such self-containedment is that a centrally-planned economy is unable to take full advantage of new technological ideas from the rest of the world and to tap new sources of technological

progress.

An interesting example of the effects of such self-containedment is seen in the case of the two Germanies. After the fall of the Berlin Wall in 1990 and the integration of the former German Democratic Republic (East Germany) into a greater German state, one of the big surprises to observers from West Germany was the low level of technology in the East. Although Western estimations of relative productivity of the two Germanies before 1990 had revealed higher productivity per worker in West Germany, the degree of technological backwardness in East Germany had been considerably underestimated. These differences in productivity had arisen despite the fact that the two nations adjoined each other and had considerable contact. Another part of the problem was lack of urgency or ability by managers in the East to implement many of the ideas from the West that they did learn about.

This approach was vividly illustrated to me in a conversation with an important West German insurance executive, who expressed his astonishment that the largest insurance company in East Germany used very few computers. Instead, it relied on administrative methods that were enshrined in the pre World War II past. The East German company, of course, was a state monopoly that faced no competition and had no need to change.

In brief, at low levels of economic development, a Stalinist economic system can obtain high economic growth using a strategy of "extensive growth." This involves massively increasing the share of the population in the labor force, by moving workers from low productivity to high productivity sectors, and by outfitting those new or newly moved workers with the same machines and equipment that other workers in the industry are using. When these sources of growth are exhausted, productivity can increase only by a strategy of "intensive growth" whereby any additional capital equipment must embody new technology,

require new skills, and take advantage of new knowledge. Without such technological changes, the substitution of capital for labor runs into diminishing returns.

In the latter part of the twentieth century, the nature of new technologies accompanying the computer and biotechnical advances seemed especially to require considerable openness; extensive traveling of domestic technicians and managers, and constant contact with foreign markets and foreigners. At this point the closed political system that guides and, in turn, is sustained by the economic system places constraints on economic growth.

3. An Overall View of Long-term Dysfunctionalities

The difficulties in maintaining effective central control of an increasingly complex economy and the loss of political legitimacy occasioned by the increasing gap between political promises and economic performance weakened the government of the USSR. Certainly, it is possible to isolate other long-term dysfunctionalities, although the three discussed above seem the most important. The unanswered historical question is whether these problems could have been handled in a different way by a more capable government than Gorbachev's so that systemic change would have been less abrupt and less far-reaching.

D. A Brief Summary

Although the three long-term dysfunctionalities specified above endangered the long-term existence of the Soviet economic system, it seems doubtful that, by themselves, they were directly responsible for the collapse either of the Soviet Union or its economic system between 1988 and 1991. But the four policy traps discussed above made life in the USSR increasingly unbearable and certainly these short-term economic problems made a change of government immanent. The USSR did not fall for the usual reasons that other nations collapse - by a coup d'etat or a peaceful shuffle of political decision makers, but by the

bizarre set of events that flashed in the headlines. It was the cunning of history, rather than predictable economic and political events, that was responsible for the final collapse of the Soviet system.

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