THE SPIRIT OF CAPITALISM, SAVINGS, ASSET PRICES AND GROWTH

by

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PREFACE

This study extends the traditional growth model and the recent endogenous growth theory to consider how a social and cultural element—the spirit of capitalism in the Weberian sense of accumulation for the sake of accumulation—impacts on savings, asset accumulation, stock market prices, and economic growth and development over time and across countries.

My thinking on the capitalist spirit and economic growth is partly due to my study in classical and Marxian economics at Wuhan University and partly due to the freedom of reading contemporary great economists at Harvard University. Unlike mathematical growth theorists, many classical and contemporary economists have shared the Weberian approach to savings and accumulation, and they have paid particular attention to cultural, social and historical elements in the process of economic growth and development. In this area, the ideological camps are conspicuously absent. Therefore, I can put together economists, historians and sociologists of different "labels" such as liberal, conservative, radical, and eccentric: Adam Smith, J.S. Mill, Karl Marx, Nassau Senior, William Jevons, John Rae, Alfred Marshall, Gustav Cassel, J.M. Keynes, Lord Acton, Max Weber, Werner Sombart, Georg Simmel, Joseph Schumpeter, Thorstein Veblen, Frank Knight, Milton Friedman, and John Kenneth Galbraith, among many others.

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INTRODUCTION

Traditional models of optimal economic growth (Ramsey, 1928, Cass, 1965, and Koopmans 1965) and
the more recent endogenous growth models (Romer, 1986, and Lucas, 1988) have focused on technology,
and time preference in economic growth. In the Ramsey-Cass-Koopmans framework, with typical
neoclassical production function and exogenously given time discount factor, the maximization of an
additive utility function defined on per-capita consumption by a representative agent or family leads to
a unique steady state where the net marginal productivity of capital equals the time discount rate. If two
countries have the same technology and the same discount rate, it is expected that per capita consumption,
per capita capital stock, saving rate and returns on capital are all equalized in the steady state. In the
Romer-Lucas framework, the starting point is to depart from the usual assumption of diminishing returns.
Romer (1986) has shown that, under increasing returns to scale, the levels of per capita income in
different countries need not converge. Thus in these two kinds of models, different assumptions on
production technology have given rise to different theoretical results on economic growth.

It is interesting to observe that we economists tend to explain growth and development by dealing
with capital, labor and technology, while historians, political scientists and sociologists have paid much
more attention to the cultural and other institutional background of growth and development. That might
be the division of labor among intellectuals. I believe that a unification of the economic approach and the
sociological approach can be achieved in a comprehensive growth model, because we share the common
conviction that culture differences among countries, in addition to production technology, play an
important role in determining economic growth and development. This book represents a preliminary
attempt in this direction. In this book, instead of talking culture in its general form, I propose an
alternative growth model by extending the standard growth theories to include Max Weber's (1958)
theory of "the spirit of capitalism". Mathematically, this task is accomplished by defining the utility
function on both consumption and capital. This definition of the utility function reflects the essence of
the spirit of capitalism in Max Weber (1958): continual accumulation of wealth for its own sake, rather than for the material rewards that it can serve to bring.

Since Max Weber published his famous study, *The Protestant Ethic and the Spirit of Capitalism*, there has been a tremendous accumulation of literature on the capitalist spirit and its relation to religions and wealth creation. Though sociologists and historian (M. Weber, W. Sombart, 1913, 1915, R. H. Tawney, 1926) often argue more about which religious belief leads to the capitalist spirit, the positive link between the capitalist spirit and wealth accumulation has been taken for granted. Recently there are even studies on theological justifications for the capitalist spirit. For interested readers, a good collection is Peter Berger's (1990) *The Capitalist Spirit: Toward a Religious Ethic of Wealth Creation*. Michal Novak's (1993) book *The Catholic Ethic and the Spirit of Capitalism* offers us another look at the origin of the capitalist spirit.

In the rest of this introduction, I briefly summarize the main ideas in this book. Chapter I introduces the capitalist-spirit model of accumulation and growth. The crucial step is to define a representative agent's utility function on both consumption and wealth accumulation. As a result of the presence of capital accumulation in the utility function, the steady-state capital stock is larger than the one at the modified-golden-rule level, and the forms of the utility function play a crucial role in determining equilibrium consumption and capital. Therefore, countries with the same technology and the same time discount rate may have different steady states depending on their degrees of the capitalist spirit. In particular, the stronger the capitalist spirit a country has, the higher the long-run consumption and capital accumulation. In addition, since there may exist multiple equilibria in the model, different countries with different initial conditions will end up with different long-run equilibria. Therefore, the convergence theorem in the optimal growth theory does not hold in the capitalist-spirit model of accumulation and growth.
The capitalist-spirit approach to accumulation and growth is taken not only by many sociologists, but also by many giants in the history of economic analysis. In chapter II, I offer a preliminary review of Aristotle's *chrematistics*, Adam Smith's principle of frugality, Nassau Senior's identity of capital and abstinence, J.S. Mill's spirit of accumulation, Karl Marx's accumulation drive, Keynes' psychology of capitalist society, Thorstein Veblen's accumulation emulation, Joseph Schumpeter's entrepreneurs and their strive for success. In order to distinguish the spirit of capitalism from the concept of time preference, I also present a detailed comparison between these two concepts based on the contributions by John Rae and Eugen Böhm-Bawerk.

Chapter III deals with the empirical relevance of the capitalist-spirit model. Since Weber's time, many empirical studies in sociology, history and economics have taken the capitalist-spirit approach to growth and development even though an explicit mathematical framework has been absent. To cite a few more recent examples, there are *Why Has Japan 'Succeeded'?* by Morishima (1982), Wiener's (1981) work on the decline of British industries: *English Culture and the Decline of the Industrial Spirit: 1850 - 1980*, and Harrison's (1985, 1992) studies, *Underdevelopment is a State of Mind* and *Who Prosper?*. All these studies can be incorporated into a mathematical growth model with the capitalist spirit and the correlation between economic growth and the capitalist spirit can be tested empirically as in DeLong (1988).

Chapter IV demonstrates the striking difference in tax-policy analysis between the standard optimal growth model and the capitalist-spirit growth model. In the former, it is well-known that a consumption tax and a lump-sum government spending have no effect on the long-run capital accumulation, which is determined by the modified golden rule and is independent of consumption tax and government spending. But in the capitalist-spirit model, a consumption tax stimulates long-run capital accumulation, and government spending reduces the long-run capital stock. In the short run, a future rise in government spending stimulates current investment; a future increase in the consumption tax raises current investment;
a change in the future income tax has an ambiguous effect on current investment; and all current increases in government taxes and government spending reduce current investment.

The important policy analysis on inflation and economic growth is done in chapter V. From the familiar Sidrauski model, inflation is supernormal because the long-run capital stock is independent of inflation and money growth. This result undermines the famous Tobin portfolio-shift effect: inflation leads to more capital accumulation. Since the 1960’s, many models based on intertemporal optimization have been produced and none of them has provided a full support for the Tobin effect. In the capitalist-spirit model of growth, the Tobin effect can be fully confirmed: a higher inflation gives rise to a higher capital stock in the long run, and, even more significantly, inflation increases the endogenous growth rate of the economy.

Chapter VI broadens the basic model to compare the effects on wealth accumulation of the altruistic sentiment (in the form of charity contributions) and the capitalist spirit. It is shown that, when a society becomes more altruistic, capital accumulation and consumption will definitely decrease, and charity contributions in the long run may be reduced as well. But if a society has a higher spirit of capitalism, then capital accumulation, consumption and charity contributions will all increase. Furthermore, a tax deduction on charity contributions may lead to more or less charity donation and more or less capital accumulation depending upon the elasticity of charity contributions with respect to the tax deduction. In addition, government support may crowd in or crowd out private charity regardless of whether government funding and private contributions are substitutes or complementary.

Chapter VII models the spirit of capitalism in an overlapping-generation framework and shows how the spirit of capitalism can contribute to the resolution of the savings puzzles: why wealth holding has tended to increase with age, why decumulation of wealth after retirement has not happened, and why households with and without children have not shown significant differences in their savings behavior.
This approach is especially useful for understanding savings by the rich and savings across countries and over time.

Chapter VIII examines, both theoretically and empirically, the implications of the capitalist-spirit hypothesis for stock market prices. In an economy populated with capitalist-spirited investors, the intertemporal marginal rate of substitution is found to be a function of both consumption and wealth. Hence, even if consumption is smooth, stock prices will be volatile—as long as wealth is so. The equilibrium risk premium for a risk asset is linear in both the consumption and the market betas. Based on the monthly US data, the generalized-method-of-moments tests of the resulting Euler equation are supportive of the capitalist-spirit hypothesis. Thus the spirit of capitalism seems to be the leading driving force behind stock market volatility and economic growth.

In this study, I have mainly focused on the role of capitalist spirit in savings, asset accumulation, and long-run growth. It should be emphasized that the capitalist-spirit model is strictly complementary to many existing models which have more or less concentrated on the technology and productivity progress. In fact, as the capitalist-spirit model just adds a cultural element to the existing models, it can embody all the contributions by both the traditional growth theory and the new growth theory. It is a mistake to totally ignore the cultural elements in economic growth and development, but it is a blunder to just talk about culture without putting technology in its right place. This is why Morishima (1982) explains the successful story of Japan by two factors: Western technology and Japanese Confucianism. The balance between culture and technology should be always maintained.
THE SPIRIT OF CAPITALISM, SAVINGS, ASSET PRICES AND GROWTH

Chapter I

A Model of Accumulation and Growth with the Spirit of Capitalism

Ancient politicians incessantly talked about morals and virtue, those of our time talk only of business and money.

—Jean-Jacques Rousseau, Discourse on the Science and Arts

In almost all real-sector growth models, the representative agent is assumed to have a utility function defined on consumption. This consumption-oriented utility function is exemplified in the models of Ramsey (1928), Koopmans (1965), Cass (1965), Romer (1986), and Lucas (1988). But more than two decades ago, Mordecai Kurz (1968) published a paper entitled "Optimal Economic Growth and Wealth Effects" and defined the utility function on both consumption, $c$, and the capital stock, $k$: $U(c,k)$. In the Kurz model, a representative agent maximizes

$$W = \int_0^\infty U(c,k)e^{-\rho t}dt, \quad 0 < \rho < 1$$

subject to a dynamic constraint of capital accumulation:

$$k = f(k) - c,$$

where $f(k)$ is the standard neoclassical production function with the following properties:

$$f(0) = 0, \lim_{k \to 0} f'(k) = \infty, \lim_{k \to \infty} f'(k) = 0, f'(k) > 0, f''(k) < 0$$

In his purely technical paper, Kurz offered little justification for the utility function $U(c,k)$. It is the intention of this chapter to justify that the utility function defined on both consumption and capital accumulation is a mathematical approach to formally model the spirit of capitalism in the sense of Max Weber (1958) and Werner Sombart (1967): the continual accumulation of wealth for its own sake, rather
than only for the material rewards that it can serve to bring (Weber, 1958, p.4). In addition, this mathematical model captures the central idea in *The Philosophy of Money* by Georg Simmel (1990).

The main significance of this new model lies in its formulating some complicated cultural and social values in a relatively simple framework. In this way, we can examine how the spirit of capitalism affect economic growth and capital accumulation and show the main differences between this capitalist-spirit model and the standard Ramsey-Koopmans-Cass model.


It is the main proposition in the sociological studies by Weber, Sombart, and Simmel that in a capitalist economy money-making and wealth accumulation are not only for consumption, but also for the sake of accumulation. According to Max Weber, this so-called capitalist spirit is the essential characteristic which distinguishes the capitalist economy from a traditional, pre-capitalist society:

"At all periods of history, wherever it was possible, there has been ruthless acquisition, bound to no ethical norms whatever". But only in a capitalist economy, "man is dominated by the making of money, by acquisition as the ultimate purpose of his life. Economic acquisition is no longer subordinated to man as the means for the satisfaction of his material needs. This reversal of what we should call the natural relationship, so irrational from a naive point of view, is evidently a leading principle of capitalism as it is foreign to all people not under capitalist influence" (Weber, 1958, p.3, emphasis added.).

Weber's idea is clear: capital accumulation in a capitalist economy is motivated not only by the maximization of long-run consumption, but also by the enjoyment (utility) from enhancing wealth itself.

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1 In addition to Kurz (1968), other studies have also modeled capital and wealth in the utility function. For example, Bardhan (1967) includes foreign capital into the utility function; Calvo (1980) puts asset accumulation into the utility function; Blanchard (1983) models foreign borrowing in the utility function; and Cole, Mehlitt and Postlewaite (1992) indirectly include the capital stock into the utility function in their wealth-status model of savings and economic growth.
That is to say, the utility function of a typical capitalist can be defined as \( U(c, k) \); or stated differently, the utility function of a capitalist can be separated to two components:

\[
u(c) + \beta v(k), \quad (\beta > 0),\]

here \( \beta \) can be used to measure the intensity of the capitalist spirit. Not only this, Weber also explicitly rejects the utility function defined only on consumption such as \( U(c) \) as the objective function of the capitalist:

The *sumnum bonum* of this ethic, the earning of more and more money, combined with the strict avoidance of all spontaneous enjoyment of life, is above all completely devoid of any eudaemonistic, not to say hedonistic, admixture. It is thought of so purely as an end in itself, that from the point of view of the happiness of, or utility to, the single individual, it appears entirely transcendental and absolutely irrational (Weber, p. 53).

Sombart (1967) refines and broadens the concept of the capitalist spirit by dividing it into two parts: the love of money (or accumulation for the sake of accumulation) and the spirit of undertaking (or the spirit of enterprise). According to Sombart, "if not the whole of European history, then surely at least the history of the capitalist spirit, must begin with the struggle between Gods and men for the possession of that accursed thing, gold" (p. 25). Sombart uses two terms to describe this human desire: the love of money (p. 50) and the greed of gold (p. 25). But this desire is not enough for a capitalist economic system to emerge. An equally important part is the spirit of enterprise (p. 63) or "the spirit of undertaking" (p. 51). In the mathematical model \( u(c) + \beta v(k), \quad (\beta > 0) \), \( \beta v(k) \) can represent these two parts of the capitalist spirit: the love of money directly and the spirit of enterprise indirectly—indirectly because enterprise and undertaking can be measured and approximated by wealth and financial success.  

In his book, Sombart devotes a great portion to "tell the tale of extraordinary unions into which the greed

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\[2\] I will say more about this point when I model Joseph Schumpeter's entrepreneur in chapter 2.
of gold and the spirit of enterprise entered, and it will unfold the history of their offspring, the spirit of capitalist undertaking" (p. 63). "The love of money united with enterprise, and the capitalist spirit was the result" (p. 50).

Simmel (1990) has made a profound philosophical study on money. One central theme in his inquiry is to show how money as means grows into ends. In his view, money is first of all the purest example of the tool and an absolute means for various purposes (p. 210-211). But since the utilization of money has unlimited possibilities, it becomes an abstract tool, which in turns leads to "the surplus value of money": "The wealthy man enjoys advantages beyond the enjoyment of what he can buy with his money... he moves in an ideal atmosphere of unquestioned privilege." "Wealth, indeed is often regarded as a kind of moral merit" (p. 217). In this process, the desire for money is "developed into a psychological value absolute, into a complete engrossing final purpose governing our practical consciousness" (p. 232). Thus money as the extreme example of a means becomes an absolute means and an end.

"Money's value as a means increases with its value as a means right up to the point at which it is valid as an absolute value and the consciousness of purpose in it comes to an end. The inner polarity of the essence of money lies in its being the absolute means and thereby becoming psychologically the absolute purpose for most people, which makes it, in a strange way, a symbol in which the major regulators of practical life are frozen" (p. 232). Or stated differently, money-making turns out to be for both consumption (the means) and for money itself (the end); hence, the objective function \( u(c) + \beta v(k) \). This is a precise representation of "people's most remarkable psychological mania for accumulation... In such cases, value is located not in the subjective reflex of ownership that is normally the reason for acquisition and possession, but in the simple objective fact, that merely having these things in their possession is valuable for such people" (p. 239).
Of course, to define the utility function on both consumption and wealth accumulation is also a way to model man not only as an economic animal, but also as a political animal. Ever since Aristotle (1958), we are taught that "man is by nature an animal of intended to live in a polis." Wealth provides man not only consumption means but also political power and social prestige. Possession of wealth is, to a considerable degree, a measure and standard of a person's success in a society. Thus wealth accumulation directly enters the utility function of a representative agent of a capitalist economy. In a book entitled The Anatomy of Power, Galbraith (1984), following the tradition of sociology and political science, classifies wealth as one of three resources of political power. "In the past, so great was the prestige of property that ... it accorded power to its possessor. What the man of wealth said or believed attracted the belief of others as a matter of course." To this day, "wealth per se no longer gives automatic access to conditional power. The rich man who now seeks such influence hires a public relations firm to win others to his beliefs. Or he contributes to a politician or a political action committee that reflects his views. Or he goes into politics himself and uses his property not to purchase votes but to persuade voters" (pp. 49-50).

This analysis agrees with what Lord Acton's (1988) contention that "power goes with property." (p. 572) Frank Knight (1942) also says that, in a laissez-faire capitalist economy, "freedom of accumulation not only carries with it the possibility of cumulative increase in the inequality of economic power... in addition, economic power confers power in other forms, including the political" (p. 82). Seeking high social position and power has been long recognized as the most important motivation in wealth accumulation in the analysis of capitalism by Max Weber, Werner Sombart, and Georg Simmel. Weber (1958) explicitly states that "the desire for the power and recognition which the mere fact of wealth brings plays its part" in wealth accumulation (p. 70). Simmel (1990) stresses "the honours acquired by wealth and the moral esteem that it enjoys" (p. 220). "The pure potentiality of money as a means is distilled in a general conception of power and significance which becomes effective as real
power and significance for the owner of money" (p.218). And the use of his money "makes him an object of respect and deference beyond his actual economic income" (p. 219).

I.2. **The Historical Development of the Spirit of Capitalism**

The analysis of the capitalist spirit by Weber, Simmel, and Sombart is based on the money-making mentality in the capitalist era and its comparison to ancient, primitive and feudalist societies. The accumulation spirit and the love for money came to dominate the economic and social life only at a relatively late stage of our human history: "The extent to which money becomes absolute for the consciousness of value depends on the major transformation of economic interest from primitive production to industrial enterprise. Modern man and the ancient Greek have such different attitudes towards money largely because formerly it served only consumption whereas now it essentially serves production." (Simmel, 1990, p. 232)

This spirit of capitalism stands in striking contrast to the transitional mentality. In the long history before the full development of modern capitalism, acquisition for the sake of acquisition has been condemned by most moral and religious teachings and the arts of money-making have been sanctioned or constrained. As Weber makes it clear, in a traditional society, the normal situation for mankind is rather that the rationally acquisitive activities are oriented to a traditionally fixed standard of living, in the capitalist era, the traditional practice is broken down and acquisition has been freed from any definite limit and becomes an endless process. "This attitude toward acquisition is 'rationalized' in the form in which Weber is interested in it, by holding it to be an ethical duty for its own sake. The spirit of capitalism looks upon money-making activities not as a means or a necessary evil, but as an ethically enjoined end in itself. To earn money is an ethical obligation for its own sake." (Talcott Parsons, 1948, p.514) The spirit of capitalism not only views money acquisition as an end, it also disregards all traditional norms and ways to make money. "Only the ultimate end, the maximization of money, is
sacred, the particular means are not, but are chosen anew according to the exigencies of each particular situation." (Parsons, p. 514) Closely related and as an extension of the spirit of capitalism, hard work is regarded as a duty and a moral obligation.

This capitalist spirit is especially foreign to the people of the Middle Ages in Europe. The feudalist economic and social system effectively reduced the working of monetary systems and commodity exchanges or circulations. The self-sufficiency property of the feudal system and the growing tie of dependence (Bloch, 1961, vol.2) prevented the emergence of money making and market exchange as the main forms of economic and social life. As Karl Marx (1977) has pointed out that in medieval Europe, everyone was dependent—serfs and lords, vassals and suzerains, laymen and clerics. Personal dependence characterizes the social relations of material production as much as it does the other spheres of life based on that production. But precisely because relations of personal dependence from the given social foundation, there is no need for market exchange. Most transactions took the shape of services in kind and payments in kind. Thus, in Tawney’s (1926) analysis, not only was money-making not the main social process in the ancient and medieval times, the practice of money-making was condemned as well. In the medieval ages, economic activities were subordinate to salvation and guided by moral principles and moral end. Material riches were necessary, but they only have a secondary importance. To seek more than necessary for a livelihood was avarice, and avarice was a deadly sin. The economic doctrine was espounded by Thomas Aquinas and was known as the just price and the prohibition of usury (see O’Brien, 1920). In practice, credit transactions were not allowed to practice by Christians and in many medieval cities Jews were imported to conduct money lending and operate the credit market. For many other commercial activities, they were usually associated with a kind of immorality. Tawney concludes:

The medieval theorists condemned as a sin precisely that effort to achieve a continuous and unlimited increase in material wealth which modern societies applauded as a quality, and the vices for which he reserved his most merciless denunciations were the more
refined and subtle of the economic virtue. A schoolmaster had the following to say in the
Fourteenth century: He who has enough to satisfy his wants and nevertheless ceaselessly
labors to acquire riches, either in order to obtain a higher social position, or that
subsequently he may have enough to live without labor, or that his sons may become men
of wealth and importance—all such are incited by a damnable avarice, sensuality, or
pride. (Tawny, 1926, p. 36)

Henri Pirenne (1937) cites the following story to illustrate the conflict between the medieval moral
and "the spirit of gain, that is to say, the business spirit." (p. 27) As St. Gerald of Aurillac (d.909) was
returning from a pilgrimage to Rome, he was told by some Venetian merchant that the pallium and other
oriental spices he bought were a great bargain because they were considerable more expensive in
Constantinople. "Gerald, reproaching himself for having defrauded the vendor, hastened forward him the
difference, considering that he could not take advantage of it without falling into the sin of avarice." (p.
27) In fact, among Pirenne's evidence, this moral conciousness was not limited to the clergy, it also
exerted a tremendous influence on merchants in the Middle Ages. "For proof of this we need only read
the many wills of bankers and speculators, directing that the poor whom they had defrauded should be
paid and bequeathing to the clergy a part of the property which at the bottom of their heart they felt to
be ill-gotten. If they could not refrain from sin, at least their faith remained unshaken." (p. 28) The
biography of St. Godric of Finchale cited in Pirenne (1952) tells us how Godric, born of poor peasant
stock, made a fortune through buying cheap and selling dear. In this money-making process, he "seems
to have been a shrewd calculator gifted with that commercial instinct which it is not altogether rare to
meet, in any age, among enterprising natures. The quest of profit guided all his actions in him can be
easily recognized that famous 'capitalistic spirit' (spiritus capitalisticus)" (pp. 117-118). But without
enjoying his new riches for too long and moved by grace, he gave up his comfortable life, turned over
his possessions to the poor, and became a hermit (pp. 116-117).
In fact, for centuries in the Middle Ages, it is poverty, not wealth, that was eulogized and encouraged. "The merchant can please God only with difficulty", says St. Jerome (Pirenne, 1952, pp.123-124). For example, in his last will and testament, Francis (1182-1226) inspired his fellow brothers: "The Most Holy himself revealed to me that I ought to live according to the model of the holy gospel. Those who presented themselves to follow this kind of life distributed all they might have to the poor. They contended themselves with one tunic, patched within and without.... Let us resort to the table of the Lord, begging our bread from door to door. Let the brothers take great care not to accept any buildings erected for them, except as all is in accordance with the holy poverty which we have vowed." (from Langer, 1968, vol.1, p.586)

With the ending of the Middle Ages came the development of commerce, trade, commodity exchange, credit, and capitalist operation in a large scale. The acquisitive habit of mind and the profit motive came into being especially in the Renaissance during the fourteenth and fifteenth centuries in the activities of men such as Jacques Coeur, the Medici, and the Fuggers, "whose outlook on life was molded more by the tangible objects of money could buy than a concern for the abstract ideas of the Middle Ages." (Langer, 1968, vol.1, p.678) In the meantime, wealth came more and more to replace birth as the source of power and prestige (Burckhardt, 1975, vol.2, p.360).

When the circulation of commodities first develops, there also develops the necessity and the passionate desire to hold fast to the product of the first metamorphosis. This product is the transformed shape of the commodity, or its gold chrysalis. (Marx, 1977, p. 227) "With more developed commodity production, every producer is compelled to secure for himself the nexus rerum, the 'social pledge'... In this way, hoards of gold and silver of the most various sizes are piled up at all the points of commercial intercourse. With the possibility of keeping hold of the commodity as exchange-value, or exchange-value as a commodity, the lust for gold awakens. With the extension of commodity circulation there is an increase in the power of money, that absolutely social form of wealth which is always ready to be used.
‘Gold is a wonderful thing! Its owner is master of all he desires. Gold can even enable souls to enter Paradise’ (Columbus, in his letter from Jamaica, 1503).” (Marx, 1977, pp. 228-229) Hans Sachs also says: "Money is the secular God of the World." (From Simmel, 1990, p. 238) But no one has expressed this passionate desire better than Shakespeare:

"Gold? yellow, glittering, precious gold?...
Thus much of this, will make black, white; foul, fair;
Wrong, right; base, noble; old, young; coward, valiant.
...What this, you gods? Why, this
Will lug your priests and servants from your sides,
Pluck stout men’s pillow from below their heads;
This yellow slave
Will knit and break religions; bless the accursed;
Make the hoar leprosy adored; place thieves.
And give them title, knee and approbation,
With senators on the bench; this is it.
That makes the wappen’d widow wed again:
...Come damned earth,
Thou common whore of mankind."

In these expressions, the capitalist spirit has manifested itself as a kind of common sense of the society and accepted without any reservation. Commensurate with this development arose the so-called "middle-class virtues" (Sombart, 1967, chapter VII): hardworking, thrift and saving. In the year 1450, the prominent figure in the Renaissance, Leon Battista Alberti, while famous as the writer of Latin comedy, painter, great architect, and great aesthetic theorist, wrote Del governo della famiglia (On the government of a family). In this book, Alberti speaks of thrift as being "holy". "Be mindful, O my sons, never to let
your expenditure exceed your income." "Beware of unnecessary expenditure as of a deadly foe"; "it is madness to spend one penny more than is absolutely essential"; "thrift hurts no one, while it is useful to the family"; "thrift is holy" (all quotations from Sombart, 1967, chapter VII). These life outlooks anticipated Daniel Defoe's Complete English Tradesman and Benjamin Franklin's Autobiography. From a historical perspective, what a different life philosophy from the moral teaching of the Middle Ages! Indeed, "it took men centuries to grow used to the new practices demanded by the economic revival of the future and to learn to accept as legitimate, without too great a mental reservation, commercial profits, the employment of capital and loans at interest." (Pirenne, 1937, p.14) From this view-point, it can be said that the standard neoclassical growth models (including both the Ramsey-Cass-Koopmans model and the Romer-Lucas model) which define the utility function only on consumption have missed and misrepresented an essential part of the representative agent in a competitive market economy and a capitalist economy. But perhaps we should add one point: the optimal growth model was conceived in the 1960's as a social planner's model (see, Cass, 1965; and Koopmans, 1965) or a mathematical utopia of a socialist economy (see, Zou, 1991), and it has been imposed on a representative agent in a capitalist economy only in a later period of its development and abstraction.

1.3. Some Basic Properties of the Capitalist-Spirit Model

In this chapter as well as in most of this book, I assume a utility function separable in consumption and capital accumulation as follows:

$$\int_0^\infty [u(c) + \beta v(k)]e^{-\rho t} dt$$  \hspace{1cm} (1.1)

This separable utility function seems to have a few advantages than the general nonseparable one in the context of the capitalist spirit. First, as in Bardhan (1968), we have difficulty in explaining the cross derivatives $\partial^2 U(c,k)/\partial c \partial k$ for the general utility form. In the production and accumulation processes, more
capital always leads to more output and, if consumption is normal, more consumption. But in terms of utility, these two can be substitutes as well as complementary and the cross partial derivative can be negative or positive; second, we can easily take the constant $\beta$ as a measure of the intensity of the capitalist spirit and for the general form $U(c,k)$, we do not know what is the best way to express the intensity of the capitalist spirit; third, by setting $\beta$ to zero, our model is reduced to the standard Ramsey-Koopmans-Cass model and that makes the comparison between these two models quite transparent.

The motion equation for capital accumulation is the familiar one:

$$ k = f(k) - c, \quad (1.2) $$

where $f(k)$ is the net output (gross output minus depreciation). The function $f(k)$ has the standard properties: $f'(k) > 0$ and $f''(k) < 0$ plus the Inada conditions.

Maximization of (1.1) subject to the dynamic constraint (1.2) yields:

$$ c = \frac{1}{-u''(c)} \left[ \beta v'(k) + u'(c)(f'(k) - p) \right], \quad (1.3) $$

$$ k = f(k) - c, \quad (1.2) $$

and the transversality condition:

$$ \lim_{k \to -\infty} e^{-\beta u'(c) k} = 0, \text{ and } k(0) \text{ given.} $$

As noted by Kurz (1968), the dynamic systems (1.2) and (1.3) may easily result in multiple equilibria, and some equilibrium points are saddle-point stable, while some are totally unstable. To see this, denote the equilibrium values of consumption and capital as $\overline{c}$ and $\overline{k}$, and linearize the systems around these values:
\[
\begin{bmatrix}
  c \\
  k
\end{bmatrix}
= \begin{bmatrix}
  \rho - f'(\bar{k}) & \beta v''(\bar{k}) u'(\bar{c}) f'(\bar{k}) \\
  -1 & f'(\bar{k})
\end{bmatrix} \begin{bmatrix}
  c - \bar{c} \\
  k - \bar{k}
\end{bmatrix}
\] (1.4)

Denote the 2x2 matrix as \( M \). The trace of the matrix:

\[ \text{Trace of } M = \rho > 0. \] (1.5)

As the trace is the sum of the two characteristic roots of the system, at least one of the roots is positive. Therefore we cannot have a stable equilibrium point.

Next the determinant of the matrix is:

\[ \Delta = (\rho - f'(\bar{k})) f'(\bar{k}) - \frac{\beta v''(\bar{k}) + u'(\bar{c}) f''(\bar{k})}{u''(\bar{c})} \] (1.6)

The second term on the right-hand side of (1.6) is negative; the first term is positive because \( f'(k) \) is always positive by assumption and \( |\rho - f'(\bar{k})| \) is also positive as shown below. In this case, \( \Delta \) does not possess a definite sign. For \( \Delta \) is the product of two characteristic roots, a negative \( \Delta \) implies that one root is positive and one negative. If \( \Delta \) is positive, then both roots will be positive since the existence of two negative roots contradicts (1.5). In this chapter, we will focus on the case that \( \Delta \) is negative; that is to say, there exists a unique perfect-foresight path in the neighborhood of the equilibrium.

We first note that the equilibrium capital stock is larger than the modified-golden-rule one. To show this, note that, in a steady state, we have:

\[ \{\beta v'(\bar{k}) + u'(\bar{c}) [f'(\bar{k}) - \rho]\} = 0, \] (1.7)

\[ f(\bar{k}) - \bar{c} = 0. \] (1.8)
And, similarly, let the steady-state values in the Ramsey-Koopmans-Cass model be \( c^{ss} \) and \( k^{ss} \), then

\[
\frac{d}{dk}(k^{ss}) - \rho = 0, \tag{1.9}
\]

\[
f(k^{ss}) - c^{ss} = 0. \tag{1.10}
\]

Here \( k^{ss} \) modified-golden-rule capital stock which is determined by the equality between \( f(k^{ss}) \) and the time preference \( \rho \) as in equation (1.9).

Compare equation (1.7) to (1.9):

\[
\frac{d}{dk}(k^{ss}) = \rho - \frac{\beta v'(k)}{u''(c)} < \rho = f'(k^{ss}). \tag{1.11}
\]

Hence, it is clear that \( \bar{k} > k^{ss} \) as \( f'(k) \) is negative. The explanation is simple. Since the representative agent derives utility directly from the capital stock in addition to consumption, he will naturally accumulate more capital in the long run.

We also note that the higher the capitalist spirit, \( \beta \), the higher the steady-state capital stock.

Total differentiating equations (1.7) and (1.8), we have:

\[
\begin{bmatrix}
\frac{dc}{dp} \\
\frac{dk}{dp}
\end{bmatrix} = \mathbf{M}
\begin{bmatrix}
v'(k) \\
u''(c)
\end{bmatrix} \frac{d\beta}{dp}. \tag{1.12}
\]

It is simple to show that:

\[
\frac{dk}{d\beta} = \frac{1}{\Delta} \frac{v'(k)}{u''(c)} > 0, \tag{1.13}
\]

which is positive as \( \Delta \) is negative and the equilibrium is a saddle point by our assumption. The
steady-state consumption is also positively related to the capitalist spirit $\beta$:

$$\frac{dc}{d\beta} = \frac{1}{\Delta} \frac{v'(\bar{k})}{u''(c)} f'(\bar{k}) > 0.$$  

From the modified golden rule in the Ramsey-Koopmans-Cass model, we know that the long-run capital stock is determined by the equality between the marginal productivity of capital and the time discount rate: $f'(\bar{k}^{ne}) = \rho$. If all countries have the same technology and the same time discount rate, the long-run capital stock and consumption will converge across countries. But in our capitalist-spirit model, in addition to the production technology and the time preference, the utility function also matters in the determination of the long-run variables. In particular, there exists no convergence in consumption and the capital stock across countries in the long run if everything else but the value $\beta$, i.e., the capitalist spirit, is different across countries.

The effects of the capitalist spirit on investment and consumption on the dynamic path can also be analyzed. Note that the solutions of the linearized system for the short-run behavior of the capital stock and consumption are:

$$k_t = \bar{k} - (\bar{k} - k_0) e^{\theta t}. \tag{1.15}$$

$$k_t = -\theta (\bar{k} - k_0). \tag{1.16}$$

$$c_t = \bar{c} - (f'(\bar{k}) - \theta)(k_t - \bar{k}). \tag{1.17}$$

where $\theta$ is the negative root of the dynamic system:

$$\theta = \frac{1}{2} \left[ \rho - \sqrt{\rho^2 - 4\Delta} \right]. \tag{1.18}$$

From (1.16) and (1.17), it is clear that, through its positive effect on the steady-state capital, $\bar{k}$, a high value of $\beta$ leads to a higher investment and a lower consumption on the optimal path for all $k_t$ less than
\( k \). But we should note that \( \beta \) may also affect \( \theta \) and \( c \). If the increase in \( \beta \) tends to lower \( b \), in other words, \( \theta \) becomes more negative, then the investment will be unambiguously high as a result of a high value of \( \beta \).

Since multiple equilibria often emerge from the capitalist-spirit model, long-run equilibria may be different for countries with the same technology, the same utility function, the same time discount rate and the same capitalist spirit but with different initial capital stock \( k(0) \). This can be easily seen from figure 1.1.

In figure 1.1, there exist three equilibria: \( E_1 \), \( E_2 \) and \( E_3 \). It is noted that \( E_1 \) and \( E_3 \) are saddle-point stable while \( E_2 \) is a critical point. Corresponding to these three equilibrium points, there are three pairs of equilibrium values of consumption and capital stock: \((c_1,k_1)\), \((c_2,k_2)\), and \((c_3,k_3)\). Suppose that the initial capital stock is below \( k_2 \), then the long-run equilibrium will be at \( E_1 \) and short-run investment will become smaller and smaller on the transitional path towards \( E_1 \). On the other hand, if the initial capital stock is above \( k_2 \), the equilibrium state will be \( E_3 \) and investment will keep increasing on the convergent path towards \( E_3 \). Thus, as a result of the initial conditions, different countries can end up will different long-run equilibria with different levels of consumption and capital accumulation. From this example, we have another reason to expect the nonconvergence of economic growth across countries.

Another interesting aspect of this capitalist-spirit model is the possibility of unbounded growth even under the standard neoclassical production function and without the assumption of an increasing returns to capital input. In the standard neoclassical growth model, since \( f'(\infty) \) approaches zero and the modified golden rule will give rise to an equilibrium state where capital stock, \( k^* \), is finite and determined from \( f'(k^*) = \rho \). Thus, in the standard model, to have unbounded growth, it is necessary that \( f'(k) \) is always greater than the time discount rate even when capital stock rises to infinity. This is the so-called lower boundary condition in Jones and Manuelli (1990):
But in the capitalist-spirit model, the lower boundary condition (1.19) can be relaxed. It is possible to have unbounded growth even if \( f'(k) < \rho \) for sufficiently large capital stock:

**Proposition 1.1:** Suppose that \( f'(k) + \beta v'(k)/u'(f(k)) \) is larger than the time discount rate \( \rho \); and suppose that \( k \) is any value such that \( f'(k) < \rho \). Then consumption and capital stock will rise for ever.

Proof:

In equation (1.3), if \( f'(k) \geq \rho \), the right-hand side will be positive and consumption will rise: and consumption will rise: \( c > 0 \). If \( f'(k) < \rho \), and suppose that there exists a steady state, then, from

\[
f(k) = c,
\]

\[
\frac{\beta v'(k)}{u'(f(k))} + \frac{f'(k) - \rho}{u'(f(k))} = 0.
\]

But equation (1.20) cannot hold because by assumption, the term \( [f'(k) + \beta v'(k)/u'(f(k))] > \rho \) for any \( k \) satisfying \( f'(k) < \rho \). So \( c > 0 \). The case that \( c \) is negative can be ruled out. This is because a negative \( c \) can happen only if \( c < f(k) \) for any value of \( k \) that is higher than the modified-golden-rule level of capital. In this case, \( [\beta v'(k)/u'(c)] \) is less than \( [\beta v'(k)/u'(f(k))] \) or \( u'(c) > u'(f(k)) \). But, then, \( k \) in (1.2) will be positive for \( f(k) > c \) and the capital stock will increase to infinity at the same time when consumption keeps decreasing. Sooner or later, the marginal utility of consumption will be significantly higher than the marginal utility of capital (for \( \beta v'(k) \to 0 \) as \( k \) approaches infinity) and the representative agent’s utility can be raised by reversing this process. Therefore, the only optimal path is to have
consumption increase for ever: \( c > 0 \). But without an ever increasing capital stock, this growing consumption is not sustainable. Thus \( k > 0 \) always.

Proposition 1.1 implies that, to have unbounded growth, it is essential to require that, as both consumption and capital increase to infinity, the sum of the net marginal productivity of capital and the marginal rate of substitution between capital and consumption is larger than the time discount factor. In particular, if the marginal rate of substitution between capital and consumption, \( v'(k)/u'(f(k)) \), is larger than the time discount rate for all \( k \) such that \( f'(k) < \rho \), consumption and capital will keep growing even though the net marginal product of capital can go to zero when capital increases without bound. I illustrate this point in figure 1.2.

In figure 1.2, both curves are upward sloping because the slope for \( c = 0 \) and \( k = 0 \) are positive and are given by \( [v^*(k) + u'(c)\mu(k^*)]/u^*(c)[\rho - f'(k^*)] \) and \( f'(k^*) \), respectively. Here \( c^* \) and \( k^* \) denote the values of consumption and capital satisfying the equation \( c = 0 \), and \( c^* \) and \( k^* \) denotes the value for \( k = 0 \), or, \( f(k^*) - c^* = 0 \). Given the condition in Proposition 1.1, there is no intersection (i.e., no stationary steady state) for these two curves. Since both consumption and capital are increasing, the optimal path, \( P \), is bounded in the region between \( k = 0 \) and \( c = 0 \). Below the curve \( k = 0 \), \( c \) is smaller than \( f(k) \) and \( k \) is positive; above the curve \( c = 0 \), for given \( k^* \), \( c \) is larger than the value of consumption, \( c^* \), which satisfies that \( c = 0 \), so \( c \) will be positive as \( u'(c) \) is decreasing in \( c, c > c^* \), and \( v'(k^*)/u'(c) \) is larger than \( v'(k^*)/u'(c^*) \).

As an example, I take the standard Cobb-Douglas production function:

\[
 f(k) = k^{1-\alpha}, \quad 0 < \alpha < 1.
\]
Let \( u(c) = \log c \) and \( v(k) = k^\gamma \), capital and consumption will increase to infinity. To see this, we only need to check that the condition in proposition 1 is satisfied:

\[
\frac{\beta v'(k)}{u'(f(k))} = \beta \alpha k^{(\alpha - 1)k^{(1 - \gamma)}} = \beta \alpha
\]

Thus there exists no finite-value equilibrium if \( \beta \alpha > \rho \), and consumption and capital stock will keep rising.

But in the standard neoclassical growth model with the Cobb-Douglas technology, unbounded growth is impossible. To see this point, we recall the modified golden rule in this special case:

\[
\frac{1 - \alpha}{k^\alpha} = \rho,
\]

and the finite capital stock in the long run is given by:

\[
k^{mg} = \left[ \frac{1 - \alpha}{\rho} \right]^\alpha.
\]

Thus, output and consumption will be finite as well in the long run.

\[
c^{mg} = f(k^{mg}) = \left[ \frac{1 - \alpha}{\rho} \right]^\alpha.
\]

In summary, in sharp contrast to the convergence theorem derived from the standard Ramsey-Koopmans-Cass model, our capitalist spirit model predicts the possibility of divergent growth performances across countries if the intensity of the capitalist spirit is different across countries, or/and if the utility functions are different across countries, or/and if the initial capital stocks are different across countries. Viewing the recently renewed interest in the endogenous growth theory as an attempt to explain the divergent growth performance in the real world, our capitalist spirit model based on the contributions of Kurz (1968), Weber, Sombart, and Simmel, among many others, has provided a framework to integrate both the standard growth models and the cultural, social approaches to economic growth.
THE SPIRIT OF CAPITALISM, SAVINGS, ASSET PRICES AND GROWTH

Chapter II

Perspectives from the History of Economic Analysis

In this chapter, I intend to show that the broadly defined capitalist-spirit approach to accumulation and growth has not only been taken by our eminent sociologists, it has also played an important role in the growth theories of great economists such as Adam Smith, N.W. Senior, J. S. Mill, Karl Marx, W.S. Jevons, Thorstein Veblen, Joseph Schumpeter, John Maynard Keynes, among many others. Before I take up these economists, I present the analysis of money-making and acquisition in the Politics of Aristotle. Even though Aristotle has denounced the spirit of acquisition, he has in fact touched upon the essence of the capitalist spirit in a commercial and market economy and anticipated much of the analysis in Karl Marx, Max Weber, Werner Sombart, and Georg Simmel.

II.1 Aristotle and Chrematistics

In ancient times, economic life was mainly based on what Karl Polanyi (1957) has called the principle of householding, namely, production for one’s own use and not for financial gain (p. 53). "Gain and profits made on exchange never before played an importance in human economy, though the institution of the market was fairly common since the latter Stone Age, its role was no more than incidental to economic life" (Polanyi, p. 43). Against an economic background of householding mixed with certain market exchange, Aristotle divides the art of acquisition into two kinds: one is to obtain the necessities of life, the other is for profits and money. The latter is called chrematistics. In a natural economy, acquisition is only for consumption: "The [natural] form of the art of acquisition is concerned with the management of the household" (p. 25). "The necessary form of the art of acquisition is concerned with the provision of subsistence, and not, therefore, unlimited in its scope, as the other form is, but subject to definite bounds" (p. 27).
According to Aristotle's historical analysis, chrematistics comes to the stage only after the appearance of money and it is an endless process without limit. Aristotle cites Solon on this point: "There is no bound to wealth stands for men" (p. 21). Chrematistics "is not natural, but is rather the product of a certain sorts of experience and skill" (p. 23). Chrematistics "consists in retail trade [conducted for profits]. At first, we may allow, it was perhaps practised in a simple way; but in process of time, and as the result of experience, it was practised with a more studied technique, which sought to discover the sources from which, and the methods by which, the greatest profits could be made. The result has been the emergence of the view that the art of acquisition is especially concerned with currency" (pp. 24-25). "For currency is the starting-point, as it is also the goal, of exchange" (p. 25). Aristotle further states that "the wealth produced by this latter form of the art of acquisition is unlimited." This is just like "the art of medicine recognizes no limit in respect of the production of health... The same is true of the retail form of the art of acquisition. There is no limit to the end it seeks, and the end it seeks is wealth ... and the mere acquisition of money" (pp. 25-26). "all who are engaged in acquisition increase their fund of currency without any limit or pause" (p. 26).

These two arts of acquisition also have close connection. This is just as in the utility function \( u(c) + \beta v(k) \) of equation (1.1), namely, capital accumulation has two purposes: for consumption and for the sake of accumulation. But we cannot tell exactly which part is for which purpose: The cause of this contradiction lies in the close connection between the two different modes of acquisition. They overlap because they are both handling the same objects and acting in the same field of acquisition, but they move along different lines—the objects of the one being simply accumulation, and that of the other something quite different (p. 26).

Aristotle further states how the money-making as a means for consumption ends up as the end, which dominates people: "They stick to the ideal that they must keep their wealth in currency untouched, or increase it indefinitely. But the fundamental cause of this state of mind is men's anxiety
about livelihood, rather than about well-being; and since their desire for that is unlimited, their desire for the things that produce it is equally unlimited. Even those who aim at well-being seek the means of obtaining physical enjoyment; and, as what they seek appears to depend on the activity of acquisition, they are thus led to occupy themselves wholly in the making of money" (p. 26) "as though to make money were the one aim and everything else must contribute to that aim" (p. 27).

Aristotle laments on the avarice and greed in wealth accumulation:

"The naughtiness of men is a cup that can never be filled: there was once a time when two obols were a sufficient allowance, but now that this has become the tradition men were always wanting something more, and are never contented until they get into infinity. It is the nature of desire to be infinite; and the mass of men live for the satisfaction of desire. The source form which a remedy for such evils may be expected is not the realization of property, but rather a method of training which makes the better sort of natures unwilling, and the poorer sort unable, to indulge in covetousness."

(p. 67)

II.2 Adam Smith: Frugality and Savings

Adam Smith's (1776) book, An Inquiry into the Nature and Causes of the Wealth of Nations, always reminds us of the division of labor and the working of the invisible hand as the main causes of wealth generation. But Adam Smith also pays particular attention to the role of frugality and parsimony—a critical aspect of the economic-man's mentality—in wealth accumulation. In this sense, the capitalist-spirit approach to capital accumulation has been also taken by Adam Smith:

The principle which prompts to save, is the desire of bettering our condition, a desire which though generally calm and dispassionate, comes
with us from the womb, and never leaves us till we go into the grave... An augmentation of fortune is the means by which the greater part of men propose and wish to better their condition. It is the means of the most vulgar and the most obvious; and the most likely way of augmenting their fortune, is to save and accumulate some part of what they acquire, either regularly and annually, or upon some extraordinary occasions. Though the principle of expense, therefore, prevails in almost all men upon some occasions, and in some men upon almost all occasions, yet in the greater part of men, taking the whole course of their life at an average, the principle of frugality seems not only to predominate, but to predominate very greatly. (pp. 324-25)

It is interesting to note that Adam Smith seems to take saving and frugality as the means to improve one’s conditions. But he immediately points out that the habit of saving or capital accumulation is innate: it "comes with us from the womb, and never leaves us till we go into the grave". Thus the habit of saving develops as an end in itself and the economic objective of one’s life often turns out to be saving for the sake of savings. Adam Smith is so occupied by the moral of savings, he declares that "every prodigal appears to be a public enemy, and every frugal man a public benefactor" (p. 324). Naturally, both consumption and capital accumulation should be included to the utility function of Adam Smith’s economic man or the representative agent in a capitalist economy.

The role of frugality and parsimony in wealth accumulation is also stressed in Adam Smith’s *The Theory of Moral Sentiments*. "The methods of improving our fortune, which it principally recommends to us, are those which expose to no loss or hazard; real knowledge and skill in our trade or profession, assiduity and industry in the exercise of it, frugality, and even some degree of parsimony,
in all our expences" (Smith, 1759, p. 213). This practice of frugality is highly approved by "the spectator". "Hence arises that eminent esteem with which all men naturally regard a steady perseverance in the practice of frugality, industry, and application, though directly to no other purpose than the acquisition of fortune" (pp. 189-190).

II.3 N.W. Senior: Abstinence Theory of Capital

Nassau W. Senior (1836) directly identifies capital as abstinence and frugality. In his theory of production, there are three instruments of production: labor, natural agents such as land, and abstinence (p. 58). Why is abstinence so important? Senior answers as follows: "The most laborious population, inhabiting the most fertile territory, if they devoted all their labor to the production of immediate result, and consumed its produce as it arouse, would soon find their utmost exertions insufficient to produce even the mere necessaries of existence" (p. 58). Therefore, "without which the two others are inefficient, we shall give the name of Abstinence" (p. 58).

The role of abstinence in economic development is greatly emphasized by Senior. Even though abstinence and exertion have been existing in different degrees in almost all societies, it is the most effective element of production, and it "is the slowest in its increase, and the least generally diffused" (p. 60). "Among nations, those that are the least civilized, and among the different classes of the same nation those which are worst educated, are always the most improvident, and consequently the least abstinent" (p. 60). After some cross-country examination of the profits rates, Senior found that the profits were lower in Holland and in England than in any other part of the globe. The reason for this, according to Senior, is that "abstinence with them (the English and the Dutch, added) is a cheap instrument of production, and they use it to the utmost" (p. 196).

But abstinence and frugality often lead to the habit of accumulation for the sake of accumulation: "capitals are generally formed from small beginnings by acts of accumulation, which
become in time habitual. The capitalist soon regards the increase of his capital as the great business of his life; and considers the greater part of his profit more as a means to that end than as a subject of enjoyment" (p. 192). Here it is clear that Senior defines the objective (utility) function of the capitalist on capital accumulation in addition to the enjoyment of consumption. In equation \( (1.1) \), I can take the parameter \( \beta \) as the degree of abstinence and \( \beta v(k) \) as the enjoyment of accumulation for the sake of accumulation in the sense of Senior.

II.4 John Stuart Mill: The Spirit of Accumulation

J. S. Mill (1848, 1909) calls the accumulation desire as "the spirit of accumulation" in his analysis of capital accumulation and economic growth over time and across countries. In Mill's time, while this spirit was low in many underdeveloped parts of the world, the spirit of accumulation was so strong in the more prosperous countries of Europe, that the signs of rapidly increasing wealth met every eye (p. 173). There were various causes for this strong spirit of accumulation in England, and, among them, the puritanism was one important factor: rapid capital accumulation in England was "greatly aided by that extreme incapacity of the people for personal enjoyment, which is a characteristic of countries over which puritanism has passed" (p. 174).

The comparison between Holland and England made by J.S. Mill also illustrates the importance of the frugal habit and the accumulation spirit in wealth creation: "the effective desire of accumulation has never reached so high a pitch in England as it did in Holland, where, there being no rich idle class to set example of a reckless expenditure, and the mercantile classes, who possessed the substantial power on which social influence always waits, being left to establish their own scale of living and standard of propriety, their habits remained frugal and unostentatious" (p. 175).

Mill has also stressed the role of wealth and property in providing man not only consumption means but also political power and social prestige. The effect of the desire for social and
political power on wealth accumulation was particularly significant in the modern history of Great Britain: "The earlier decline of feudalism having removed or much weakened invidious distinctions between the originally trading classes and those who have been accustomed to despise them; and a polity having growing up which made wealth the real source of political influence; its acquisition was invested with a factitious value, independent of its intrinsic utility. It becomes synonymous with power; and since power with the common herd of mankind gives power, wealth became the chief source of personal consideration, and the measure and stamp of success in life. To get out of one rank in society into the next above it, is the great aim of English middle-class life, and the acquisition of wealth the means" (p. 174). The capitalist institutions in Great Britain not only "give a most direct and potent stimulus to the desire of acquiring wealth", but "by the scope they have allowed to individual freedom of action, have encouraged personal activity and self-reliance, while by the liberty they confer of association and combination, they facilitate industrial enterprise on a large scale" (p. 174).

II.5 Karl Marx: The Nature of Capitalist Accumulation

Karl Marx regards the instinctive nature of accumulation by capitalists as an essential part of capitalism. In *Capital* (1977), Marx divides the surplus value or profits possessed by a capitalist into two parts: one part of the surplus value is consumed by the capitalist as revenue, and the other part employed as capital, i.e. it is accumulated (p. 738). But capitalist is "capital personified" (p. 739), his function is to accumulate capital for the sake of accumulation: "Except as capital personified, the capitalist has no historical value, and no right to that existence". "But, in so far as he is capital personified, his objective is not the acquisition and enjoyment of use values" (p. 739, italics added) or the utility of personal consumption, \( u(c) \), "but the acquisition and augmentation of exchange-values" (p. 739) or the
accumulation of capital, \( u(c) + \beta v(k) \). "As such, he shares with the miser an absolute drive towards self-enrichment" (p. 739).

According to Marx, accumulation for the sake of accumulation has its origin in commodity production and monetary exchange. Its early form is money hoarding. The hoarding drive is boundless in its nature. Qualitatively and formally considered, money is independent of all limits, that is it is the universal representative of material wealth because it is directly convertible into any other commodity. But at the same time every actual sum of money is limited in amount, and therefore has only a limited efficacy as a means of purchase. This contradiction between the quantitative limitation and the qualitative lack of limitation of money keeps driving the hoarder back to his Sisyphean task: accumulation. He is in the same situation as a world conqueror, who discovers a new boundary with each country he annexes (Marx, pp. 230-231).

In order that gold be held as money, and made to form a hoard, it must be prevented from circulating, or from dissolving into the means of purchasing enjoyment. The hoarder therefore sacrifices the lusts to the fetish of gold. He takes the gospel of abstinence very seriously. On the other hand, he cannot withdraw any more from circulation, in the shape of money, than he has thrown into it, in the shape of commodities. The more he produce, the more he can sell. Work, thrift and greed are therefore his three cardinal virtue, and to sell much and buy little is sum of his political economy (Marx, p. 213).

Well before Weber, Sombart and Simmel, Marx distinguishes the production and circulation of a capitalist economy from a traditional mode of production. In a traditional mode of production, there exist money and commodity exchange, but its purpose is mainly for the use-values in commodities. Thus the formula for the simple commodity circulation is:

\[
\text{C-M-C},
\]

(2.1)

where \( C \) is commodity and \( M \) money. It says that "the transformation of commodities into money and the re-conversion of money into commodities: selling in order to buy" (p. 247). This is what Marx calls
"the path of simple circulation, as for instance in the case of the peasant who sells corn, and with the money thus set free buys clothes" (p. 248).

But for capitalist mode of production, the circular form is:

\[ M-C-M, \]

(2.2)

"the transformation of money into commodities, and the re-conversion of commodities into money: buying in order to sell. Money viewed from this perspective is called capital. Of course, it is evident that the process M-C-M is absurd if M is the same at the beginning and in the end. The miser's plan would be far simpler and surer: he hold on to his money with exposing it to the dangers of circulation. A capitalist "releases the money, but only with the cunning intention of getting it back again" (p. 249) with an increment or a "surplus value": more money is finally withdrawn from circulation than was thrown into it at the beginning. Therefore, (2.2) has to be modified by the following complete form of the capitalist circulation:

\[ M-C-M' \]

(2.3)

where \( M' = M + \Delta M \), and \( \Delta M \) is the surplus value.

Like Aristotle, Marx contrasts these two kinds of circulation and draws the conclusion why capitalist circulation is an endless process of money-generating: "The repetition or renewal of the act of selling in order to buy finds its measure and its goal (as does the process itself) in a final purpose which lies outside it, namely consumption, the satisfaction of definite needs. But in buying in order to sell, on the contrary, the end and the beginning are the same, money or exchange-value and this very fact makes the movement an endless one" (p. 252). "The circulation of money as capital is an end in itself, for the valorization of value takes place only within this constantly renewed movement. The movement of capital is therefore limitless" (p. 253).

"As the conscious bearer of this movement, the possessor of money becomes a capitalist. His person, or his pocket, is the point from which the money starts, and to which it returns. The
objective content of the circulation we have been discussing—the valorization of value—is his subjective purpose, and it is only in so far as the appropriation of ever more wealth in the abstract is the sole driving force behind his operations that he functions as a capitalist, i.e. as capital personified and endowed with consciousness and a will. Indeed Marx emphasizes that consumption and use-values must therefore never be treated as the immediate aim of the capitalist. This boundless drive for enrichment, this passionate chase after value, is common to the capitalist and the miser; but while the miser is merely a capitalist gone mad, the capitalist is a rational miser. The ceaseless augmentation of value, which the miser seeks to attain by saving his money from circulation, is achieved by the more acute capitalist by means of throwing his money again and again into circulation (pp. 254-255).

This accumulation drive is determined by two factors. The first factor is the pressure of external competition which forces capitalists to accumulate:

what appears in the miser as the mania of an individual is in the capitalist
the effect of a social mechanism in which he is merely a cog … competition
subordinates every individual capitalist to the immanent laws of capitalist production, as external and coercive laws. It compels him to keep extending his capital, so as to preserve it, and he can only extend it by means of progressive accumulation. (p. 739)

The second and the much more important factor is the capitalist's internal impulse and desire towards accumulation:

Accumulate, accumulate! That is Moses and the prophets! 'Industry furnishes the material which saving accumulates.' Therefore save, save, i.e. reconvert the greatest possible portion of surplus-value or surplus product into capital! Accumulation for the sake of accumulation, production for the sake of production: this was the formula in which classical economics
expressed the historical mission of the bourgeoisie in the period of its
domination. (p. 733)

Or as John Ramsay MacCulloch (1830) in his the Principles of Political Economy states: "The
inextinguishable passion for gain, the auri sacra fames (accursed hunger for gold), will always lead
capitalists" (p. 179).

Therefore, to Marx, there perhaps exists no better way to describe the capitalist preference
than defining the utility function as $u(c) + \beta v (k)$, where $\beta$ is interpreted as the degree of internal
accumulation drive.

Marx thinks that the spirit of capitalism, i.e. accumulation for the sake of accumulation
and production for the sake of production, is the fundamental force leading to the creation of enormous
wealth and the progress of our humankind. In the Manifesto to the Communist Party (1848), Marx and
Engles eulogize this accumulation drive and enormous material progress achieved by the "capitalist mode
of production":

The bourgeoisie, during its rule of scarce one hundred years, has created
more massive and more colossal productive forces than have all preceding
generations together. Subjection of Nature's forces to man, machinery,
application of chemistry to industry and agriculture, steam-navigation,
canalization of rivers, whole population conjured out of the ground—what
earlier century had even a presentiment that such productive forces
slumbered in the lap of social labor? (Howe, ed., 1976, p. 35).

Similar expression can be found in Capital. As the capitalist accumulates for the sake of
accumulation, "in this way he spurs on the development of society's production forces, and the creation
of those material conditions of production which alone can form the real basis of a higher form of
society, a society in which the full and free development of every individual forms the ruling principle. Only as a personification of capital is the capitalist respectable” (Capital, p. 739).

II.6 William Stanley Jevons: Abstinence Theory of Capital Again

Since I have already stated N.W. Senior’s abstinence theory of capital, I will just briefly mention W. S. Jevons’(2nd edition 1879) idea, summarized by Bohm-Bawerk (1959):

Jevons cites Senior approvingly, and explains the latter’s ‘abstinence’ as that ‘temporary forgoing of enjoyment which is an essential feature of capital.’ Or he calls it the ‘endurance of want’ which the capitalist assumes, and he devises formula by which to compute the magnitude of the sacrifice termed ‘abstinence’. He counts it as an element in the cost of production; at other times by an ambiguous use of terminology he even calls it interest; and in one instance he specifically call the capitalist’s receipts compensation for his ‘abstinence and risk’. (Vol. I, p. 328)

II.7 John Maynard Keynes: the Psychology of Capitalist Society

John Maynard Keynes (1919) develops the same idea in his statement of the “psychology” of capitalist society. He says that “Europe was so organised socially and economically as to secure the maximum accumulation of capital. While there was some continuous improvement in the daily conditions of life of the mass of the population, society was so framed as to throw a great part of the increased income into the control of the class least likely to consume it. The new rich of the nineteenth century were not brought up to large expenditures, and preferred the power which investment gave them to the pleasures of immediate consumption… Herein lay, in fact, the main justification of the capitalist system. If the rich had spent their new wealth on their own enjoyments, the world would long ago have found such a regime
intolerable. But like bees they saved and accumulated, not less to the advantage of the whole community because they themselves held narrow ends in prospect." (p. 16, italic added.)

Keynes continues to describe the savings behavior of the capitalist class: They "were allowed to call the best part of the cake theirs and were theoretically free to consume it, on the tacit underlying condition that they consumed very little of it in practice. The duty of 'saving' became nine-tenths of virtue and the growth of the cake the object of true religion.... And so the cake increased; but to what end was not clearly contemplated. Individuals would be exhorted not so much to abstain as to defer, and to cultivate the pleasures of security and anticipation. Saving was for old age or for your children; but this was only in theory—the virtue of the cake was that it was never to be consumed, neither by you nor by your children after you" (p. 12, italic added). Here Keynes directly identifies both consumption and capital accumulation (the increase of the cake) as the objective of capitalists. Very often in the past as well as at present time, saving is said to be for the future consumption. It seems that the ultimate purpose of saving is for consumption. "But this was only in theory", this is not true in reality! The truth, in Keynes' words, is that *the duty of 'saving' became nine-tenths of virtue and the growth of the cake the object of true religion.*

For Keynes, this habit of saving for the sake of savings played a fundamental role in the enormous progress of living condition for the common people and the equilibrium of social life in the capitalist society. "The accumulation habits of Europe.... were the necessary condition of the greatest of the external factors which maintained the European equipoise" (p. 19), and "the immense accumulation of fixed capital which, to the great benefit of mankind, ...were could never have come about in a Society where wealth was divided equitably" (pp. 16-17). "In fact, it was precisely the inequality of the distribution of wealth which made possible those vast accumulations of fixed wealth and of capital improvements which distinguished that age from all others" (p. 16). Just because of the capitalists' habit
of accumulation for the sake of accumulation, and not because of their accumulation for the sake of consumption, the general public benefitted from capital accumulation and accepted the inequality.

II.8 Alfred Marshall and Gustav Cassel

Marshall (8th edition, 1920) explain savings by various factors. "The accumulation of wealth is governed by a great variety of causes: by custom, by habits of self-control and realizing the future, and above all by the power of family affection" (p. 196). "That men labour and save chiefly for their families, and not for themselves, is shown by the fact that they seldom spend, after they have retired from work, more than the income that comes in from their savings, preferring to leave their stored-up wealth intact for their families" (pp. 189-190). But at the same time, Marshall points out the importance of social distinction in the explanation why some people save for the sake of savings. In Marshall’s view, to achieve social distinction is the main purpose of life, savings are just the mean to the end. He cites approvingly Nassau Senior: "the desire for distinction ... comes with us from the cradle and never leaves us till we go into grave" (p. 73). With this, it is not difficult to understand even the "irrational" savings behavior:

There are indeed some who find an intense pleasure in seeing their hoards of wealth grow up under their hands, with scarcely any thought for the happiness that may be got from its use by themselves or by others. They are prompted partly by the instinct of the chase, by the desire to outstrip their rivals; by the ambition to have shown ability in getting the wealth, and to acquire power and social position by its possession. And sometimes the force of habit, started when they were really in need of money, has given them, by a sort of reflex action, an artificial and unreasoning pleasure in amassing wealth for its own sake. (p. 139)
Gustav Cassel (1924) rejects the life-cycle and intergenerational-transfer motives as the whole explanation of savings. He lists various factors, in particular, the desire for higher social recognition in motivating savings:

There is a formation of capital for which it is hardly possible to assign any concern about the future as motive. It cannot be said of the leading capitalists who satisfy all their wants of any consequence, and have a capital the returns on which guarantees this satisfaction of wants for all time to them and their families, yet constantly set aside large sum to increase their wealth, that they save out of the concern about the future. In these cases there must be some other motive. It is the economic interest of the capitalist to increase his wealth, and this in time becomes an end in itself. The motives that are at work are numerous. The senseless cupidity that in times finds its sole pleasure in contemplating the growth of its wealth, and may very well be described as an abnormal sluggishness of spirit and a pathological impoverishment of the emotional life, is certainly not the sole explanation. The desire of splendor and of the higher position in the society which the possession of great wealth assures, the stimulation of jealousy of other men, the healthy joy of the strong man in successful work as such, in ruling large masses, in influence especially—these are all factors that have to be taken into account. (pp. 228-29)
II.9 Thorstein Veblen

Veblen (1899) is strongly against the economic theory of consumption-motivated accumulation (p. 34) and he takes the objective of accumulation mainly as a symbol of honor, social distinction and "respect from one's neighbor":

The end of acquisition and accumulation is conventionally held to be the consumption of the goods accumulated.... This is at least felt to be the economically legitimate end of acquisition, which alone it is incumbent on the theory to take account of.... But it is only when taken in a sense far removed from its naive meaning that consumption of goods can be said to afford the incentive from which accumulation invariably proceeds. The motive lies at the root of ownership. The possession of wealth confers honor, it is an invidious distinction. Nothing equally cogent can be said for the consumption of goods, nor for any other conceivable incentive to acquisition, and especially not for an incentive to the accumulation of wealth. (p. 35)

In this sense, it is not difficult to understand why "no approach to a definite attainment is possible" or why there is no limit for the accumulation process, "since the struggle is substantially a race for reputability on the basis of an invidious comparison" (p. 39) and since "property set out with being booty held as trophies of the successful raid" (p. 36).

In addition to honor and respect, "the power conferred by wealth also affords a motive to accumulation" (p. 39). "Under the regime of individual ownership the most available means of visibly achieving a purpose is that afforded by the acquisition and accumulation" (p. 40). Therefore, "the propensity for achievement—the instinct of workmanship—tends more and more to shape itself into a
straining to excel others in pecuniary achievement. Relative success, tested by an invidious pecuniary comparison with other men, becomes the conventional end of action" (p. 40).

Veblen (1915, 1939) applies his theory to explain economic development in Imperial Germany while making a comparison between the industrial revolution in England and the one in Germany. This is a very interesting point because Veblen presents a contrast between conspicuous consumption in English society and an accumulation drive in Imperial Germany. Veblen’s thinking can be easily represented by the utility function defined on both consumption and accumulation: \( \Theta u(c) + (1-\Theta)v(k) \); here \( \Theta (0 < \Theta < 1) \) is the weight assigned to consumption in a society. With economic progress in English society, \( \Theta \) became greater or \( \beta \) became smaller in equation (1) and more and more weight was thrown to consumption instead of accumulation. This is Veblen’s idea of the “penalty of taking the lead”!

Veblen (1899, 1915) predicts the same fate for the American society. But in Imperial Germany (and later Veblen extended his study to Japan), the imperial power based on accumulation restrained this shift towards conspicuous consumption. Since I cannot offer a better summary than Joseph Dorfman (1939), let me make a paraphrase from Dorfman:

Germany avoids this ‘penalty of taking the lead’ in modern industry under private property by virtue of its more recent entrance among the great powers. Relatively free from the dead hand of funded capital, her technology could develop at a faster pace than in the hands of its birth. However, the surplus is devoted not to the conspicuous consumption or waste of resources human and inanimate of the leisure class in English society, but to the intangible glory of the reigning house. The objective of a dynastic State is insatiable dominion, and wealth accumulation is organized to enhance fighting capacity. Thus in Imperial Germany, the will to power and dominance kept capital accumulation as an end in itself.

This is the reason why Imperial Germany and Imperial Japan “made rapid stride in the machine technology as to outstrip the democratic English-speaking peoples from whom emanated the modern industrial process.” (Dorfman, p.xviii.)
II.10 Joseph A. Schumpeter

In the Schumpeterian system of economic development and growth, entrepreneurs play the fundamental role. According to Schumpeter (1934, 1950), capitalism is by nature a form or method of economic change, which not only never is but never can be stationary (Schumpeter, 1950, p. 82). The fundamental impulse that sets and keeps the capitalist engine in motion comes from the "process of destructive creation" or entrepreneurs' innovations. In *The Theory of Economic Development*, Schumpeter classifies those entrepreneurs' innovations into five cases: (1) The introduction of a new goods or of a new quality of a good. (2) The introduction of a new method of production. (3) The opening of a new market. (4) The conquest of a new source of supply of materials or half-manufactured goods. (5) The carrying out of the new organization of any industry (Schumpeter, 1934, p. 66).

Since entrepreneurs are central to the capitalist economic system, the representative-agent model of growth should have their role. But what is the objective function of entrepreneurs in the Schumpeterian system? Schumpeter rejects the traditional, hedonistic definition which takes the argument of entrepreneurs utility function as solely the consumption, i.e., he rejects the type of utility function of $u(c)$ as entrepreneur's objective function. Let us look at his analysis of the "psychology of the entrepreneurs" closely.

Schumpeter first states that an entrepreneur does have certain motive or objective, but "in no sense is his characteristic motivation of the hedonist kind" (Schumpeter, 1934, p. 92), namely, the "wants as are capable of being satisfied by the consumption of goods". If we restrict the entrepreneur's wants to this consumption desire, "then it is no longer true that our type is acting on a wish to satisfy his wants" (p. 92). Schumpeter has the following observation and reasoning to reject this hedonistic definition of entrepreneurs preference:

For unless we assume that individuals of our type are driven along by an insatiable craving for hedonist satisfaction, the operations of Gossen's law
would in the case of business leaders soon put a stop to further effort. Experience teaches, however, that typical entrepreneurs retire from the arena only when and because their strength is spent and they feel no longer equal to their task. This does not seem to verify the picture of the economic man, balancing probable results against disutility of effort and reaching in due course a point of equilibrium beyond which he is not willing to go. Effort, in our case, does not seem to weigh at all in the sense of being felt as a reason to stop. (p. 92)

Even though the consumption-hedonistic motive is not the main objective of an entrepreneur, "yet it points to another psychology of non-hedonist character". The entrepreneur is strongly motivated first of all by the "dream and the will to found a private kingdom, usually, though not necessarily, also a dynasty" (p. 93). "Then there is the will to conquer, the impulse to fight, to prove oneself superior to others, to succeed for the sake, not of the fruits of success, but of success itself, from this aspect, economic action becomes akin to sport.... The financial result is a secondary consideration, or, at all events, mainly valued as an index of success and as a symptom of victory, the displaying of which very often is more important as a motive of large expenditure than the wish for the consumers' goods themselves" (p. 93). This drive for "industrial or commercial success is still the nearest approach to medieval lordship possible to modern man. Its fascination is specially strong for people who have no other chance of achieving social distinction. The sensation of power and independence loses nothing by the fact that both are largely illusion" (p.93).

Therefore, according to Schumpeter, an entrepreneur's utility function should be defined on both consumption and the drive for success. But the latter can be represented by the financial success and wealth accumulation. So the utility function \( u(c) + \beta v(k) \) can be used to approximate an
entrepreneur's utility function and "the psychology of entrepreneurial activity" (p. 94). "Pecuniary gain is indeed a very accurate expression of success" (p. 94).

II.11 The Difference Between the Capitalist Spirit and the Time Preference

What is the difference between the capitalist spirit and the time preference? My answer consists of two parts: first, they are two distinctive concepts; second, the capitalist spirit can influence the time preference.

John Rae is the originator of the time preference theory. In his book, New Principles of Political Economy (1834), he proposes the following definition:

The determination to sacrifice a certain amount of present good, to obtain another greater amount good, at some future period, may be termed the effective desire of accumulation (p. 119).

This effective desire of accumulation is later called the time preference—a theory fully developed by Eugen von Bohm-Bawerk (English edition, 1959). According to Bohm-Bawerk, it is a fundamental proposition that: "Present goods have in general greater subjective value than future (and intermediate) goods of equal quantity and quality. And since results derived from the ascribing of subjective value determine objective exchange value, present goods have in general greater exchange value and a higher price than future (and intermediate) goods of the same kind and number" (Vol.II, Book IV, p. 265).

This systematic discounting of future goods results from three causes: "(1) the difference in the situation as to provision for wants as between present and future, (2) the undervaluation of future goods and advantages by reason of perspective, and (3) the greater productiveness of more protracted methods of production" (Vol. II, Book IV, p. 283).
time preference is very different from the capitalist spirit. The former is the preference of present goods over future goods, and the latter implies the utility from accumulation for the sake of accumulation. In the social-status model, the difference is even more obvious because one refers to the utility of social rank determined by capital and wealth accumulation, which has nothing to do with the time preference per se. In growth theory, a lower time preference and a higher capitalist spirit both lead to more capital accumulation and faster endogenous growth rate. That can be seen from the following example. In (1.1), let \( u(c) = \log c \), and \( v(k) = \log k \). Then, maximize

\[
\int_0^\infty (\log c + \beta \log k) e^{-\mu t} dt,
\]

subject to:

\[
k = Ak - c.
\]

The endogenous growth rate is given by \( \gamma = A - \frac{\rho}{1+\beta} \). \( \gamma \) (2.6)

In (2.6), the endogenous growth rate is negatively related to the time discount factor \( \rho \) and positively related to the capitalist spirit \( \beta \). In the capitalist-spirit model, it no longer require\( \gamma \) that the marginal productivity of capital be larger than the time discount factor in order to have a positive endogenous growth rate as in the endogenous-growth model. In fact, even if the marginal productivity of capital is smaller than the time discount factor, a relatively large value of the capitalist spirit can generate a positive endogenous growth rate. It is also interesting to see that, in (2.6), when the capitalist spirit is absent from the model, i.e. \( \beta = 0 \). The endogenous growth rate is given by the marginal productivity of capital minus the time discount rate: \( \gamma = A - \rho \); when the capitalist spirit is very strong, the endogenous growth rate will be close to the value of the marginal productivity of capital: \( \gamma \approx A \).
How does the capitalist spirit influence the time preference? The answer is already provided by John Rae (1834) in some roundabout way. According to Rae, the effective desire for accumulation or the time preference depends on various factors: "1. The prevalence throughout the society, of the social and benevolent affections, ... 2. The extent of the intellectual powers, and the consequent prevalence of habits of reflection, and prudence, in the minds of the members of the society, 3. The stability condition of the affairs of the society, and the reign of law and order throughout it" (p. 124). In the list, Rae does not say anything about the capitalist spirit because he argues in great detail that this self-interested motivation is not applicable to the whole history of mankind. Unlike Mandeville (last edition, 1725) and Adam Smith, Rae is a moralist and partly shares the opinion that "the love of money is the root of all evil, and infallibly leads to wickedness" (p. 127). Rae cites from Plato and other Roman and Greek writers to show how "the character of the money-making man was uniformly vicious" (p. 126). Because of this moral stand, Rae does not directly take the self-interested motivation of the capitalist spirit, or in his term, "the sort of spirit" (p. 125), as a determinant of the effective desire of accumulation or the time preference. On the contrary, Rae regards "the social and benevolent affections" as the main factor influencing the time preference: "These feelings, therefore, investing the concerns of futurity with a lively interest to the individual, and giving a continuity to the existence and projects of the race, must tend to strengthen very greatly the effective desire of accumulation" (p. 122).

But it is quite clear from Rae's long argument against the money-making spirit in the moral sense that he admits the role of "that sort of spirit" in strengthening the effective desire of accumulation in modern time, in particular in modern England. When he takes the altruist element of human affection as the main determinant of the effective desire of accumulation or the time preference, he says "that the principle of self interest alone, though it may not, of itself, give great strength to this desire, yet, from its combination with other springs of action, must, generally do so indirectly and ultimately and may, therefore, be assumed as a cause sufficient to account for the phenomena" (p. 124). According to Rae,
this point of view is definitely true for a modern capitalist society: "If we confine our attention to the present time, and to particular parts of the globe, this may be readily admitted.... Because, in Great Britain, a regard to mere self interest, may now prompt to a cause of action leading to making a large provision for the wants of others, we are, in reality, no more warranted to conclude that it will do so always, and in every place, than were the ancients warranted to conclude, because, in their particular communities, the pursuit of wealth commonly generated evil, that it must therefore do so always and in every place" (pp. 124-125).

Therefore, if limited to modern capitalist age and in developed Europe and America, Rae does admit the role of the capitalist spirit or "that sort of spirit" in determining the effective desire of accumulation or the time preference. He states in some detail why people will accumulate capital for its own sake - an argument well before Max Weber and even before Karl Marx:

There seem to be, in modern times, and in particular communities, two circumstances, that may lead an individual, from a mere regard to his personal interest, to pursue the paths of sober industry and frugality, and consequently, to make an extended provision for the wants of others. These seem to be the desire of personal, family aggrandizement, and a wish, conjoined with the pursuit of both, to rank high in the estimation of the world. The acquisition of fortune, is a road open to that of most men, and, in the present days, is the only road open to that of most men. The mere desire to rise in the world, and envy of superiority of other men, may excite many to enter on this path, and preserve them steadily in it (p.125, italics added).

Here again, the utility function is defined on both consumption and accumulation! But, as a moralist, Rae immediately warns against the danger out of this accumulation spirit: "This sort of spirit,
however, must be kept in strict check, by a large surrounding mass of genuine probity, and tenderness of the happiness of others, or it certainly breaks out into disorder" (p. 125). What a contrast to Bernard Mandeville's fable of "private vices, publick benefits" and Adam Smith's praise of the self-interested economic man!

In passing it is noted that Adam Smith (1759) has already developed the connection between frugality and time preference:

That self-command, in the same manner, by which we restrain our present appetites, in order to gratify them more fully upon another occasion, is approved of, as much under the aspect of propriety, as under that of utility. When we act in this manner, the sentiments which influence our conduct seem exactly coincide with those of spectator. The spectator does not feel the solicitations of our present appetites. To him the pleasure which are to enjoy a week hence, or a year hence, is just as interesting as that which we are to enjoy this moment. When for the sake of the present, therefore, we sacrifice the future, our conduct appears to him absurd and extravagant in the highest degree, and he cannot enter into the principles which influence it. On the contrary, when we abstain from present pleasure, in order to secure greater pleasure to come, when we act as if the remote object interested us as much as that which immediately presses upon the senses, as our affections exactly correspond with his own, he cannot fail to approve our behavior (p. 189. See almost the same statement by Adam Smith on p. 215).
THE SPIRIT OF CAPITALISM, SAVINGS, ASSET PRICES AND GROWTH

Chapter III

Empirical Relevance of the Capitalist-Spirit Model

This chapter will demonstrate that, without explicit mathematical models, sociologists, political scientists, historians and some economists have extensively used the capitalist-spirit approach to their empirical research. For this purpose, I first review the literature on the capitalist-spirit approach in social, economic and historical studies; then, I show how this sociological approach can be combined with the recent theory of endogenous growth; and, finally, I present the results from the econometric study by DeLong (1988) to show that the correlation between the capitalist spirit and economic growth can be empirically tested.

III.1 Max Weber: Religions, the Capitalist Spirit, and Wealth Accumulation

From his early life, Weber observed from business entrepreneurs, in particular from his uncle Karl David Weber, a connection between enterprise effort and an ethic of economic conduct such as hard work and frugality. To many businessmen, hard work and saving seem to be a duty that carries their own intrinsic value (Bendix, 1962, pp. 50-52). In a capitalist society, the dominant outlook of life seems to be the continual accumulation of wealth for its own sake combined with an absence of interest in the worldly comfort. "The old leisurely and comfortable attitude toward life gave way to a hard frugality in which some participated and came to the top, because they did not wish to consume but to earn, while others who wished to keep on with the old ways were forced to curtail their consumption" (Weber, 1958, p. 68). In this accumulation process, Weber finds a role played by the "new spirit, the spirit of modern capitalism" (p. 68). What can explain this psychological propensity? Weber finds the answer in "this-worldly asceticism" of Protestants—hard work, frugality, honesty and austerity. According to Weber, the Calvinist concept of "calling" perhaps has the most important role in shaping this capitalist
spirit of accumulation for the sake of accumulation. This is because Calvinism advocates that hard work is "the fulfillment of the obligations imposed on the individual by his position in the world" (p. 79). Hard work in one's calling and success are regarded as a sign of grace and salvation, and wealth is commended insofar as they resulted from the performance of duty. Man should not refuse to accept God's gifts and to be His steward: "You may labor to be rich for God, though not for the flesh and sin" (Bendix, 1960, p. 62). The fear of indulging in things of flesh would discourage luxury consumption. "When the limitation of consumption is combined with the release of acquisitive activity, the inevitable result is obvious: accumulation of capital through ascetic compulsion to save" (Weber, 1958, p. 172).

Even in Weber's time, evidence showed a clear connection between Protestant ethic and wealth accumulation. In beginning the first chapter of his book, "Religious Affiliation and Social Stratification", Weber (1958) cited the obvious phenomenon of Protestants' success in society, supporting his assertion on the link between the Protestant ethic and the capitalist spirit and the link between the capitalist spirit and economic progress:

A glance at the occupational statistics of any country of mixed religious composition bring to light with remarkable frequency a situation which has several times provoked discussion in the Catholic press and literature, and in Catholic Congress in Germany, namely, the fact that business leaders and owners of capital, as well as the higher grades of skilled labor, and even more the higher technically and commercially trained personal of modern enterprises, are overwhelmingly Protestant. This is true not only in cases where the difference in religion coincides with one of nationality, and thus of cultural development, as in Eastern Germany between Germans and Poles. The same thing is shown in the figures of religious affiliation almost wherever capitalism, at the
time of its great expansion, has had a free hand to alter the social distribution of the population in accordance with its needs, and to determine its occupational structure. The more freedom it has, the more clearly is the effect shown (Weber, 1958, p. 35).

With the help of his student, Martin Offenbacher, Weber examined the economic and social statistics based on religion affiliations in the city of Baden. Weber cited that in 1895, "there was taxable capital available for the tax on returns from capital:

Per 1,000 Protestants ... ... 954,000 marks
Per 1,000 Catholics ... ... 589,000 marks" (Weber, 1958, p.188).

It seems obvious that the Protestants were more economically successful than the Catholics. In the same city, Protestants appeared to be more ready than Catholics to enroll at high schools that fitted in with the industrial way of life. "The same thing may be observed in Prussia, Bavaria, Wurtemberg, Alsace-Lorraine, and Hungary" (Weber, 1958, p. 38, p.189, note 8). At the same time, Weber is surprised at the small participation of Catholics in the modern business life of Germany (p. 39). Through those statistical investigations, Weber and his student found high correlation between the Protestants and high economic achievements. It is this sharp empirical observation that supports Weber's theory of the Protestant ethic as the origin of the capitalist spirit. "Thus the principal explanation of this difference must be sought in the permanent intrinsic character of their religious beliefs, and not only in their temporary external historico-political situations" (Weber, 1958, p. 40).

This connection between religion and wealth accumulation was recognized well before Max Weber. Petty, Montesquieu, Buckle, Keats and others commented on the affinity between Protestantism and the development of the commercial spirit (Bendix, 1960, p. 55; Weber, 1958, Chapter 1 and p. 189, notes 11 and 12). Different religions do have different attitudes toward economic life, which may promote
or retard wealth accumulation. In the case of the two religions—Catholic versus Protestant, Weber seemed to approve, with his own modifications, the following summary by his student Martin Offenbacher:

The Catholic is quieter, having less of the acquisitive impulse; he prefers a life of the greatest possible security, even with a smaller income, to a life of risk and excitement, even though it may bring the chance of gaining honor and riches. The Proverb says jokingly, 'either eat well or sleep well'. In the present case the Protestant prefers to eat well, the Catholic to sleep undisturbed. (Weber, 1958, pp. 40-41)

III.2 Werner Sombart: The Spirit of Capitalism across Countries

In The Quintessence of Capitalism, Sombart (1915) makes a systemic analysis on how the intensiveness and extensiveness of the capitalist spirit affect economic growth in Europe and America since the 13th century. Before I present his main ideas here, I have to remind us that Sombart's definition of the capitalist spirit is much broader than Weber's. To Sombart, the spirit of capitalist has two essential components: the love of money and the spirit of enterprise. In this way, the spirit of capitalism includes the accumulation spirit in the sense of Weber and the entrepreneurship in the sense of Joseph Schumpeter (1934).

In Sombart's view, even though the rise and growth of the capitalist spirit happened in Europe and America in their transition from traditional societies to modern capitalist societies, "not all nations were caught in the stream of capitalist growth at the same time" and "the duration of the influence of the capitalist spirit in a nation may vary in length" (Sombart, 1915, p. 130). Furthermore, the intensiveness and extensiveness of the capitalist spirit may be different in different nations. Consequently, the spirit of enterprise and the desire for gain would vary (p. 131). How does the economic history of European countries and the United States reflect this varying capitalist spirit? How does the varying capitalist spirit
across countries affect economic growth? To answer these questions, Sombart has made the following observations on the following countries:

(1) Italy. "The capitalist spirit first manifested itself in Italy" (p. 132). During the 13th and the 14th centuries, the capitalist spirit was fully developed in the trading republic of Lombardy. In fact, throughout the Middle Ages, the intensive growth of the capitalist spirit in Italy was far ahead of all other European countries. The capitalist spirit as a state of mind also reached its highest development in Tuscan Republic and Florence. "As early as the 14th century the Florentines were filled with a feverish desire for gain, and a devotion to business that almost amounted to a passionate love. Florence was that state which was requested by dying fathers in their last wills and testaments to fine their sons one thousand florins if they had no regular occupation" (p. 132).

"But all this capitalist splendor came to a speedy end" in the 15th and the 16th centuries. The spirit of enterprise began to decay, "the joy of acquisitiveness and the devotion to business made way for a comfortable mode of life" (p. 133). The society developed more towards feudal state where people began to "despise work and to seek after titles of nobility", and of course economic growth in the increasing aristocratic environments began to slow down.

(2) The Iberian Peninsula. By the 14th century, the capitalist spirit had its strong influence in the commerce of Barcelona. The geographical discovery in the 15th century was the best indicator of the intensified capitalist spirit in Spain and Portugal. In the 16th century, the conquest of America and the colony plantation, the expanding world trade with both the West and the East, and the growing manufacturing industries all signaled the dominance of the capitalist spirit.

"Then came total paralysis in the 17th century, of which every schoolboy has heard. The spirit of enterprise faded away, and all interest in business vanished. Instead, the nation turned from economic activities to religion, court life, or knighthly exercises" (p. 135). In the new era, "everybody imagines he
is a nobleman". The consequence was pointed out by *Ranke* and cited by *Sombart*: "it was only natural that gradually a distinct disinclination for work and business, and a contempt for industry and frugality, should be the result" (p. 136).

In concluding his study on the Iberian Peninsula, *Sombart* made the following statement, which directly foretells *Harrison's* studies (1985, 1992) on Latin America: "Their way of life, then, was totally opposed to the capitalist spirit. And wherever Spaniard and Portuguese established themselves in colonies the ideals of the mother country accompanied them" (p. 136).

(3) Germany. The capitalist spirit took its root in Germany much later than many European countries. By the 16th century, the capitalist spirit in Germany could not compare to what prevailed in Italy in the 14th century. It was only after 1850 that the capitalist spirit really awoke in Germany. By *Sombart's* time, the capitalist spirit in Germany "has grown so mighty that, as no one can deny, Germany is catching up the United States of America as the land wherein that spirit has reached its utmost development" (p. 142).

(4) Holland. "In all probability the United Province were the land in which the capitalist spirit for the first time attained its fullest maturity" (p. 144). By the 17th century, "in the Netherlands an entire people became imbued with the capitalist spirit" and it was regarded as the land of capitalism *par excellence* (p. 144). In *Ranke's* pen, in Netherlands, "industry throve, and the quality of the work done was splendid. The rich continued to be moderate in their habits and thrifty; and many a one who sold fine cloth to others was content himself with a rough material. The poor had their needs provided and idleness was a deadly sin which merited and received condign punishment" (p. 146). But by the late 19th century and the early 20th century, part of the capitalist spirit continued to exist, but some of it decayed and disappeared. Even in the 18th century, the spirit of enterprise dwindled away, and, with the interest income, the capitalist "waxed fat". "Even the smallest interest in capitalist undertakings was no longer to be met with" (p. 147).
(5) Great Britain. "The heroic age of capitalism began in the 16th century, when the land was filled with a mighty spirit of undertaking, born of the love of adventure and the impulse for conquest" (p. 147). In the 17th century, the capitalist spirit also appeared strongly in Scotland in the wake of Reformation. "Everywhere you might have observed an unbridled desire for gain and undertakings innumerable" (p. 148).

But by late 19th century, "all reliable and authoritative observers appear to agree that today a condition of 'capitalist decline' has made its appearance in England" (p. 150). In particular, "the spirit of enterprise, interest in business, and love of industry are all declining... The Englishman finds pleasure in luxury, in an aristocratic manner of living, and above all in spone" (pp. 150-151). Thus Sombart explains the decline of Britain as a result of the decline of the capitalist spirit in Britain. Of course, his diagnosis of the "British Disease" is well before the ones by Rosovsky (1980) and especially Wiener (1981). [See more on this point in English Culture and the Decline of the Industrial Spirit: 1850 - 1980, later].

(6) The United States of America. Sombart takes the United States as the best case study on the connection between the capitalist spirit and rapid economic growth. Sombart summarizes his observations on the American capitalist spirit as follows: the elements of the capitalist spirit have had a niche in the American national character ever since the foundation of the colonies; the early stages of the capitalist spirit changed into the later and fully perfect stage sooner and more completely in America than anywhere else; the capitalist spirit had developed to its utmost in the United States and the whirlwind still rages (pp. 151-152).

III.3 David McClelland: The Achieving Society

McClelland (1961) presents a strong case to extend the usual consumption-oriented utility function to include the "achievement" in the society. Economic development and growth are not only driven by
material gain and better consumption, but also by the desire to achieve and to succeed. This theorization is very similar to Joseph Schumpeter's entrepreneurship and is also very close to the theory of Hagen (1962): the socio-psychological "need for achievement" which under some circumstances takes economic form, especially, wealth accumulation. In McClelland's definition of "the need for achievement", we can easily include wealth accumulation and financial success. In this way, the capitalist-spirit model becomes part of McClelland's achievement model.

The most remarkable aspect about the McClelland approach is the detailed empirical examination between economic performance and the evidence of high need for achievement in about thirty countries. From his empirical analysis, he finds that values and cultures encouraging high achievement are closely related to better economic performance. This is true for the Quakers, Hassidic Jews, the Jains of India, etc. On the other hand, an institution such as slavery, which undermines achievement motivation, results in bad economic performance.

III.4 Weber, Sutton, Harris, Kaysen and Tobin: The Capitalist Spirit and the "Miracle of America"

When Max Weber wrote his book on the capitalist spirit early of the twentieth century, the "miracle of America" was in its heyday. It is not strange at all that Weber devoted a large part of his book to trace the cultural or psychological root of this rapid American economic expansion to the colonial period of the seventeenth and the eighteenth centuries. To Weber, the strong capitalist spirit embodied in the American cultural values played its fundamental role in creating the "miracle of America" and the capitalist spirit manifested in no better form than the words of Benjamin Franklin. After extensive citations from Benjamin Franklin, Weber concludes:

"It is Benjamin Franklin who preaches to us in these sentences, the same which Ferdinand Kärnberger satirizes in his clever and malicious Picture of American Culture as the supposed confession of faith of the Yankee. That it is the spirit of capitalism which here speaks in characteristic fashion, ..."
Let us pause a moment to consider this passage, the philosophy of which Kurnberger sums up in the words, 'They make tallow out of cattle and money out of men'. The peculiarity of this philosophy of avarice appears to be the ideal of the honest men of recognized credit, and above all the idea of a duty of the individual toward the increase of his capital, which is assumed as an end in itself. Truly what is here preached is not simply a means of making one's way in the world, but a peculiar ethic" (Weber, 1958, pp. 50-51).

What are the characteristics of the American capitalist spirit expressed in Benjamin Franklin's ethic? We recite a few Franklin's passages in Weber's book:

"Remember, that money is of the prolific, generating nature, Money can beget money, and its offspring can beget more and so on. Five shillings turned is six, turned again it is seven and three pence, and so on, till it becomes a hundred pounds. The more there is of it, the more it produces every turning, so that the profits rise quicker and quicker. He that kills a breeding-sow, destroys all her offspring to the thousand generation. He that murders a crown, destroys all that it might have produced, even scores of pounds" (Weber, 1958, p. 49). "After industry and frugality, nothing contributes more to the raising of a young man in the world than punctuality and justice in all his dealings" (p. 49). "Remember, that time is money" (p. 48). "Remember, that credit is money" (p. 48).

Weber thinks that Franklin's ethic is also closely connected with certain religious ideas. "If we thus ask, why should 'money be made out of men', Benjamin Franklin himself, although he was a colorless deist, answers in his autobiography with a quotation from the Bible, which his strict Calvinistic father drummed into him again and again in his youth: 'Seest thou a man diligent in his business? He shall stand before kings' (prov. xxii. 29). The earning of money within the modern economic order is, so long as it is done legally, the result and the expression of virtue and proficiency in a calling; and this virtue and proficiency are, as it is now not difficult to see, the real Alpha and Omega of Franklin's ethic" (Weber, pp. 53-54).
Weber's cultural and psychological approach to the growth "miracle of America" was taken by many people. In a grand undertaking, Francis X. Sutton, Seymour Harris, Carl Kaysen and James Tobin made a detailed study on the role of the American business creed in creating the economic miracle. In the book entitled *The American Business Creed* (1956), they outlined a series of the cultural values of America: materialism and productivity, activism, the continuing goal of progress, the spirit of adventure (Sutton, et al., 1956, pp. 251-269); that is to say, "the spirit of capitalism" defined by Max Weber and preached by Benjamin Franklin manifests in all these aspects of the American business culture. Why should one make money and profits in the American society? Because "personal money income plays a highly important role in our society as a symbol of achievement. A man with a large income is likely to gain respect—not because of the income itself but because of the presumption that it is an index of his importance or competence". (Sutton et al., 1956, p. 331). The role of entrepreneur and the industrialist spirit in American economic growth has been put nicely by Harold Underwood Faulkner in his *American Economic History* (7th edition, 1954):

Any discussion of the causes of the development of American manufacturing would be incomplete without mentioning the part played by the entrepreneurs, who often were neither scientists nor, strictly speaking, manufacturers or industrialists. These were men like Andrew Carnegie in steel, Philip, D. Armour in slaughtering and meat packing, John D. Rockefeller in oil refining, and J. P. Morgan in Finance.... Far more numerous were small manufacturers who were often a combination of engineer, inventor or scientist, and businessman, and who were the original entrepreneurs or builders of American manufacturing (p. 400).
To put it simply, we can describe so many American entrepreneurs in the way as Max Weber says of Franklin: "Benjamin Franklin was filled with the spirit of capitalism at a time when his printing business did not differ in form from any handicraft enterprises." (Weber, p. 63)

III.5 Harrison: The Economic Decline of the United States and the Erosion of Its Traditional Value

In an ambitious attempt to explain economic growth and development from East Asia to Latin America and to the United States, Harrison (1992) makes another case for his "cultural determinism" of economic development and growth. According to him, the success, including the economic success, of America is based on eight fundamental values: freedom, justice, work, excellence, frugality, family and community (p. 224, emphasis added). From its early history on, the dominant American culture was strongly influenced by Calvinist precepts: self-reliance, enterprise, hard work, austerity (p. 225, emphasis added).

How does one explain the popular talk of today: the decline of America? Harrison attributes the causes of this phenomenon to the erosions of those traditional values and, in particular, the erosion of "the spirit of capitalism" in Max Weber's words. He points to the lowest saving rate of the United States among twenty-four industrial countries and the United States as the world's largest debtor as his empirical evidence. He compares the consumption-oriented generations after World War II to work-saving-oriented generations before the War:

"For prior generations, with the securing of basic needs at stake, work was an end in itself. For the generations that followed the war, work, often made easier by labor-saving devices, has increasingly become a means of acquiring things—cars, houses, boats, clothes, leisure time." Our principal satisfaction or utility in the word of economics has come from consumption, "not from a job well done" (Harrison, 1992, p. 230). That is to say, in the utility function, \( u(c) + \beta v(k) \), the utility of work and saving has kept decreasing relative to the satisfaction of consumption in the United States. Harrison
thinks that declining industrial spirit that once happened in Britain is now happening in the United States today: "As in Britain since the late nineteenth century, industry and commerce have lost prestige, and ... professions that are often hostile to business—for example academia, the media—now attract more top talent." (p. 230)

As the conclusion of his diagnosis and analysis, Harrison regards the waning of the "spirit of capitalism" in the sense of Max Weber as the main cause of the decline of America: "In The Protestant Ethic and the Spirit of Capitalism, Max Weber attributed the Industrial Revolution principally, and I believe correctly, to an ethos that combined hard work with frugality, that is, thrift and austerity. When frugality is removed from the equation, hard work and the related values of education and excellence may be compromised. Disrespect for thrift and austerity, driven by increased focus on the present and reduced focus on the future, has a lot to do with our low national levels of saving and investment, the saving and loan scams, and the likes of Ivan Boesky." (p. 230)

III.6 Harrison: Underdevelopment Is a State of Mind

Lawrence Harrison (1985) also takes his cultural approach to study the lack of economic development in Latin America. His definition of "the State of Mind" is much broader than the capitalist spirit, but the latter is a very important part in his argument and, in fact, he classifies Weber's theory of the capitalist spirit under the name of entrepreneurs and puts Weber and Schumpeter together in his book, Underdevelopment Is A State of Mind.

The basic message from Harrison (1985) is that culture is the principal determinant of development (p. 166). "In the case of Latin America, we see a cultural pattern, derivative of traditional Hispanic culture, that is ... anti-entrepreneurial (or anti-the-capitalist-spirit, added), and at least among the elite, anti-work" (p. 165). "The low value that attaches to work and practical achievement has
probably suppressed the entrepreneurial instinct and performance ... thereby also contributing to reduced rates of economic growth" (p. 148).

III.7 Werner Sombart and Milton Friedman: Judaism and the Spirit of Capitalism

The economic success of the Jewish people has been recognized for a long time since the Middle Ages. When Max Weber wrote his *Protestant Ethic and the Spirit of Capitalism*, he also noted the outstanding economic performance of the Jewish people in Europe. He said, in terms of the average income, "it is true that the Jews ... were far ahead of the rest" (Weber, 1958, p. 188, note 5). While Weber takes the Protestant ethic as the origin of the capitalist spirit, Werner Sombart (1913, 1915) takes the Jewish religion and culture as the origin of the capitalist spirit. For many years, Sombart’s argument has been condemned by some as anti-Semitic, but Milton Friedman (1987) regards it as philo-Semitic and provides support for Sombart’s view. Since the economic role of the Jewish people is so important, we should never miss a most persuasive explanation of their economic success. In fact, in my opinion, compared to Sombart’s theory, the standard neoclassical growth model which focuses on technology, if not helpless in explaining the economic success of the Jewish people, misses at least the most important cultural element in the Jewish people. Here I follow Milton Friedman’s (1987) interpretation of Sombart very closely.

In both Sombart and Friedman’s opinion, Judaism is most favorable to competitive capitalism and individual freedom; its attitude toward riches is closer to the capitalist spirit than both Christianity and the Protestant ethic. Let us recite Sombart’s words from Milton Friedman (1987):

---

3 Weber disagrees with Sombart on this point; see in particular Chapter XXX: *The Evolution of the Capitalistic Spirit*, in General Economic History. (Weber, 1992)
Throughout the centuries, the Jews championed the cause of individual liberty in economic activity against the dominating views of the time. The individual was not to be hampered by regulations of any sort... I think that the Jewish religion has the same leading ideas as capitalism... The whole religious system is in reality nothing but a contract between Jehovah and his chosen people... God promises something and gives something, and the righteous people must give Him something in return. Indeed, there was no community of interest between God and man which could not be expressed in these terms—that man performs some duty enjoined by the Torah and receives from God a quid pro quo. (Friedman, 1987, pp. 47-48)

Why does the capitalist spirit have its origin in the Judaism? Sombart answers as follows: You will find a few passages [in the Old Testament and the Talmud] wherein poverty is lauded as something nobler and higher than riches. But on the other hand you will come across hundreds of passages in which riches are called the blessing of the Lord, and only their misuse or their danger warned against. (Friedman, 1987, p. 48)

The Jewish attitude towards riches is in sharp contrast to the Christian one. In the New Testament, "it is easier for a camel to go through the eye of a needle than for a rich man to enter into the kingdom of God", but Sombart says "as often as riches are lauded in the Old Testament, they are damned in the New.... The religion of the Christians stands in the way of their economic activities... The Jews were never faced with this hindrance" (Friedman, 1987, p. 48). From his analysis, Sombart reaches the conclusion:

"Free trade and industrial freedom were in accordance with Jewish law, and therefore in accordance with God's will" (Friedman, 1987, p. 48). Furthermore, Sombart thinks that the Protestant (and the Puritan especially) went back to the Old Testament for their religious inspiration and followed
more the Hebrew tradition. Therefore, if Max Weber regards the Protestant ethic as the origin of the capitalist spirit, he should logically carry his proposition to the end—the Jewish religion.

Milton Friedman concurs with Sombart's analysis on the role of the Jewish religion in the process of wealth accumulation and economic progress:

If, like me, you regard competitive capitalism as the economic system that is most favorable to individual freedom, to creative accomplishment in technology and the arts, and to the widest possible opportunities for the ordinary man, then you will regard Sombart's assignment to the Jews of a key role in the development of capitalism as high praise. You will, as I do, regard his book as philo-semitic.

(Friedman, 1987, p. 53)

III.8 Michio Morishima: Why Has Japan Succeeded?

The capitalist-spirit approach to economic growth has been used by Michio Morishima (1982) to explain the economic success of Japan. In a book entitled Why Has Japan 'Succeeded?', Morishima attributes the economic success of Japan to Western technology and Japanese Confucianism. His approach is typically Weberian and his comparison between the protestant ethic and the Japanese ethos is illuminating. For modern capitalism to be established, a religious revolution had to come first. In the Western, "Puritanism's worldly frugality meant opposition to enjoyment and consumption, and luxury consumption especially was completely squeezed out. In this way the formation of capital was carried out through frugality; new capital was then used productively and became a new source of profit. Thus the religious revolution resulting from Protestantism created the modern entrepreneur and capitalism—a new type of person who was the possessor of an earnest faith, and who controlled huge wealth, but nevertheless contended himself with a life of extreme simplicity, striving to accumulate capital" (pp. 83-84). For Japan, Morishima finds something equivalent in Confusian doctrine of frugality:
If the Japanese had not adopted the belief of frugality, which was another of the prerequisites of capitalism, then modern capitalism could certainly not have been achieved in Japan. In Japan in those days Buddhism and Shinto, the traditional religions, did not have that great influence on the everyday life of the Japanese people. However, ... as a result of the Tokugawa Bakufu's cultural policy, Confucianism has spread widely and deeply among the Japanese people. Confucianism was understood in Japan as an ethical system rather than a religion, and it directly taught the Japanese people that frugal behavior was noble behavior. Therefore Japan, at the end of the Meiji Revolution, had already fulfilled the second prerequisite for capitalism. (p. 86)

When Hayashi (1986) makes a detailed examination "Why is Japan's saving rate so apparently high?", he lists cultural factors as one of the explanatory factors (p. 167). The paper by Horioka (1985) has also shown some mixed evidence on the relation between the culture and high saving rates in Japan. There is also an interesting observation made by Lawrence Summers and one of his students appeared in Hayashi (1986): "Summers suggested cultural difference between Japanese and Americans as a possible explanation of the high saving rate in Japan. He cited a work based on survey data for Japanese-Americans by one of his students. The research showed that Japanese-Americans by one of his students. The research showed that Japanese-Americans' saving rate is 5 percent higher than that of the other group" (p. 234).

III.9 Martin Wiener: The Decline of the Industrial Spirit and the Decline of British Economy

As another example to illustrate how change in the capitalist spirit may affect industrial growth we quote from Martin Wiener (1982): English Culture and the Decline of the Industrial Spirit, 1850-1980:
For Britain, Wiener argues that, after the Great Exhibition of 1851, "social and psychological currents began to flow in a different direction" (p. 157). "The emerging culture of industrialism...was itself transformed. The thrust of new values borne along by the revolution in industry was contained in the later nineteenth century; the social and intellectual revolution implicit in industrialism was muted, perhaps even aborted" (p. 157). "For a century and a half the industrialist was an essential part of English society, yet he was never quite sure of his place. The educated public's suspicions of business and industry inevitably colored the self-image and goals of the business community. Industrialists responded to their mental environment, sometimes by seeking to leave the world of production for more acceptable realms of gentility, and sometimes by striving to adapt their way of life to the canons of gentility....As a rule, leaders of commerce and industry in England over the past century have accommodated themselves to an elite culture blended of preindustrial aristocratic and religious values and more recent bureaucratic values that inhibited their quest for expansion, productivity, and profit" (p. 127). The gentrification of the industrialists discouraged "commitment to a wholehearted pursuit of economic growth" (p. 127) and led to "the waning of the industrial spirit" (p. 159) or the capitalist spirit.

The declining industrial spirit as a cause of British economic decline has been shared by many economic historians. We cite Henry Rosovsky (1980) as another example:

"Most economic historians agree that Britain's climacteric occurred about one hundred years ago,... In my opinion, the principle factors were internal and human, and therefore avoidable: British entrepreneurship had become flabby; growth industries and new technology were not pursued with sufficient vigor; ..." (from Harrison, 1992, p. 247).

The attitude of Englishmen in the early of this century towards the American was quite similar to the one adopted today by the American and European towards the Japanese. Americans in particular (and more recently Japanese) were perceived by many leaders of industry...as narrow people obsessed with the economic side of life, paying for their material success with the quality of personal life (p. 142).
The confession by Samuel Courtauld, cited in Wiener's book, is typical: "I view the so-called 'Americanization of Europe' with the utmost dislike. I doubt whether American ideals of living—purely materialistic as they are—will finally lead to a contended working nation anywhere when the excitement of constant expansion has come to an end" (p. 142).

Maybe modern world history has increasingly been dominated by the capitalist spirit which puts wealth accumulation above everything else. Facing this trend, traditionalists, moralists and romanticists can only express their contempt for this spirit of capitalism: the accumulation for the sake of accumulation. Let us listen to Jean-Jacques Rousseau's denunciation of his contemporaries: "Ancient politicians incessantly talked about morals and virtue, those of our time talk only of business and money" (Rousseau, 1750, 1962, p. 51). In the capitalist era, politicians have already obsessed with money, to say nothing about our businessmen and capitalists.

### III.10 The Endogenous-Growth Approach to the Spirit of Capitalism

It is the intention of this section to show that the various economic and social studies I have reviewed so far can be unified in an extended mathematical model of economic growth and in this model the positive association between the capitalist spirit of wealth accumulation analyzed by Weber, Sombart, Harrison and many others can be theoretically proved and statistically tested.

First I present the capitalist spirit in a simple endogenous-growth framework. Following Barro (1990) and Rebello (1991), I assume that the net output is constant returns to capital:

\[ f(k) = Ak. \]  \hspace{1cm} (3.1)

Just for simplicity, I let the utility functions be:

\[ u(c,k) = logc + \beta logk, \]
where the parameter $\beta$ is positive, which measures the capitalist spirit.

To generate endogenous growth in the Barro-Rebelo model, it is essential to have the net marginal product of capital being greater than the time discount rate: $A > \rho$. This condition can be easily relaxed in our capitalist-spirit model. To see this point, I maximize:

$$
\int_o^\infty (\log c + \beta \log k) e^{-\rho t} dt,
$$

subject to:

$$
\dot{k} = Ak - c,
$$

with the initial capital stock given by $k(0)$.

The current-value Hamiltonian is:

$$
H = \log c + \beta \log k + \lambda (Ak - c),
$$

here $\lambda$ is the costate variable. The optimal conditions are:

$$
\frac{1}{c} = \lambda,
$$

$$
\frac{\beta}{k\lambda} + A - \rho = \frac{\dot{\lambda}}{-\lambda},
$$

$$
(A - \frac{1}{k\lambda}) = \frac{\dot{k}}{k}.
$$

Differentiate condition (3.5) with respect to time and denote the constant growth rate of consumption as $\gamma$,

$$
\frac{\dot{\lambda}}{\lambda} = \frac{\dot{c}}{c} = \gamma.
$$

Substitute $\gamma$ into (3.6):

$$
k\lambda = \frac{\beta}{\gamma + \rho - A}.
$$
Log differentiate (3.9) with respect to time on both sides,

\[
\begin{align*}
\frac{\dot{k}}{k} &= -\frac{\dot{\lambda}}{\lambda} = \gamma. \\
\end{align*}
\]  

(3.10)

That is to say, the growth rate of capital on the balanced growth path is the same as the growth rate of consumption. Substitute \(\dot{k}/k = \gamma\) into (3.7):

\[
\begin{align*}
k\lambda &= \frac{1}{A - \gamma}. \\
\end{align*}
\]  

(3.11)

Then use (3.9) and (3.11) to solve for the balanced growth rate \(\gamma\),

\[
\begin{align*}
\frac{\beta}{\gamma + \rho + A} &= \frac{1}{A - \gamma}, \\
\end{align*}
\]  

(3.12)

and

\[
\begin{align*}
\gamma &= A - \frac{\rho}{1 + \beta}. \\
\end{align*}
\]  

(3.13)

To have positive growth rate in (3.13), \(A - \rho/(1 + \beta)\) needs to be positive, namely, \((1 + \beta) A > \rho\), but we do not need the lower boundary condition \(A > \rho\). In fact, here we can have \(A < \rho\); but as long as \((1 + \beta) A > \rho\), there exists a positive endogenous growth rate.

From equation (3.13), we first note that the growth rate is higher the stronger is the spirit of capitalism:

\[
\begin{align*}
\frac{d\gamma}{d\beta} &= \frac{\rho}{(1 + \beta)^2} > 0. \\
\end{align*}
\]  

(3.14)

Even if technology and the time discount rate are the same across countries, growth rates will be different if the capitalist spirit is different.

Second, on the balanced growth path, the saving rate, \(s\), is:
\[ s = \frac{k}{f(k)} = \left( \frac{k}{k} \right) \left( \frac{k}{\Delta k} \right) = \frac{\gamma}{\Lambda} = 1 - \frac{\rho}{(1 + \beta)\Lambda}. \]  

(3.15)

So the saving rate is an increasing function of the capitalist spirit:

\[ \frac{ds}{d\beta} = \frac{\rho}{\Lambda(1 + \beta)^2} > 0. \]  

(3.16)

Third, the intensity of the capitalist spirit also positively affects the path of investment. To see this, we note that the path of the capital stock is:

\[ k(t) = k(0)e^{\left[ A - \frac{\rho}{1 + \beta} \right] t}. \]  

(3.17)

and the path of investment is:

\[ \dot{k}(t) = k(0) \left[ A - \frac{\rho}{1 + \beta} \right] e^{\left[ A - \frac{\rho}{1 + \beta} \right] t}. \]  

(3.18)

Hence, \( \frac{d\dot{k}(t)}{d\beta} \) is positive and the rate of investment is accelerating:

\[ \frac{d\dot{k}(t)}{dt} = k(0) \left[ A - \frac{\rho}{1 + \beta} \right]^2 e^{\left[ A - \frac{\rho}{1 + \beta} \right] t} > 0. \]  

(3.18)

Fourth, the capitalist spirit depresses initial consumption while stimulating initial investment. That is to say, a country with a strong capitalist spirit will consume little and invest a lot at the initial stage of economic growth. To show this result, it is noted that from (3.17) the initial investment is:

\[ \dot{k}(0) = k(0) \left[ A - \frac{\rho}{1 + \beta} \right], \]  

(3.19)

which is increasing with the capitalist spirit \( \beta \). For the initial consumption, the equilibrium condition for output yields:

\[ c(0) + \dot{k}(0) = f(k(0)) = Ak(0), \]
or

\[
  c(0) = \frac{k(0)\rho}{1+\beta}.
\]

That is to say,

\[
  \frac{dc(0)}{d\beta} = -k(0)\frac{\rho}{(1+\beta)^2} < 0.
\]

But fifth the capitalist spirit in the long-run raises consumption. To show this point, I have:

\[
  c(t) = \frac{k(0)\rho}{1+\beta} e^{\left[\frac{\lambda - \rho}{1+\beta}\right]t},
\]

and

\[
  \frac{dc(t)}{d\beta} = k(0)\rho \frac{e^{\left[\frac{\lambda - \rho}{1+\beta}\right]t}}{(1+\beta)^2} [\rho t - 1 - \beta].
\]

From (3.23), it is clear that \( dc(t)/d\beta \) is positive if \( \rho t \) is greater than \((1+\rho)\) and that is always true if \( t \) is sufficiently large. But during the time period when \((\rho t)\) is less than \((1+\rho)\), consumption is negatively related to the capitalist spirit \( \beta \). Therefore, there exists a short-run loss versus a long-run gain in consumption.

To complete the analysis, I need to check that the discounted utility in (3.2) is bounded. Substituting \( k(t) \) in (3.17) and \( c(t) \) in (3.22) into (3.2) yields:

\[
  \int_0^\infty (logc + \beta log k) e^{-\rho t} dt = \left[\frac{\gamma + \beta}{\rho}\right] + \frac{1}{\rho} \log \left[\frac{k(0)(1+\beta)}{1+\beta}\right],
\]

which is indeed bounded as required.

I also need to check the transversality condition,
\[
\lim_{t \to \infty} e^{-\rho t} \lambda k(t) = \lim_{t \to \infty} e^{-\rho t} \frac{k(t)}{c(t)} = \\
= \lim_{t \to \infty} e^{-\rho t} \frac{k(0)(1+\beta)e^{\left[\frac{A-\rho}{1+\rho}\right]t}}{k(0)\rho e^{\left[\frac{A-\rho}{1+\rho}\right]t}} = \\
= \lim_{t \to \infty} e^{-\rho t} \left[\frac{1+\beta}{\rho}\right] = 0,
\]

so the transversality condition is satisfied.

This theoretical model can also be empirically tested. In fact, this has been done in a remarkable short study by DeLong (1988). He finds that, contrary to the claim made by William Baumol (1986), that productivity levels among the once-rich twenty-two countries in 1870 did not converge in 1979. In fact, "holding constant 1870 per capita income, nations that had Protestant religious establishments in 1870 had 1979 per capita income more than one-third higher than do nations that had Catholic establishments." And he shows that "there is one striking ex-ante association between growth over 1870-1979 and an exogenous variable: a nation's dominant religious establishment." DeLong divides the once-rich twenty-two nations as follows. The nations with Protestant religious establishments in 1870 were Australia, Denmark, Finland, East Germany, the Netherlands, New Zealand, Norway, Sweden, United Kingdom, and the United States; the nations with mixed religious establishments in 1870 were Belgium, Canada, France, West Germany, and Switzerland; and the nations with solid Catholic religious establishments in 1870 were Argentina, Austria, Chile, Ireland, Italy, Portugal and Spain. Then in his regression analysis, a religious establishment variable that is one for Protestant, one-half for mixed, and
zero for Catholic nations is significantly correlated with growth as long as measurement error variance is not too high.

DeLong admits that, even though his regression equation is difficult to interpret, “it does serve as an example of how culture may be associated with substantial divergence in growth performance”. Since DeLong’s regression analysis with the religious dummy variable is so rare and exceptional in the empirical studies on economic growth by professional economists, I cite his explanation for the positive link between the Protestant religious establishments and a higher per capita GDP growth here: “The disapproval of self-interested profit seeking by radical Protestantism went hand in hand with seventeenth century economic development. And by 1800 profit seeking and accumulation for accumulation’s sake has become morally praiseworthy activities in many nations with Protestant religious establishments. How was the original Protestant disapproval for the market transformed? Accounting for the evolution of the economic ethic of the Protestant West from Jean Calvin to Cotton Mather to Benjamin Franklin to Andrew Carnegie is a deep puzzle in economic history. The best analysis may still be the psychological account given by Max Weber” (pp. 1146-47, emphasis added).

DeLong’s regression analysis can be easily interpreted as an empirical implementation of the capitalist-spirit model. Recall the endogenous growth rate derived for the special case is:

$$\gamma = A - \frac{\rho}{1 + \beta}.$$  

If religious establishments are an approximation to the capitalist spirit, it is justified to set $\beta = 1$ for the Protestants, $\beta = 1/2$ for the mixed, and $\beta = 0$ for the Catholics. Then the theoretical conclusions of a positive correlation between the long-run growth rate and the capitalist spirit can be shown empirically.
Chapter IV

Taxes, Government Spending and Growth

In this chapter, I present some detailed policy analysis in this capitalist-spirit model of growth and compare the results to the ones from the standard optimal growth model in Ramsey (1928), Koopmans (1963) and Cass (1965). It is well-known that long-run capital accumulation in the Ramsey-Koopmans-Cass model is determined by the famous modified golden rule. Without changing the time preference, the population growth rate and other exogenous factors, government spending and consumption tax have no effect on long-run capital accumulation, and they only crowd out equilibrium consumption. In the capitalist-spirit model, I will show that, in the long run, a consumption tax stimulates capital accumulation, and government spending reduces the equilibrium capital stock.

In addition to long-run equilibrium analysis, I utilize a technique developed by Kenneth Judd (1982, 1985, 1987) to analyze the short-run effects of fiscal policies in the capitalist-spirit model. I find that: (1) a future rise in government spending stimulates current private investment; (2) a future increase in the consumption tax raises current private investment; (3) a change in the future output tax has an ambiguous effect on current investment; (4) all current increases in government taxes and government spending reduce current private investment.

IV.1. Long-Run Policy Analysis

In this section, we are going to see some significant differences in their long-run policy implications between the capitalist-spirit model and the Ramsey-Koopmans-Cass growth model. The policy parameters analyzed here are: an output tax \( \tau_o \), a consumption tax \( \tau_c \), and government spending \( g \). I also assume that all policy changes in this subsection are permanent; I will deal with temporary policy changes in the next
section. When these policy instruments are introduced into the model, the optimization program becomes:

$$\text{Max } \int [u(c) + \beta v(b)] e^{-\rho t} dt, \quad t \in T$$

s.t.

$$k = (1 - \tau_c) f(k) - (1 + \tau_g) c - g.$$  

Then, the basic motion equations describing the optimal path are modified to be:

$$\dot{c} = \frac{1}{-u''(c)} \left[ (1 + \tau_c) \beta v'(k) + u'(c)((1 - \tau_g)f'(k) - \rho) \right]$$  \hspace{1cm} (4.1)$$

$$\dot{k} = (1 - \tau_g) f(k) - (1 + \tau_c) c - g.$$  \hspace{1cm} (4.2)$$

The following long-run policy analysis will be made by focusing on the saddle-point equilibria.

If there are multiple equilibria in this system, I denote one pair of the steady-state values of consumption and capital as \((\bar{c}, \bar{k})\) and linearize the steady-state equations of (4.1) and (4.2) around \((\bar{c}, \bar{k})\):

$$\begin{bmatrix} \rho - (1 - \tau_g) f'({\bar{k}}) & -\frac{(1 + \tau_c) \beta v''({\bar{k}}) + (1 - \tau_g) u'(\bar{c}) f''({\bar{k}})}{u''(\bar{c})} \\ -(1 + \tau_c) & (1 - \tau_g) f'({\bar{k}}) \end{bmatrix} \begin{bmatrix} dc \\ dk \end{bmatrix} = \begin{bmatrix} \beta v'({\bar{k}}) \frac{d\tau_c}{u''(\bar{c})} - \frac{u'(\bar{c}) f'({\bar{k}})}{u''(\bar{c})} \frac{d\tau_g}{d\gamma} \\ \bar{c} d\tau_c + f({\bar{k}}) d\tau_g \end{bmatrix}.$$  \hspace{1cm} (4.3)$$

Denote the 2x2 matrix in equation (4.3) as \(M'\) and the the determinant of \(M'\) as \(\Delta'\). Then \(\Delta'\) is negative at \((\bar{c}, \bar{k})\) by the property of a saddle-point equilibrium.
It has become well known that the steady-state capital stock in the Ramsey-Koopmans-Cass model is uniquely determined by the modified golden rule: \( f'(k^{*4}) = \rho \). In this simplest form it tells us that the consumption tax \( \tau_c \) and government spending \( g \), if introduced to the Ramsey-Koopmans-Cass model as in equation (4.2), cannot affect the long-run capital accumulation \( k^{*4} \). Their long-run effects only appear to crowd out private consumption. But, in this aspect, the capitalist-spirit model stands in sharp contrast to the Ramsey-koopmans-Cass model:

**Proposition 4.1:** Government spending crowds out both long-run private consumption and long-run capital stock.

This proposition is much closer to the policy discussions in the real life when people talk about how government spending crowds out private investment and capital formation. From the perspective of the Ramsey-Koopmans-Cass model, these kinds of policy discussions do not hold tight because government spending does not crowd out the equilibrium capital accumulation. Here the capitalist spirit model provides a firm foundation for the policy debate on the effect of government spending on capital formation. To show proposition 4.1, I apply Cramer's rule in equation (4.3):

\[
\frac{dc}{dg} = \frac{(1+\tau_c)\beta^{u''(\bar{k})} + (1-\tau_c)u'(\bar{c})f''(\bar{k})}{\Delta'u''(\bar{c})} < 0. \quad (4.4)
\]

\[
\frac{dk}{dg} = \frac{[\rho -(1-\tau_c)f'(\bar{k})]}{\Delta'} < 0. \quad (4.5)
\]

The reason for proposition 4.1 is the following: as an increase in government spending reduces the representative agent's income, the representative agent responds to the increase in the very short run by cutting his consumption. Since the capital stock is fixed in the short run, the marginal utility of the reduced consumption \( u'(c) \) (here \( c \) is less than the initial steady-state consumption \( \bar{c} \)) as a result of an
increase in \( g \) weighted by \((1 - \tau_c)(\rho - f'(k))\) will be higher than the marginal utility of the capital stock \( \beta v'(k) \) weighted by the constant \((1 + \tau_c)\). So the equilibrium condition,

\[
(1 - \tau_c)(\rho - f'(k))u'(c) = \beta v'(k)(1 + \tau_c),
\]
can no longer be maintained. The representative agent will react to lower his investment in the short run until eventually the capital stock is reduced and the above equilibrium condition is restored when both \( c \) and \( k \) are smaller than the initial equilibrium values \((\bar{c}, \bar{k})\).

Turning to a consumption tax \( \tau_c \), I find another significant difference between the capitalist-spirit model and the Ramsey-Koopmans-Cass model:

**Proposition 4.2:** In the long run, a consumption tax has an ambiguous effect on consumption but it always increases capital accumulation.

Unlike in the Ramsey-Cass-Koopmans model where a consumption tax has no effect on capital accumulation and it only reduces consumption, the capitalist-spirit model gives rise to a positive connection between the consumption tax and capital accumulation. The ambiguous effect of a consumption tax on consumption is also very interesting. To show this proposition, I simply apply Cramer’s rule again in equation (4.3):

\[
\frac{dc}{d\tau_c} = \frac{\beta v'(k)(1 - \tau_c)f'(k) + \bar{c}(1 + \tau_c)\beta v''(k) + \bar{c}(1 - \tau_c)u''(c)f''(k)}{\Delta'u''(c)}, \tag{4.6}
\]

\[
\frac{dk}{d\tau_c} = \frac{[\rho - (1 - \tau_c)f'(k)]u''(c)\bar{c} + (1 + \tau_c)\beta v'(k)}{\Delta'u''(c)} > 0. \tag{4.7}
\]

The sign of \( dk/d\tau_c \) is always positive, but the sign \( dc/d\tau_c \) is ambiguous since the first term in the numerator of the right-hand side of equation (4.6) is positive while the second and the third terms are negative. We also note that \( \Delta' \) is negative, and \([\rho - (1 - \tau_c)f'(k)]\) is negative.
This proposition sounds strange especially when a consumption tax may lead to a higher consumption. I offer the following explanation: when a consumption tax at a higher rate is imposed on consumption, the representative agent will save more and invest more to increase his capital stock because the effective cost of consumption is now higher than before, and the capital stock is more attractive in generating utility. With more capital stock and with the assumption that the net marginal productivity of capital is always positive, the newly accumulated capital will produce more output for consumption and for investment. Of course when capital depreciation and population growth are introduced into the equation of capital accumulation, we have to assume that the gross marginal productivity of capital is greater than the rate of capital accumulation and the rate of population growth. This has often been done in recent endogenous-growth models such as Barro (1990), Rebelo (1991), Jones and Manuelli (1991), among many others. If the gross marginal productivity of capital is less than the sum of the depreciation rate and the population growth rate, then a consumption tax will always lead to more capital accumulation and possibly more consumption when the initial steady-state capital stock is more than the modified-golden-rule one (this is always true in the capitalist spirit model as in Chapter I) but less than the golden-rule one; see Phelps (1961).

As for the output tax, its effect on capital accumulation does not show qualitative difference in both the capitalist-spirit model and the Ramsey-Koopmans-Cass model. In both models, an output tax reduces the long-run capital stock. So I will not analyze it here in any detail. But this similarity should not obscure the significant differences between these two models in their effects of a consumption tax and government spending.

IV.2. Short-run policy analysis

To find out how short-run policy changes at the present time and in the future affect current consumption and investment, I follow the technique pioneered by Judd (1982, 1986, 1987). Assume that the economy
is initially, at time $t = 0$, in the equilibrium $(c, k)$ corresponding to the policy parameters $\tau_y$,
$\tau_c$ and $g$. Also at time $t = 0$, government policies change as follows:

$$\tau'_y = \tau_y + \epsilon h_{\tau y}(t),$$  \hspace{1cm} (4.8)

$$\tau'_c = \tau_c + \epsilon h_{\tau c}(t),$$ \hspace{1cm} (4.9)

$$g' = g + \epsilon g(t),$$ \hspace{1cm} (4.10)

where $\epsilon$ is a parameter. Functions $h_{\tau y}(t), h_{\tau c}(t)$ and $g(t)$ describe the intertemporal policy changes in a magnitude-free fashion since $\epsilon$ can represent different magnitudes of changes. For example, a change in the output tax during time $T_1 < t < T_2$ can be represented by setting $h_{\tau y}(t)$ to be one for $T_1 < t < T_2$ and zero otherwise.

Substituting $\tau'_y, \tau'_c$ and $g'$ for $\tau_y, \tau_c$ and $g$ in equations (4.1) and (4.2):

$$c = \frac{1}{-u''(c)}[(1 + \tau_c + \epsilon h_{\tau c}(t))\beta v'(k) + u'(c)((1 - \tau_y - \epsilon h_{\tau y}(t))\beta' - \rho)],$$ \hspace{1cm} (4.11)

$$k = (1 - \tau_y - \epsilon h_{\tau y}(t))f(k) - (1 + \tau_c + \epsilon h_{\tau c}(t))c - \frac{g}{\tau} - \epsilon g(t)$$ \hspace{1cm} (4.12)

The solutions for $k$ and $c$ depend on both $t$ and $\epsilon$. I write the solutions as $k(t, \epsilon)$ and $c(t, \epsilon)$. Since $\epsilon = 0$ implies that the system remains at the initial position, the effects of policy changes can be seen from the impact on the paths of $c$ and $k$ as $\epsilon$ shifts from zero to a small positive or negative value. Formally, I define the initial impacts of $\epsilon$ on $c$ and $k$ here:

$$c_\epsilon(t) = \frac{\partial c(t,0)}{\partial \epsilon} \hspace{1cm} k_\epsilon(t) = \frac{\partial k(t,0)}{\partial \epsilon}$$

$$c_\epsilon(t) = \frac{\partial}{\partial \epsilon} \left[ \frac{\partial c(t,0)}{\partial t} \right] \hspace{1cm} k_\epsilon(t) = \frac{\partial}{\partial \epsilon} \left[ \frac{\partial k(t,0)}{\partial t} \right]$$
Differentiating equations (4.11) and (4.12) with respect to $\epsilon$ while evaluated at $\epsilon = 0$ yields a pair of differential equations in the variables $c_\epsilon$ and $k_\epsilon$:

\[
\begin{bmatrix}
c'_\epsilon \\
k'_\epsilon
\end{bmatrix} = M' \cdot \begin{bmatrix}
c_\epsilon \\
k_\epsilon
\end{bmatrix} + \begin{bmatrix}
w'_1(t) \\
w'_2(t)
\end{bmatrix}
\]  

(4.13)

where $M'$ is the 2x2 Jacobian matrix in (4.3), and

\[
w_1(t) = \frac{1}{-u''(c)} \left[ h_{\alpha}(t) \beta v'(\bar{k}) - u'(c) h_{\gamma}(t) f'(\bar{k}) \right],
\]  

(4.14)

\[
w_2(t) = -h_{\gamma}(t) f(\bar{k}) - h_{\alpha}(t) \bar{c} - g(t).
\]  

(4.15)

As in Judd (1987), the Laplace transform can be used to solve equation (4.13). For sufficiently large positive $s$, the Laplace transform of a function $f(t)$ ($t > 0$) is another function $F(s)$, where

\[
F(s) = \int_0^\infty f(t)e^{-st}dt.
\]

Let $C_\epsilon(s)$, $K_\epsilon(s)$, $H_\beta(s)$, $H_\alpha(s)$, $G(s)$, $W_1(s)$ and $W_2(s)$ be the Laplace transforms of $c_\epsilon(t)$, $k_\epsilon(t)$, $h_\beta(t)$, $h_\alpha(t)$, $g(t)$, $w_1(t)$ and $w_2(t)$, respectively. Then

\[
\begin{bmatrix}
c_\epsilon \\
k_\epsilon
\end{bmatrix} = \left( s\Lambda - M'^{-1} \right) \begin{bmatrix}
w_1(s) + c_\epsilon(0) \\
w_2(s)
\end{bmatrix}
\]  

(4.16)

here $\Lambda$ is the identity matrix. Write out $(s\Lambda - M'^{-1})$ explicitly in (4.16):

\[
\left( s\Lambda - M'^{-1} \right) = \frac{1}{s - \omega}
\]

and $\mu$ is the positive characteristic root and $\omega$ is the negative characteristic root of $M'^{-1}$ (note that $\Delta'$ is negative for the saddle-point equilibrium).
\[ \mu = \frac{\rho + (1 - \tau_x)f'(\bar{k}) + \left[ \rho + (1 - \tau_x)f'(\bar{k}) \right]^2 - 4\Delta'}{2} > 0 \]

\[ \omega = \frac{\rho + (1 - \tau_x)f'(\bar{k}) - \left[ \rho + (1 - \tau_x)f'(\bar{k}) \right]^2 - 4\Delta'}{2} < 0; \]

and

\[ W_1(s) = \frac{1}{-u''(\bar{c})} [H_{x}(s)\beta v'(\bar{k}) - u'(\bar{c})H_{\tau}(s)f'(\bar{k})], \]

\[ W_2(s) = H_{\tau}(s)f(\bar{k}) - H_{x}(s)\bar{c} - G(s), \]

where \( H_{\tau}(s) = \int_{0}^{s} h_{\tau}(t)e^{-st}dt, H_{x}(s) = \int_{0}^{s} h_{x}(t)e^{-st}dt, \) and \( G(s) = \int_{0}^{s} g(t)e^{-st}dt. \)

Naturally these Laplace transforms can be regarded as the present values of different policy changes discounted at the rate \( s > 0. \)

In (4.16), \( c_e(0) \) is the initial jump in consumption immediately following policy changes. As usual in dynamic analysis, this jump is necessary to assure the convergence of the variables along the perfect-foresight path. To determine \( c_e(0), \) it is noted that the existence of a saddle-point equilibrium in the capitalist-spirit model implies a bounded, steady-state capital stock for any \( \epsilon. \) Therefore, \( K_e(0) \) must be finite for all \( s > 0, \) even for \( s = \mu \) (the positive characteristic root of the dynamic system). However, when \( s = \mu, \) the matrix \( (sA - M') \) is singular. To remove this singularity, implicitly, the numerator on the right hand side of (4.16) has to be zero [see the appendix in Judd (1987) for technical details]. That is to say,

\[ (W_1(\mu) + c_e(0))\left[ \mu - (1 - \tau_x)f'(\bar{k}) \right] - W_2(\mu)\frac{(1 + \tau_x)\beta v''(\bar{k}) + (1 - \tau_x)u'(\bar{c})f''(\bar{k})}{u''(\bar{c})} = 0, \]

or,

\[ c_e(0) = -\frac{W_1(\mu) + W_2(\mu)\frac{(1 + \tau_x)\beta v''(\bar{k}) + (1 - \tau_x)u'(\bar{c})f''(\bar{k})}{u''(\bar{c})[\mu - (1 - \tau_x)f'(\bar{k})]} \quad (4.17) \]

and
\[ W_1(\mu) = \frac{1}{-u''(\tilde{c})} [H_{D}(\mu) \beta v'(\tilde{k}) - u'(\tilde{c}) H_{Q}(\mu) f'(\tilde{k})], \]

\[ W_2(\mu) = -H_{D}(\mu) f(\tilde{k}) - H_{C}(\mu) c - G(\mu). \]

To see how these policy changes affect current investment, I substitute (4.17) into (4.13) and set \( t = 0 \) (also note that \( k_c(0) \) is zero because the initial capital stock is given and cannot jump):

\[ k_c(0) = -(1+\tau_c) c(0) - h_{xy}(0) f(\tilde{k}) - h_{xc}(0) \tilde{c} - g(0) \]  \hspace{1cm} (4.18)

where \( c(0) \) is given in (4.17).

Combining (4.17) and (4.18), I have:

**Proposition 4.3:** A future increase in government spending represented by \( G(\mu) \) stimulates current private investment.

The economic intuition for this proposition is the following. Anticipating a rise in the future government spending, the representative agent will expect a lower income in the future because government spending acts like a lump-sum tax in this model. Therefore, current consumption will be reduced in response to a lower future income and as a measure to smooth consumption over time. This reduced consumption is given by

\[ \frac{dc_c(0)}{dG(\mu)} \frac{(1+\tau_c) \beta v''(\tilde{k}) + (1-\tau_c) u'(\tilde{c}) f''(\tilde{k})}{u''(\tilde{c}) [\mu - (1-\tau_c) f'(\tilde{k})]} < 0. \]

Since current income is not changed, the reduction in current consumption is saved for current investment. In fact, from (4.18), current investment will increase by the amount of reduced consumption plus the savings in the consumption tax:

\[ \frac{dk_c(0)}{dG(\mu)} = -(1+\tau_c) \frac{dc_c(0)}{dG(\mu)} > 0. \]
Therefore, comparing to proposition 4.1 the short-run effect of a future increase in government spending on capital accumulation is just the opposite of the long-run effect of a permanent increase in government spending.

Proposition 4.4: A future increase in the consumption tax represented by \( \mathcal{H}_c(\mu) \) will encourage current private investment.

I can offer a similar explanation for this proposition as the one for proposition 4.3 above. With a future rise in the consumption tax, the representative agent will become poorer in terms of actual consumption. He responds today by reducing some consumption and saving more for the future. This consumption smoothness over time leads to a reduction in current consumption:

\[
\frac{dc_e(0)}{dH_{tc}(\mu)} = \frac{\beta v'(\bar{C})}{u''(\bar{C})} - \frac{(1+\tau_c)\beta v''(\bar{C}) + (1+\tau_c)u'(\bar{C})f''(\bar{K})}{u''(\bar{C})[\mu - (1-\tau_c)f'(\bar{K})]} - \frac{c}{0}.
\]

Again, since the savings as a result of a reduced consumption are not subject to a consumption tax, the actual savings and investment will increase by, from (4.18), \((1 + \tau_c)\) times of the reduced consumption:

\[
\frac{dk_e(0)}{dH_{tc}(\mu)} = -(1 + \tau_c) \frac{dc_e(0)}{dH_{tc}(\mu)} > 0.
\]

Thus, combining this proposition with proposition 4.2, I have found that a future consumption tax works in the same direction as a permanent rise of consumption tax in favoring investment.

Proposition 4.5: A future rise in the output tax represented by \( \mathcal{H}_o(\mu) \) has an ambiguous effect on current investment.
From (4.18),

\[
\frac{dk_{\varepsilon}(0)}{dH_{\tau\gamma}(\mu)} = \begin{bmatrix} -u'(\bar{c}) \\ u''(\bar{c}) \end{bmatrix} \cdot \frac{(1 + \tau_\gamma)\beta v''(\bar{k}) + (1 - \tau_\gamma)u'(\bar{c})f''(\bar{k})}{u''(\bar{c})[\mu - (1 - \tau_\gamma)f'(\bar{k})]} f(\bar{k}).
\]

The first term on the right hand side is positive while the second term is negative; the net effect is ambiguous. This is because a higher future output tax directly reduces the incentive to save (invest) more and produce more. On the other hand, the reduced income in the future will force the representative agent to save more today to compensate a future loss in his income. This works as a counter force to the direct disincentive of an output tax on savings.

**Proposition 4.6:** All current increases in government taxes and spending reduce current investment.

This can be seen from (4.18) that an increase in current output tax represented by \( h_\gamma(0) \) reduces current investment by \( f(\bar{k}) \):

\[
\frac{dk_{\varepsilon}(0)}{dh_{\gamma}(0)} = -f(\bar{k}) < 0;
\]

similarly, the negative effect of a current rise in consumption tax on current investment is given by:

\[
\frac{dk_{\varepsilon}(0)}{dh_{\tau\gamma}(0)} = -\bar{c} < 0;
\]

finally, an increase in current government spending reduced current investment dollar by dollar:
\[
\frac{dk_g(0)}{dg(0)} = -1.
\]

The economic explanation for this proposition can be stated as follows. A current, momentary increase in government taxes and government spending, with future government taxes and spending held constant, will have no effect on current consumption because the representative agent endeavors to have a steady state level of consumption [see Judd (1985) for a similar explanation for the effect of a current increase in government spending on current consumption and current investment]. This is why all current taxes and current government spending have not appeared as the determinants of current consumption in equation (4.17).

These propositions indicate that the timing of taxes and government spending has significant impact on the short-run investment. While a future increase in both consumption tax and government spending stimulates current investment, a current increase in consumption tax and government spending discourages current investment. Therefore, as a corollary to these propositions, an increase in consumption tax and government spending both today and in the future will have an ambiguous effect on the short-run investment. Similar result also holds for a rise in output tax both today and in the future. To stimulate current investment, the government can either announce a future increase in the consumption tax and government spending or cut all current taxes and government spending.

IV.3. Conclusion

This chapter served two purposes. First, it makes two striking comparisons between the effects of a consumption tax and government spending on long-run capital accumulation. In the Ramsey-Koopmans-Cass model, these policy changes have no effect on the equilibrium capital stock; in
the capitalist-spirit model, a permanent increase in consumption tax raises the equilibrium capital stock while a permanent increase in government spending reduces the equilibrium capital stock.

Second, this chapter has derived many interesting results regarding the effects of various policy changes on short-run investment. In particular, it is shown that a future increase in consumption tax and government spending stimulates current investment but a current rise in consumption tax, output tax and government spending discourages the short-run investment.
THE SPIRIT OF CAPITALISM, SAVINGS, ASSET PRICES AND GROWTH

Chapter V

Money, Inflation and Growth

Since Tobin (1965) demonstrated the positive effect of inflation on capital accumulation as a result of portfolio shift from non-interest-bearing money to capital stock, many plausible models based on explicit optimization over an infinite horizon have been produced. The most famous infinite-horizon model is due to Sidrauskis (1967a). He shows that if the representative agent maximizes an additive discounted lifetime utility defined on consumption and real balances, and if the marginal product of capital depends only on the capital-labor ratio, then long-run capital accumulation is independent of money growth or inflation. In particular, when the preference is separable in consumption and real balances, capital accumulation is not affected by inflation even in the short run.

A few infinite-horizon extensions of the Sidrauskis model have appeared since the 1960s; see a most recent survey by Orphanides and Solow (1990). One approach is to introduce real balances into the production function while retaining the Sidrauskis utility function. If the production function is concave in capital and real balances, and if the cross partial derivative is positive, then inflation reduces long-run capital accumulation. Another approach taken by Brock (1974) is to include leisure into the Sidrauskis utility function. In this case, money is no longer supernormal but the direction of the effect on capital becomes ambiguous. In a cash-in-advance model of economic growth, Stockman (1981) has shown that (1) if only consumption is subject to the liquidity constraint or the finance constraint, capital accumulation is independent of inflation as in the Sidrauskis model; but (2) if both consumption and investment are subject to the liquidity constraint, inflation reduces capital accumulation. Therefore, all these infinite-horizon models have either overturned the Tobin portfolio-shift effect or obtained some ambiguous results regarding the Tobin effect.
This chapter considers a capitalist-spirit model of growth with capital accumulation and money over an infinite horizon. In its mathematical form, it is a hybrid model of Sidrauskis (1967a) and Kurz (1968): the representative agent’s utility function is defined on consumption, real balances and wealth. In this capitalist-spirit model, there exists unambiguously the Tobin portfolio-shift effect. Specifically, in section V.1 of this chapter, I demonstrate that, for a perfect-foresight equilibrium and even with a separable utility function of consumption and real balances, a higher inflation leads to a higher capital stock in the long run. Thus, the capitalist-spirit model renders support for the descriptive Tobin model. In addition, as in the real-sector Kurz (1968) model, multiple equilibria often appear in this monetary model. That is to say, depending on the initial conditions, different economies can have very different equilibria. Therefore, the convergence theorem derived from the standard Cass (1965) model does not hold in the monetary model either.

Another contribution of this approach is to deal with, in section V.2, the effect of inflation on the endogenous rate of growth. With a simple, separable utility function and with the same assumption about the production function as in Rebelo (1987) and Barro (1990), it is shown that inflation increases the balanced rate of growth. Of course, if the capitalist spirit is absent in the model, the balanced rate of growth is independent of the growth rate of money.

V.1. The Model and Long-Run Analysis

It is easy to extend the Kurz model into a monetary economy by combining it with the Sidrauskis (1967a) model: a representative agent maximizes an additive utility function over an infinite horizon:\(^4\):

\[
\int_0^\infty (U(c,m) + \beta v(a))e^{-\rho t}dt,
\]

\( (5.1) \)

\(^4\) I need to point out that all results obtained in this chapter also apply to the alternative definition of the utility function \(U(c,m) + \beta v(k)\) instead of \(U(c,m) + \beta v(a)\).
where \( m \) is real balances and \( U(c,m) \) is the utility function with liquidity services in the Sidrauski model and \( a \) is the total wealth, namely, the sum of capital and real balances:

\[
a = k + m, \tag{5.2}
\]

and \( \beta v(a) \) is the utility directly from wealth accumulation.

The new dynamic constraint is given by:

\[
a = f(k) + x - c - \pi m - g, \tag{5.3}
\]

where \( x \) is the lump-sum transfer from the government, \( \pi \) is the expected inflation rate, and \( g \) is government spending. It is noted that:

\[
a = k + m. \tag{5.4}
\]

Let \( \lambda_c \) be the costate variable associated with the budget constraint (5.3) and \( \lambda_m \) the costate variable associated with the wealth definition (5.2). The Hamiltonian is given as follows,

\[
H = (U(c,m) + \beta v(a) + \lambda_c [f(k) + x - c - \pi m - g] + \lambda_m (a - k - m))e^{-\pi}. \tag{5.5}
\]

It is well-know that in the Sidrauski model, a separable utility function in consumption and real balances results in not only long-run, but also short-run superneutrality. To show the significant difference between our capitalist-spirit model and the Sidrauski model, I assume that \( U(c,m) \) is separable in \( c \) and \( m \) in this chapter:

\[
U(c,m) = u(c) + l(m). \tag{5.6}
\]

The conditions necessary for a maximum are

\[
u'(c) = \lambda_c, \tag{5.7}
\]

\[
l'(m) = u'(c)(f'(k) + \pi), \tag{5.8}
\]

\[
\beta v'(a) + u'(c)(f'(k) - \rho) = -u''(c)c \tag{5.9}
\]
\[
\lim_{t \to \infty} a \lambda_t e^{-\rho t} = 0, \quad (5.10)
\]

plus the dynamic budget constraint:
\[
k + m = f(k) + x - c - \pi m - g. \quad (5.3')
\]

By definition,
\[
m = (\theta - \pi) m^*, \quad (5.11)
\]

where \( \theta \) is the constant rate of money growth, and \( p \) is the price level. On the perfect-foresight path, the expected inflation rate is equal to the actual one:
\[
\frac{\dot{p}}{p} = \pi. \quad (5.12)
\]

We also note that government transfer, \( x \), is equal to the net increase in money supply:
\[
x = \theta m. \quad (5.13)
\]

Substituting (5.11), (5.12) and (5.13) into conditions (5.8) and (5.3'), and re-writing condition (7.9), we have:
\[
c = \frac{\beta v'(a) + u'(c)(f'(k) - p)}{-u''(c)}, \quad (5.9)
\]
\[
m = \left(f'(k) + \theta - \frac{1'(m)}{u'(c)}\right) m^*, \quad (5.14)
\]
\[
k = f(k) - c - g. \quad (5.15)
\]

In the steady state \( c = k = m = 0 \):
\[ (5.9') \]
\[ \beta v'(a^*) + u'(c^*)(f'(k^* - \rho) = 0, \]
\[ (5.14') \]
\[ f'(k^*) + \theta - \frac{1}{u'(c^*)} \frac{1'(m^*)}{u'(c^*)} = 0, \]
\[ (5.15') \]
\[ f(k^*) - c^* - g^* = 0. \]

Two points about the steady state equation (5.9') are worth commenting here. First, as \( \beta v'(a^*) \) is positive, \((f'(k) - \rho)\) has to be negative in the steady state, namely, the steady state capital is larger than the modified-golden-rule level of capital. Second, if \( \beta \) is zero in (5.9'), we are back to the Sidrauski model, and capital accumulation is independent of monetary growth in both short run and long run; for \( \beta \) is positive in our model, capital accumulation will in general depend on inflation.

As in the real-sector Kurz (1968) model, there often exist multiple equilibria in this monetary model. That is to say, depending on the initial conditions, different economies can have very different long-run steady states. Thus the convergence theorem in the standard neoclassical growth model such as in Case (1968) does not hold in this monetary growth model with the capitalist spirit. But in this chapter, I will focus on an equilibrium with only one negative characteristic root; or stated differently, I will focus on a perfect-foresight equilibrium. Linearizing (5.9), (5.14) and (5.15) around \( k^* \), \( c^* \), and \( m^* \), I have:

\[
\begin{bmatrix}
    c & -f'(k^*) - \rho & \beta v''(a^*) & \beta v''(a^*) + u'(c^*) f''(k^*) \\
    m & 1'(m^*) u''(c^*) m^* & 1''(m^*) m^* & f''(k^*) m^* \\
    k & -1 & 0 & f'(k^*)
\end{bmatrix}
\begin{bmatrix}
    c - c^* \\
    m - m^* \\
    k - k^*
\end{bmatrix}
\]

(5.16)

Call the 3x3 matrix in (5.16) as \( T \). The trace of matrix \( T \) is positive:
The trace of \( T = \rho - \frac{1}{u'(c^*)} \frac{m^*}{u'(c^*)} > 0. \)

Since the trace is the sum of the three characteristic roots of the dynamic system, a positive trace implies that at least one characteristic root is positive. The determinant of the matrix \( T \), which I denote as \( \Delta_T \), does not possess a definite sign,

\[
\Delta_T = (f'(k^*) - \rho) i'(k^*) \frac{1}{u'(c^*)} + f''(k) \frac{\beta v''(a^*) m^*}{u''(c^*)} + \\
+ \frac{\beta v''(a^*) + u'(c^*) f''(k^*)}{u''(c^*)} \frac{1}{u'(c^*)} \frac{1}{u''(c^*)} \frac{\beta v''(a^*)}{u''(c^*)} \frac{1}{u'(c^*)} \frac{m^*}{u''(c^*)} \frac{f'(k^*)}{u'(c^*)},
\]

(5.17)

where the second, the third and the fourth terms on the right-hand side of (5.17) are always negative, but the first term is positive.

As noted by Brock (1974), Calvo (1979) and Fischer (1979), a unique perfect foresight path is crucial for the assumption of rational expectation in a monetary economy. In this model, this assumption amounts to a negative \( \Delta_T \), to see this point, we know that a negative \( \Delta_T \) implies that there are either three negative roots or one. Since the trace of matrix \( T \) is positive as shown above, at least one of the roots is positive. Therefore the dynamic systems have one negative root and two positive roots. Since we have one state variable and two jumping variables in the model, there exits a unique perfect-foresight path converging to the steady state.

**Proposition 5.1:** Along the unique perfect-foresight path, a higher growth rate of money leads to more capital accumulation in the steady state.

Totally differentiating equations (5.9), (5.14) and (5.15) yields:
\[
\begin{bmatrix}
    \frac{dc}{d\theta} \\
    \frac{dm}{d\theta} \\
    \frac{dk}{d\theta}
\end{bmatrix} = \begin{bmatrix}
    \frac{v'(a^*)}{u''(c^*)} d\beta \\
    -m^* d\theta \\
    d\theta
\end{bmatrix}.
\]

By Cramer's rule, (and note that the determinant of \( T, \Delta_T \), is negative)

\[
\frac{dk}{d\theta} = \frac{-Bv''(a^*)m^*}{\Delta_T u''(c^*)} > 0.
\]  

(5.19)

I can offer some intuitions for this result. As the growth rate of money rises, inflation goes up and the cost of money holdings increases. In terms of the utility from wealth accumulation, it is relatively cheaper to save more in the form of capital accumulation than as real balance holdings. Thus the representative agent reduces his money stock. This is similar to the explanation of the Tobin portfolio-shift effect in an ad hoc monetary growth model [see Tobin (1965), also Sidrauski (1967b)]. Of course, the result here is derived from an infinite-horizon model with the optimal choice of the representative agent instead of with some ad hoc money-demand and asset-accumulation equations.

Consumption also increases as a result of a higher inflation:

\[
\frac{dc}{d\theta} = f'(k^*) \frac{dk}{d\theta} > 0.
\]  

(5.20)

This is true because inflation leads to more capital accumulation, which in turn yields more output for consumption. The effect of inflation on money demand is not clear-cut. To see this, I use Cramer's rule in the linear system (5.18),

\[
\frac{dm}{d\theta} = \frac{1}{\Delta_T} (f'(k^*) - \rho)m^* f'(k^*) + \frac{Bv''(a^*) + u'(c^*)f''(k^*)m^*}{\Delta_T u''(c^*)},
\]  

(5.21)
where the second term on the right-hand side of (5.2) is always negative, which represents the substitution effect of money demand, but the first term is positive, which represents the income effect of money demand since inflation leads to more capital accumulation, more output and more consumption.

**Proposition 5.2:** The stronger the spirit of capitalism, the higher the steady-state capital; the higher the government spending, the lower the steady-state consumption and real balances. The effect of government spending on the steady-state capital is ambiguous.

Recall that, in the model, parameter $\beta$ measures the intensity of the capitalist spirit. From (5.18), it is easy to show the positive effect of the capitalist spirit on long-run capital accumulation:

$$\frac{dk}{d\beta} = \frac{-1''(m^*)m^*v'(a^*)}{\Delta_Tu''(c^*)u''(c^*)} > 0. \quad (5.22)$$

I have already discussed both theoretical and empirical implications of the capitalist spirit for economic growth over time and across countries in the real-sector model. Here I just want to emphasize that this result holds for a real economy as well as a monetary economy.

As for the effect of government spending on the various variables in the model, I can show that, again from (5.18),

$$\frac{dk}{dg} = \frac{(f'(k^*)-\rho)f''(m^*)m^*}{\Delta_Tu''(c^*)} + \frac{\beta v''(a^*)1'(m^*)m^*u''(c^*)}{\Delta_Tu''(c^*)u''(c^*)^2} \geq 0? \quad (5.23)$$

$$\frac{dm}{dg} = \frac{-1'(m^*)u''(c^*)m^*\beta v''(a^*)u'(c^*)f''(k^*)}{\Delta_Tu''(c^*)u'(c^*)^2} + \frac{1}{\Delta_T}(f'(k^*)-\rho)f''(k^*)m^* < 0, \quad (5.24)$$

$$\frac{dc}{dg} = \frac{-\beta v''(a^*)f''(k^*)m^*}{u''(c^*)} + \frac{[\beta v''(a^*)u'(c^*)f''(k^*)]1'(m^*)m^*}{u'(c^*)u''(c^*)} \frac{1}{\Delta_T} < 0. \quad (5.25)$$
Therefore, an increase in government spending crowds out both private consumption and real balance holdings. To see the effect of government spending on capital accumulation, I have to look at the magnitude of its effect on consumption. From equation (5.25), the two terms in the parentheses are the two of the three negative terms in $\Delta_r$. But $\Delta_r$ also has one positive term. Hence we do not know whether these two negative terms in (5.25) are larger than or smaller than $\Delta_r$ (note that $\Delta_r$ is also negative by assumption). Differentiate equilibrium condition (5.15) with respect to $g$,

$$
\frac{dk}{dg} = \left(1 + \frac{dc}{dg}\right) \frac{1}{f'(k^*)}.
$$

(\text{dk/dg}) \text{ will be positive if (dc/dg) is larger than minus one and negative if (dc/dg) is smaller than minus one. That is to say, if government spending crowds private consumption more than one by one, then government spending can increase long-run capital accumulation. This result is also interesting compared to the Sidrauski (1967b) model, where government spending fully crowds out private consumption and exerts no effect on capital accumulation in the steady state.}

\textbf{V.2. Inflation and Endogenous Growth}

Even though recent studies on endogenous growth have reformulated many growth models, e.g., Romer’s (1986) and Lucas’ (1988) revisions of the traditional Solow model, Barro’s (1988) extension of the new model into government spending, and Rebelo’s (1987) study of multi-sector and cash-in-advance models, the Sidrauski (money-in-utility) model has received little attention as far as I know. This is not strange as I will show that in the Sidrauski model the balanced rate of growth is independent of the rate of monetary growth.

To derive an explicit solution to the endogenous growth rate, I again follow Rebelo (1987) and Barro (1990) and use a linear production function defined on the stock of capital:
\[ f(k) = Ak, \]  
(5.27)

where \( A > 0 \) is the constant net marginal product of capital.

The utility function is assumed to be of the simple form:

\[ u(c) = \log c, \quad l(m) = \log m, \quad \beta v(a) = \beta \log a. \]  
(5.28)

The motion equation for asset accumulation is modified to be:

\[ a = Ak + x_c - \pi m, \]  
(5.29)

\[ a = k + m. \]  
(5.30)

The representative agent maximizes a discounted logarithm utility function defined in (5.28) subject to constraints (5.29) and (5.30). The optimal conditions are (\( \lambda \) is the costate variable):

\[ \lambda = \frac{1}{c}, \]  
(5.31)

\[ \lambda (A + \pi) = \frac{1}{m}, \]  
(5.32)

\[ \frac{\beta}{k + m} + \lambda (A - \rho) = -\dot{\lambda}, \]  
(5.33)

\[ Ak + x_c - \pi m = k + m. \]  
(5.34)

Again, by definition,

\[ \dot{m} = (\theta - \rho)m. \]  
(5.11)

On the perfect-foresight path, the expected inflation rate equals the actual one:
\[ \frac{p}{\pi} = - \frac{\pi}{p} \]  

(5.12)

In addition, government transfer, \( x \), is just the revenue from inflation in the model without any other taxes:

\[ x = \theta m. \]  

(5.13)

Substituting (5.11) (5.12) and (5.13) into (5.32), (5.33) and (5.34), I obtain:

\[ \lambda = \frac{1}{c}, \]  

(5.31)

\[ \frac{m}{c} = \frac{1}{[A + \theta - m/m]}, \]  

(5.35)

\[ \frac{m + k}{c} = \frac{\beta}{[p - A - \lambda/\lambda]}, \]  

(5.36)

\[ k = A k - c. \]  

(5.37)

In the rest of this section, I focus on a particular solution to the dynamic system: the balanced growth path. Along this path, all real variables grow at a constant rate. Let \( \gamma \) be the growth rate of consumption, \( \gamma = c/c = \lambda/\lambda \). Differentiate (5.35) on both sides with respect to time and note that \( m/m \) is a constant:

\[ \frac{m}{c} = \frac{c}{m} = \gamma. \]
Similarly from (5.37),

\[
\frac{k}{c} = \frac{1}{\gamma}. 
\]

Therefore, on the balanced growth path, consumption, real balances and capital stock all grow at the same rate, \(\gamma\).

Next I want to solve the balanced growth rate, \(\gamma\), in terms of the technology, the parameters of the preference, and the money growth rate. In (5.35), (5.36) and (5.37), substitute all the growth rates with the common variable \(\gamma\).

\[
\frac{m}{c} = \frac{1}{A+\theta-\gamma}, \tag{5.38}
\]

\[
\frac{k}{c} = \frac{1}{A-\gamma}, \tag{5.39}
\]

\[
\frac{m+k}{c} = \frac{\beta}{\rho-(A-\gamma)}. \tag{5.40}
\]

Equation (5.38) plus (5.39) equals (5.40),

\[
\frac{1}{A+\theta-\gamma} + \frac{1}{A-\gamma} = \frac{\beta}{\rho-(A-\gamma)}. 
\]

Simple algebra leads to

\[
A-\gamma = \frac{-(\beta+1)\theta-2\rho \pm \sqrt{((\beta+1)\theta-2\rho)^2+4(2+\beta)\theta\rho}}{2(2+\beta)}. 
\]

From (5.39), \((A-\gamma)\) has to be positive. Thus, the endogenous growth rate is given by:

\[
\gamma = A + \frac{[(\beta+1)\theta-2\rho] - \sqrt{((\beta+1)\theta-2\rho)^2+4(2+\beta)\theta\rho}}{2(2+\beta)}. \tag{5.41}
\]
In passing it is noted that, if the capitalist spirit is not present in the model, in other words, if $\beta = 0$, the utility function is $(\log c + \log m)$ and the unique balanced growth rate is directly given by equations (5.31) and (5.33):

$$\gamma = A - \rho,$$

which is exactly the same as in the case of the real economy: the growth rate of the economy is independent of inflation. In this case, to generate positive growth, the net marginal product of capital has to be larger than the time discount rate. By the way, we cannot set $\beta = 0$ in (5.41) to get the balanced growth rate because (5.41) is derived with the assumption that $\beta > 0$.

In (5.41), I can show:

**Proposition 5.3**: The higher the monetary growth rate, the higher the endogenous growth rate.

Proof: Differentiate $\gamma$ with respect to $\theta$ in (5.41):

$$\frac{d\gamma}{d\theta} = \frac{1}{2(2+\beta)}(\beta+1) - \frac{[(\beta+1)\theta - 2\rho](\beta+1) + 2(2+\beta)\rho}{\sqrt{(\beta+1)\theta - 2\rho}^2 + 4(2+\beta)\theta\rho},$$

(5.42)

which is shown to be positive in the appendix of this chapter. The reason for this result is the following: with a higher rate of money supply and a higher inflation, the representative agent tends to substitute real balance holdings with capital. That will stimulate the rate of investment and capital accumulation, which in turn raises the balanced growth rate of the economy. In the end, as the balanced growth rate goes up, the rise in the growth rate of money does not bring about a full proportional rise in the inflation rate. To see this, just look at the following identity:

$$\frac{m}{m} = \theta - \pi$$

On the balanced growth path,

$$\gamma = \theta - \pi.$$
Differentiate this equation with respect to the growth rate of money:

\[
\frac{dx}{d\theta} = 1 - \frac{dy}{d\theta} < 1.
\]

Therefore, inflation falls short of the growth rate of money.

Proposition 5.3 is a very strong result. It says that inflation not only stimulates long-run capital accumulation, it also increases the long-run economic growth rate. In this sense, this result significantly extends the Tobin portfolio-shift effect in the context of endogenous growth.

It goes without saying that this positive connection between economic growth and inflation may not hold tight in empirical studies. On the contrary, empirical studies have often shown a negative correlation between growth and inflation especially for developing countries. These empirical results have refuted both the superneutrality in the Sidrauski model and the positive association between inflation and economic growth in the capitalist-spirit model. But this is not surprising at all. My theoretical model does not take all other costs of inflation into the consideration and it has only focused on the Tobin portfolio-shift effect from the perspective of the utility and liquidity services of real balances. This is exactly the point emphasized by Orphanides and Solow (1990):

"Inflation is bad, period. Whatever the function of money is, it becomes harder to satisfy in the presence of inflation, especially rapid inflation. This is an interesting prior since it is held by virtually every policy-maker. Furthermore, the reasons this view is held have nothing to do with money and growth literature. We know of no study of hyperinflations that mentions the Tobin effect! If the money and inflation literature is relevant, this must be where it fits in. (Of course, there never was any implication that the Tobin effect would outweigh the disorganizing consequences of very rapid inflation.)" (pp.225-226).

Proposition 5.4: The stronger the capitalist spirit, the higher the balanced growth rate.
Proof: In (5.41), differentiate $\gamma$ with respect to the capitalist spirit parameter $\beta$, and rearrange terms,

$$
\frac{d\gamma}{d\beta} = \frac{1}{2(2+\beta)^2} \left[ (\theta+2\rho) + \sqrt{((\beta+1)\theta-2\rho)^2+4(2+\beta)\theta\rho} - \frac{(2+\beta)(\beta+1)\theta^2}{\sqrt{((\beta+1)\theta-2\rho)^2+4(2+\beta)\theta\rho}} \right].
$$

(5.43)

which is shown to be positive in the appendix of this chapter. As in the case of proposition 5.2, proposition 5.4 illustrates another implication of the cultural-economic approach in examining capital accumulation and economic growth.

V.3. Conclusion

In an infinite-horizon model of economic growth with the capitalist spirit, I have demonstrated that the Tobin portfolio-shift effect holds unambiguously: in the long run, inflation stimulates capital accumulation and increases the endogenous growth rate. These results have overturned the superneutrality result in the Sidrauski model and the negative association between inflation and growth in the money-in-production model and the cash-in-advance model (Stockman, 1981). It also avoids the ambiguity in the leisure-in-utility model (Brock, 1974).

While the capitalist-spirit and social-status approach to study money and growth offers some interesting and perhaps surprising results, I want to re-emphasize that the theoretical conclusions from the model are at most one-sided because I have not consider other costs of inflation or other negative effects of inflation on growth as observed in so many empirical and theoretical studies. My results only highlight the existence of substitution between capital and real balances in the process of inflation as predicted by the Tobin model. It is due to this substitution effect that inflation tends to increase capital
accumulation and economic growth. But again "there never was any implication that the Tobin effect would outweigh the disorganizing consequences of very rapid inflation" (Orphanides and Solow, 1990).

V.4: Appendix

Here I prove Propositions 5.3 and 5.4.

For proposition 5.4, I only need to show that the terms in the parentheses of equation (5.42) is positive. Suppose not, then:

$$\frac{1}{\sqrt{(\beta +1)\theta -2\rho +2(2+\beta)\rho}} < \frac{1}{\sqrt{(\beta +1)\theta -2\rho +2(2+\beta)\rho}}.$$  \(\text{(A1)}\)

For \(\theta > 0\), the numerator on the right-hand side of (A1) is positive, so both sides are positive. Take square on both sides, and cross multiply:

$$\frac{(\beta +1)^2(1(\beta +1)\theta -2\rho)^2+4(2+\beta)\theta \rho} < \frac{(1(\beta +1)\theta -2\rho}(\beta +1)\rho)^2+2(2+\beta)\rho}.$$  \(\text{(A2)}\)

Expand the expression:

$$\frac{(\beta +1)^2(1(\beta +1)\theta -2\rho)^2+8(2+\beta)\theta \rho}{(\beta +1)^2(1(\beta +1)\theta -2\rho)^2+8(2+\beta)\theta \rho} < 0$$  \(\text{(A3)}\)

namely,

$$0 < -8\rho^2(\beta +1)(2+\beta) + 4\rho^2(2+\beta)^2,$$  \(\text{(A4)}\)

or,

$$0 < 4\rho^2(2+\beta)(2+\beta -2\beta -2),$$  \(\text{(A5)}\)

$$0 < -4\beta \rho^2(2+\beta),$$  \(\text{(A6)}\)

which is a contradiction for both \(\beta\) and \(\rho\) are positive, and the right-hand side is negative. Hence the right-hand side of equation (5.42) is positive.
Next I show that the terms in the parentheses of equation (5.43) are positive, which is the same as:

\[
(\theta + 2\rho) + \sqrt{[(\beta + 1)\theta - 2\rho]^2 + 4(2 + \beta)\theta \rho} > \frac{(2 + \beta)(\beta + 1)\theta^2}{\sqrt{[(\beta + 1)\theta - 2\rho]^2 + 4(2 + \beta)\theta \rho}}. \tag{A7}
\]

Multiply both sides by the positive number \(\sqrt{[(\beta + 1)\theta - 2\rho]^2 + 4(2 + \beta)\theta \rho}\), and simplify:

\[
(\theta + 2\rho)\sqrt{[(\beta + 1)\theta - 2\rho]^2 + 4(2 + \beta)\theta \rho} + 4\rho^2 + 4\theta \rho > (\beta + 1)\theta^2. \tag{A8}
\]

But the left-hand side of inequality (A8) is the same as:

\[
(\theta + 2\rho)\sqrt{[(\beta + 1)\theta - 2\rho]^2 + 4\rho^2 + 4\theta \rho} + 4\rho^2 + 4\theta \rho > (\theta + 2\rho)(\beta + 1)\theta + 4\rho^2 + 4\theta \rho > (\beta + 1)\theta^2, \tag{A9}
\]

which is just what I need to prove.
But do not go to war with Political Economy.

(1) Because the Political Economists are a powerful and dangerous class;

(2) Because it is impossible for ladies and gentlemen to fill up the interstice of legislation if they run counter to the common motives of self-interest.

(3) (You won't agree to this.) Because Political Economists have really done more for the laboring classes by their advocacy of Free Trade, etc., than all the philanthropists put together.

I wish it was possible as a matter of taste to get rid of all philanthropic expressions, 'missions,' etc., which are distasteful to the educated. But I suppose they are necessary for collection of money, and no doubt as a matter of taste there is a good deal that might be corrected in the Political Economists. The light of feelings never teaches the best way of dealing with the world en masse, and the daylight never finds the way to the heart either of man or beast.

You see I want to have all the humanities combined with Political Economy. Perhaps it may be replied that such a combination is not possible in human nature. Excuse my speculation.

By Benjamin Jowett, M.A., Master of Balliol College, Oxford. [From George Stigler, Memoirs of an Unregulated Economist, pp. 6-7]

This chapter studies charity contributions and wealth accumulation by extending the capitalist-spirit model to consider the social-status implications of charity and wealth in Becker (1974, 1976a, 1976b), Cole, Mailath and Postlewaite (1992), and Fershtman and Weiss (1993). In this new model, a representative agent derives utility from both consumption and social status, with the latter determined by his wealth and charity donation. This dynamic, general equilibrium framework enables us not only to re-examine many issues such as tax policy and charity contributions (Clotfelter, 1985), and the crowding-out effect of government support (Kingma, 1989), but also to study the dynamics of charity donation and wealth accumulation. Above all, I intend to answer the following question: if a society tends to be more
altruistic, or if the social status is determined more by charity contributions than by wealth, will capital accumulation be reduced and charity donation be increased in the long-run?

I organize this chapter as follows. In section VI.1, I set up the model and study the properties of equilibrium and stability of the dynamic system. Section VI.2 deals with the effects of accumulation spirit, altruist sentiment, and tax deduction of charity contributions on capital accumulation and charity donation. Section IV focuses on the effects of government funding on private charity and capital accumulation. I conclude this chapter in section VI.4.

VI.1 The Model

Let a representative agent have the following instantaneous utility function defined on consumption and social status or prestige:

$$U(c,s),$$

(6.1)

where $c$ is consumption, and $s$ is the social status.

Following Kurz (1968), Becker (1974, 1976a, 1976b), Kingma (1989), Cole, Mailath and Postlewaite (1992), and Fershtman and Weiss (1993), I define the social status to be a function of the wealth and charity contributions:

$$s = s(k,a),$$

(6.2)

where $k$ is the capital stock or wealth and $a$ is charity contributions.

The inclusion of charity into the utility function is a typical way to represent the altruist sentiment or sympathy. Adam Smith (1759, 1976) says:

How selfish so ever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure
of seeing it. Of this kind is pity or compassion, the emotion which we feel for the misery of others, when we either see it, or are made to conceive it in a very lively manner. That we often derive sorrow from the sorrow of others, is a matter of fact too obvious to require any instances to prove it; for this sentiment, like all the other original passions of human nature, is not confined to the virtuous and humane, though they perhaps feel it with the most exquisite sensibility. The greatest ruffian, the most hardened violator of the laws of society, is not altogether without it. (p. 9)

This approach also reflects a social-status argument. According to Becker (1974), "charitable behavior can also be motivated by a desire to avoid scorn of others or to receive social acclaim." (in Becker, 1976b, p.273.) Kingma (1989) argues that an agent makes a contribution to charity to relieve his guilt or increase his social standing (p. 1199).

The inclusion of wealth into the social status function is already justified in chapter 1. Wealth provides man not only consumption means but also political power and social prestige. Possession of wealth is, to a considerable degree, a measure and standard of a person's success in a society. This argument has been put forward by Weber, Mill, Marshall, Cassel, and Veblen. To further illustrate this point, I add Adam Smith (1976):

The rich man glories in his riches, because he feels that they naturally draw upon him the attention of the world, and that mankind are disposed to go along with him in all those agreeable emotions with which the advantages of his situation so readily inspire him. At the thought of this, his heart seems to swell and dilate itself within him, and he is fond of his wealth, upon this account, than for all the other advantages it procures him (pp. 50-51).
Without further details of justification for the utility function, I turn to the analysis of the model itself. For analytical simplicity, I choose the following separable utility function instead of the more general form in (6.1) and (6.2):

$$u(c) + \beta v(k) + \alpha w(a), \quad \alpha \text{ and } \beta > 0,$$

where $\beta$ and $\alpha$ are the social-status weights assigned to wealth and charity, respectively. $\alpha$ can also be interpreted as the altruist sentiment and $\beta$ the capitalist spirit. It is further assumed that $u(c), v(k),$ and $w(a)$ are increasing, concave, and differentiable.

The representative agent's capital accumulation is given by:

$$\dot{k} = (1 - \tau_c)f(k) - (1 + \tau_c)c - (1 - \tau_s)a,$$

(6.4)

where $f(k)$ is the net output with $f'(k) > 0$ and $f''(k) < 0$; $\tau_c$ is the income tax rate; $\tau_c$ is consumption tax; $\tau_s$ is the rate of tax deduction on charity donation. In this setup, I distinguish the income tax rate and the rate of tax deduction on charity contributions in order to allow a more general treatment. The special case of this setup is when these two rates are the same.

The representative agent maximizes:

$$\int_0^\infty [u(c) + \beta v(k) + \alpha w(a)]e^{-\rho t}dt,$$

(6.5)

subject to the budget constraint of (6.4) and with the initial capital stock given by $k(0)$.

The Hamiltonian for this optimization is:

$$H(c, a, k, \lambda) = u(c) + \beta v(k) + \alpha w(a) + \lambda (1 - \tau_c)f(k) - (1 + \tau_c)c - (1 - \tau_s)a,$$

(6.6)

where $\lambda$ is the shadow price of the capital stock.

The necessary conditions for an optimum are:
\[ u'(c) = \lambda (1 + \tau_c), \quad (6.7) \]
\[ \alpha w'(a) = \lambda (1 - \tau_a), \quad (6.8) \]
\[ \dot{\lambda} = \lambda \rho - \lambda (1 - \tau) f'(k) - \beta v'(k), \quad (6.9) \]
\[ \dot{k} = (1 - \tau) f(k) - (1 + \tau_0) c - (1 - \tau_a) a. \quad (6.4) \]

Conditions (6.7) and (6.8) are the familiar marginal conditions for allocation between consumption and charity, and they can be written as the equality between the marginal rate of substitution and the cost ratio:

\[
\frac{u'(c)}{\alpha w'(a)} = \frac{1 + \tau_c}{1 - \tau_a}.
\]

From (6.7) and (6.8), I can solve consumption and charity donation as the functions of \( \lambda, \tau_c, \alpha, \tau_a \):

\[ c = c(\lambda, \tau_c), \quad (6.10) \]
\[ a = a(\lambda, \alpha, \tau_a), \quad (6.11) \]

with the following properties:

\[ \frac{\partial c}{\partial \lambda} = \frac{(1 - \tau_c)}{u''(c)} < 0, \quad (6.12a) \]
\[ \frac{\partial c}{\partial \tau_c} = \frac{\lambda}{u''(c)} < 0, \quad (6.12b) \]
\[ \frac{\partial a}{\partial \lambda} = \frac{(1 - \tau_a)}{\alpha w''(a)} < 0, \quad (6.12c) \]
\[ \frac{\partial a}{\partial \tau_a} = \frac{-\lambda}{\alpha w''(a)} > 0, \quad (6.12d) \]
\[ \frac{\partial a}{\partial \alpha} = \frac{-w'(a)}{\alpha w''(a)} > 0. \quad (6.12e) \]
Substituting \( c \) and \( \alpha \) in (6.10) and (6.11) together with the properties of (6.12a)-(6.12e) into (6.9) and (6.4) yields:

\[
\dot{\lambda} = \lambda \rho - \lambda (1 - \tau_y) f'(k) - \beta v'(k),
\]

\[
\dot{k} = (1 - \tau_y) f(k) - (1 + \tau_c) c(\lambda, \alpha, \tau_c) - (1 - \tau_y) a(\lambda, \alpha, \tau_y).
\]

(6.13) (6.14)

Now I turn to the equilibrium and stability of the dynamic system in (6.13) and (6.14). Let \( \bar{\lambda}, \bar{k}, \bar{c} \) and \( \bar{a} \) denote the equilibrium values of \( \lambda, k, c, \) and \( a, \) respectively. At equilibrium, \( \dot{\lambda} = \dot{k} = 0, \) which implies that:

\[
\bar{\lambda} \rho - \bar{\lambda} (1 - \tau_y) f'(\bar{k}) - \beta v'(\bar{k}) = 0
\]

(6.15)

\[
(1 - \tau_y) f(\bar{k}) - (1 + \tau_c) \bar{c}(\bar{\lambda}, \tau_c) - (1 - \tau_y) \bar{a}(\bar{\lambda}, \alpha, \tau_y) = 0.
\]

(6.16)

It is noted that, to maintain equilibrium condition (6.15), we need:

\[
\bar{\lambda} \rho - \bar{\lambda} (1 - \tau_y) f'(\bar{k}) - \beta v'(\bar{k}) > 0.
\]

(6.17)

Linearizing the dynamic system of equations (6.13) and (6.14) around the steady state values, I obtain:

\[
\begin{bmatrix}
\dot{\lambda} \\
\dot{k}
\end{bmatrix} =
\begin{bmatrix}
\beta v'(\bar{k}) & -\lambda (1 - \tau_y) f''(\bar{k}) - \beta v''(\bar{k}) \\
-(1 + \tau_c) \frac{\partial c}{\partial \lambda} - (1 - \tau_y) \bar{a}(\bar{\lambda}, \alpha, \tau_y) & (1 - \tau_y) f'(\bar{k})
\end{bmatrix}
\begin{bmatrix}
\bar{\lambda} - \bar{\lambda} \\
\bar{k} - \bar{k}
\end{bmatrix}.
\]

(6.18)

In (6.18), the trace of the 2x2 matrix is equal to the positive time discount rate \( \rho \) [use condition (6.17)]. Hence there is at least one positive eigenvalue. The determinant of the 2x2 matrix does not have a definite sign. Again, from the previous analysis, there may exist multiple equilibria for the dynamic system derived from a utility function defined on both consumption and the capital stock. Therefore, it is quite possible that some equilibria are critical with two positive eigenvalues. But for the
present analysis, I will again focus on a perfect-foresight equilibrium, namely, there are one positive eigenvalue and one negative eigenvalue corresponding to one state variable and one jumping variable in the dynamic system. Since the determinant of the 2x2 matrix in (6.18) is the product of the two eigenvalues, the perfect-foresight equilibrium requires that:

\[
\Delta_s = \beta v'(\tilde{k})(1-\tau_y)f'(\tilde{k})[\lambda(1-\tau_y)f''(\tilde{k})+\beta v''(\tilde{k})] < 0. \tag{6.19}
\]

Condition (6.19) is the standard prerequisite for rational-expectation analysis in intertemporal models, and it will be used repeatedly in the following exercises of comparative statics.

VI.2 Comparitive Statics

To find out how charity, consumption and capital accumulation are affected by the altruist sentiment \(\alpha\), the capitalist spirit \(\beta\), the time discount rate \(\rho\), and various tax variables, I totally differentiate equations (6.15) and (6.16):

\[
\begin{bmatrix}
\beta v'(\tilde{k}) & -\lambda(1-\tau_y)f''(\tilde{k})-\beta v''(\tilde{k}) \\
-(1+\tau_y)(\frac{\partial c}{\partial \lambda})-(1-\tau_y)(\frac{\partial a}{\partial \lambda}) & (1-\tau_y)f'(\tilde{k})
\end{bmatrix}
\begin{bmatrix}
d\lambda \\
dk
\end{bmatrix}
= 
\begin{bmatrix}
-\lambda d\rho -\lambda f'(\tilde{k})d\tau_y + v'(\tilde{k})d\beta \\
f(\tilde{k})d\tau_y + c[1+E(e,\tau_c)]d\tau_e + a[E(a,\tau_e)-1]d\tau_a + (1-\tau_y)(\frac{\partial a}{\partial \alpha})d\alpha
\end{bmatrix}, \tag{6.20}
\]

where \(E(c,\tau_c)\) is the elasticity of consumption with respect to consumption tax:

\[
E(c,\tau_c) = \frac{(1+\tau_c)}{c}(\frac{\partial c}{\partial \tau_c}) < 0, \tag{6.21}
\]
and \( E(a, \tau_a) \) is the elasticity of charity donation with respect to the rate of the tax deductible:

\[
E(a, \tau_a) = \left[ \frac{1-\tau_a}{a} \right] \frac{\partial a}{\partial \tau_a} > 0. \tag{6.22}
\]

From (6.20), a few observations can be derived. First, to test whether the established negative relationship between capital accumulation and the time discount rate still holds here, I use Cramer's rule in (6.20) to obtain:

\[
\frac{d\lambda}{d\rho} = \frac{-(1-\tau_c)f'(k)\lambda}{\Delta_s} > 0, \tag{6.23}
\]

\[
\frac{dk}{d\rho} = \frac{-\lambda [(1+\tau_c)(\frac{\partial c}{\partial \lambda}) + (1-\tau_a)(\frac{\partial a}{\partial \lambda})]}{\Delta_s} < 0, \tag{6.24}
\]

which are true because \( \Delta_s \) is negative from (6.19), \((\partial c/\partial \lambda)\) and \((\partial a/\partial \lambda)\) are negative from (6.12a) and (6.12c). Therefore, (6.24) confirms the result in the traditional optimal growth model. With (6.23), it is easy to see that consumption and charity donation are also negatively related to the time discount rate:

\[
\frac{dc}{d\rho} = (\frac{\partial c}{\partial \lambda}) \frac{d\lambda}{d\rho} < 0,
\]

\[
\frac{da}{d\rho} = (\frac{\partial a}{\partial \lambda}) \frac{d\lambda}{d\rho} < 0.
\]

To state it differently: since a rise in the time discount rate reduces long-run capital accumulation, it also reduces consumption and charity contributions.

The capitalist spirit parameter, \( \beta \), is an important variable. In passing it should be noted that if parameter \( \beta \) is zero, then long-run capital accumulation is independent of charity and altruistic sentiment. This is clear from (6.15). When \( \beta = 0 \), long-run capital accumulation is determined by \( f'(k) = \rho/(1-\tau_a) \),
which is the modified golden rule with income taxation and is independent of the altruist sentiment or the social-status weight assigned to charity, \( \alpha \). More importantly, I have:

Proposition 6.1: A rise in the capitalist spirit leads to more capital stock, more charity donation and more consumption in the long run.

From (6.20),

\[
\frac{d \lambda}{d \beta} = \frac{v'(\bar{k})(1 - \tau_p)\bar{k}''(\bar{k})}{\Delta_s} < 0,
\]

(6.25)

\[
\frac{dk}{d \beta} = \frac{v'(\bar{k})(1 + \tau_p)(\frac{dc}{dl})(\frac{\partial c}{\partial \lambda})(1 - \tau_p)(\frac{\partial a}{\partial \lambda})}{\Delta_s} > 0,
\]

(6.26)

\[
\frac{dc}{d \beta} = (\frac{\partial c}{\partial \lambda})(\frac{d \lambda}{d \beta}) > 0,
\]

(6.27)

\[
\frac{da}{d \beta} = (\frac{\partial a}{\partial \lambda})(\frac{d \lambda}{d \beta}) > 0.
\]

(6.28)

The intuition for this proposition is the following: When the capitalist spirit rises, people will cut consumption and charity donation in the short run and increase their investment. With more capital stock built up over time, more output will be produced; hence more consumption and charity donation.

The effect of the social-status weight attached to charity or the altruist sentiment can be shown as:

Proposition 6.2: A rise in the altruist sentiment reduces long-run capital accumulation and consumption. Its impact on charity donation is ambiguous in the long run.

From (6.20),

\[
\frac{d \lambda}{d \alpha} = \frac{\lambda(1 - \tau_p)\bar{k}''(\bar{k}) + \beta v''(\bar{k})(1 - \tau_p)(\frac{\partial a}{\partial \alpha})}{\Delta_s} > 0,
\]

(6.29)
\[
\frac{dk}{da} = \frac{\beta v'(k)(1-\tau)(\frac{\partial x}{\partial a})}{\Delta_s} < 0, \tag{6.30}
\]

\[
\frac{dc}{da} = (\frac{\partial c}{\partial \lambda})(\frac{d\lambda}{da}) > 0, \tag{6.31}
\]

\[
\frac{da}{da} = (\frac{\partial a}{\partial \lambda})(\frac{d\lambda}{da}) + (\frac{\partial x}{\partial a}), \tag{6.32}
\]

The surprising thing is the contrast between proposition 6.1 and proposition 6.2. If the charity sentiment increases, in the short run, charity donation will rise and investment will be cut. But in the long run, as capital and output are reduced, consumption will also be lower and charity donation may be cut as well. This is why in (6.32) the net effect of \( x \) on charity donation is ambiguous because the second term on the right-hand side of (6.32) is always positive, while the first term is always negative.

The spirit of capitalism in the Weberian sense of accumulation for the sake of accumulation may not be so highly regarded in our moral judgement as the altruistic sentiment; but the lesson from the above analysis is quite clear: it is the money-making spirit that leads to more consumption and more charity contributions. Thus the implications from propositions 6.1 and 6.2 undoubtedly render support for what Benjamin Jowett has said about philanthropists and the political economists, cited by George Stigler (1989) as the argument why economists are good people even though they promote the self-interested money-making philosophy. (See the quotation in the beginning of this chapter.) Indeed, the money-making economic man seems to be cold-blooded compared to a philanthropist. But if a society becomes more philanthropic, and if a higher social esteem is accorded to charity donation, the society becomes poor as a whole and charity donation may eventually decline.

The idea embodied in these two propositions is an ancient one. Here I first cite a statement from a famous Chinese philosophy, Xun Kuang (c.313-238, B.C.): "Man will observe rituals and be
benevolent when his barns and storehouses are well packed, and he will care about honor and disgrace
when he has enough clothing and food." The famous Chinese historian, Sima Qian (145-87, B.C.), says:
Benevolence and righteousness can lie only inside the duke's mansion. When one becomes rich,
benevolence and righteousness follow. Or as Plato puts it in Republic: Have your clothes and food, then
cultivate your virtue.

In practice, money-making has often been a means to finance charity. Without giving
countless modern and contemporary examples, I cite an old story from Pirenne (1937, p. 49): "The Life
of St. Guy (eleventh century) relates that he applied himself to business in order that he might have more
money to bestow in alms."

Taxation and charitable giving have been examined in many studies; see Feldstein (1975),
Feldstein and Clotfelter (1976), and Clotfelter (1980, 1985). Here the social-status model offers a
different perspective to the relation between taxes and charity contributions. I first take up the income
tax.

**Proposition 6.3:** An income tax reduces capital accumulation, consumption and charity
donation.

This can be easily checked in (6.20) and I omit it here. The intuition is quite simple. A higher
income tax reduces the incentive for capital accumulation. With less capital stock in the long run, the
society has less output, less consumption and less charity donation.

**Proposition 6.4:** Tax deduction on charity has an ambiguous effect on capital accumulation
and charity donation in the long run.

In the very short run, tax deduction provides an incentive for more charity donation and even
more income to the representative agent. But this stimulating effect may be so big that investment is cut
as a result of this incentive. More specifically, from (6.20),
\[ \frac{d\lambda}{d\tau_a} = \frac{\left[\lambda(1-\tau_\sigma)\beta'(\bar{k})+\beta v''(\bar{k})\right]\alpha[E(a,\tau_\sigma)-1]}{\Delta_s}, \quad (6.33) \]

\[ \frac{dk}{d\tau_a} = \frac{\beta v'(\bar{k})\alpha[E(a,\tau_\sigma)-1]}{\Delta_s}, \quad (6.34) \]

\[ \frac{dc}{d\tau_a} = \left(\frac{dc}{d\lambda}\right)\left(\frac{d\lambda}{d\tau_a}\right), \quad (6.35) \]

\[ \frac{da}{d\tau_a} = \left(\frac{da}{d\lambda}\right)\left(\frac{d\lambda}{d\tau_a}\right) + \left(\frac{da}{d\tau_a}\right). \quad (6.36) \]

Now if \([E(a,\tau_\sigma)-1]<0\), or if \(E(a,\tau_\sigma)<1\) [recall that \(E(a,\tau_\sigma)\) is always positive from (6.12d)], \(d\lambda/d\tau_a\) is negative and \(dk/d\tau_a\) is positive. Then capital accumulation will increase as a result of a higher tax deduction on charity contributions. This is true because charity donation responds to tax deduction positively, but less proportionally to the incentive. Therefore some deducted tax income is allocated to charity and some is allocated to investment and capital formation. Since capital and output are increased, consumption will also rise, \(dc/d\tau_a\). In this case, both the income effect (more output) and the substitution effect (less costly for charity donation as a result of tax deduction) lead to more charity contributions: \(\frac{da}{d\tau_a} > 0\).

But if \([E(a,\tau_\sigma)-1]>0\), or if \(E(a,\tau_\sigma)>1\), \(d\lambda/d\tau_a\) is positive and \(dk/d\tau_a\) is negative. Then capital accumulation will be reduced as a result of a higher tax-deduction rate on charity contributions; that is to say, the incentive is so large that people even sacrifice investment to contribute more to charity. In this case, long-run consumption will be reduced as well: \(dc/d\tau_a < 0\). For charity contributions in the
long run, it may increase or decrease because the price effect raises charity donation while the income effect (a lower output and a lower capital stock) reduces it.

**Proposition 6.5:** A consumption tax has an ambiguous effects on capital accumulation and charity donation.

From (6.20),

\[
\frac{d\lambda}{d\tau_e} = \frac{\lambda(1-\tau) \eta''(\bar{k}) + \beta \lambda''(\bar{k}) \bar{c}[E(c,\tau_e) + 1]}{\Delta S},
\]

(6.37)

\[
\frac{dk}{d\tau_e} = \frac{\beta \lambda'(\bar{k}) \bar{c}[E(c,\tau_e) + 1]}{\Delta S},
\]

(6.38)

\[
\frac{dc}{d\tau_e} = \left( \frac{\partial c}{\partial \lambda} \right) \frac{d\lambda}{d\tau_e} + \frac{\partial c}{\partial \tau_e},
\]

(6.39)

\[
\frac{da}{d\tau_e} = \left( \frac{\partial a}{\partial \lambda} \right) \frac{d\lambda}{d\tau_e}.
\]

(6.40)

Therefore, if \(E(c,\tau_e) < -1\) [recall that \(E(c,\tau_e)\) is always negative from (6.12b)], \(d\lambda/d\tau_e\) will be negative and \(dk/d\tau_e\) positive. In this case, a higher consumption tax results in more capital accumulation and more charity contribution. This is true because private consumption is reduced more proportionally than the tax increase and the extra income from the reduced consumption is allocated to charity and capital formation. Furthermore, as long-run capital and output increase in this case, the reduction in consumption as a result of a higher tax will be partially offset by the rise in income.

But if \(E(c,\tau_e) > -1\), \(d\lambda/d\tau_e\) will be positive and \(dk/d\tau_e\) negative. In this case, a higher consumption reduces both capital accumulation and charity donation. The reason is just the opposite to what I have offered above.
VI.3 Effects of Government Funding on Private Charity and Investment

Many existing studies have modeled and empirically tested the effects of government funding on charitable contributions. For example, Roberts (1984) finds a dollar-for-dollar crowd-out, while others find partial government crowd-out (Abrams and Schmitz, 1978, 1985) or no crowd-out (Reece, 1979). More recently, Kingma (1989) presents a reexamination of both theoretical and empirical issues in this area. In this section, I extend the basic model in section VI.1 to include both private charity and government support and show the effects of government support on private charity and capital accumulation.

The utility functions used in many existing studies cited above have taken various forms. Kingma (1989) synthesizes them by defining a representative agent's utility function on consumption, own charity donation, others' charity donation, and government support. Here I follow Feldstein (1980) and Kingma and modify the representative agent's utility function in (6.1) as follows:

\[ u(c) + \beta v(k) + \alpha w(a,g), \]  

(6.41)

where \( g \) denotes government support. The function \( w(a,g) \) needs to be specified more carefully. In the existing studies, there exist two assumptions regarding the cross derivative \( \frac{\partial^2 w}{\partial a \partial g} \):

\[ \frac{\partial^2 w}{\partial a \partial g} > 0, \]  

(6.42)

and

\[ \frac{\partial^2 w}{\partial a \partial g} < 0. \]  

(6.43)

The case that private charity and government support are perfect substitutes in the utility sense is just a special case of (6.43) because, in this case, \( w(a,g) = w(a+g) \) and \( \frac{\partial^2 w}{\partial a \partial g} = \frac{\partial^2 w}{\partial g^2} = \frac{\partial^2 w}{\partial a^2} \), which is negative by the concavity of the utility function. I call (6.42) the complementary case of private charity and government support and (6.43) the substitution case.
With the modification in (6.41), the optimal condition (6.8) is changed to

\[
\frac{\beta \delta w(a,g)}{\partial a} = \lambda (1 - \tau_a).
\]  

(6.44)

Now from (6.7) and (6.44), I can solve consumption and charity donation as the functions of \( \lambda, \tau, \beta, \tau_a \) and \( g \):

\[
c = c(\lambda, \tau_a),
\]

(6.10)

\[
a = a(\lambda, a, \tau_a, g).
\]

(6.45)

Note that the consumption function remains the same, but the properties of the charity-donation function are different:

\[
\frac{\partial a}{\partial \lambda} = \frac{\left(1 - \tau_a\right)}{\alpha \delta^2 w(a, g)} < 0,
\]

(6.45a)

\[
\frac{\partial a}{\partial \tau_a} = \frac{\lambda}{\alpha \delta^2 w(a, g)} > 0,
\]

(6.45b)

\[
\frac{\partial a}{\partial a} = \frac{\partial w(a, g)}{\partial a} > 0,
\]

(6.45c)

\[
\frac{\partial a}{\partial g} = -\frac{\alpha \delta^2 w(a, g)}{\partial a \partial g}.
\]

(6.45d)
(6.45d) does not have a definite sign because the numerator can be either negative or positive depending on the complementary case or substitution case between private charity and government support as specified in (6.42) and (6.43), respectively.

Substituting c and a in (6.10) and (6.45) with the properties of (6.12a), (6.12b), (6.45a)-(6.45d) yields:

\[ \lambda = \lambda \rho - \lambda (1 - \tau_s) f'(k) - \beta v'(k), \]  
\[ \hat{k} = (1 - \tau_s) f(k) - (1 + \tau_s) c(\lambda, \tau_s) - (1 - \tau_s) a(\lambda, \alpha, \tau_a, \bar{g}). \]  
\[ (1 - \tau_s) f(k) - (1 + \tau_s) c(\lambda, \tau_s) - (1 - \tau_s) a(\lambda, \alpha, \tau_a, \bar{g}) = 0. \]

The equilibrium conditions become:

\[ \lambda \rho - \lambda (1 - \tau_s) f'(\bar{k}) - \beta v'(\bar{k}) = 0 \]  
\[ (1 - \tau_s) f(\bar{k}) - (1 + \tau_s) c(\bar{\lambda}, \tau_s) - (1 - \tau_s) a(\lambda, \alpha, \tau_a, \bar{g}) = 0. \]

Now the effects of government support on private charity and private capital accumulation can be derived from (6.15) and (6.47):

\[ \frac{d\lambda}{dg} = \frac{(1 - \tau_s) f''(\bar{k}) + \beta v''(\bar{k})}{\Delta_s} \frac{\partial a}{\partial \bar{g}}, \]  
\[ \frac{dk}{dg} = \frac{(1 - \tau_s) \beta v'(\bar{k})}{\Delta_s} \frac{\partial a}{\partial \bar{g}}. \]

From (6.48) and (6.49), for the complementary case of (6.42), \( \frac{\partial a}{\partial \bar{g}} \) is positive, \( \frac{dk}{dg} \) is negative, and \( \frac{d\lambda}{dg} \) is positive. For the substitution case of (6.43), \( \frac{\partial a}{\partial \bar{g}} \) is negative, \( \frac{dk}{dg} \) is positive, and \( \frac{d\lambda}{dg} \) is negative. Therefore,
Proposition 6.6: When private charity and government support are complementary in the utility function, a rise in government support reduces private capital accumulation and consumption, and it has an ambiguous effect on the long-run charity donation; when private charity and government support are substitutes, a rise in government support increases private capital accumulation and consumption, and it also has an ambiguous effect on private charity in the long run.

Equations (6.48) and (6.49) have already shown the effects of government funding on long-run capital accumulation for both cases. I only need to examine its effect on consumption and private charity. Combining (6.12a) and (6.48), I obtain:
\[
\frac{dc}{dg} = \frac{\partial c}{\partial \lambda} \cdot \frac{d\lambda}{dg},
\]
which is positive or negative depending on whether government support and private charity are substitutes or complementary.

To see the ambiguous effects of government support on private charity, I use equations (6.45a), (6.45d) and (6.48) to obtain:
\[
\frac{da}{dg} = \frac{\partial a}{\partial \lambda} \cdot \frac{d\lambda}{dg} + \frac{\partial a}{\partial g}.
\]
(6.50)

In (6.50), if government support and private charity are substitutes, the second term on the right-hand side, \(\partial a/\partial g\), is negative, but the first term is positive from (6.45a) and (6.48). Thus the net effect is ambiguous. Similar arguments apply to the complementary case. The reasoning for proposition 6 is quite clear. If government spending and private charity are substitutes, a rise in government support gives rise to a reduction in private charity contribution in the short run. Responding to this reduction, private investment and consumption will increase. In the long run, with more capital stock and output, consumption and even private charity contribution will be higher than before as a result of a higher private income, even though there exists a short-run reduction in the private charity contribution.

Likewise, when government funding and private charity are complementary, a rise in government support will increase private charity in the short run. At the same time, private investment and consumption will
be sacrificed. In the long run, with less capital stock and less output, private consumption will definitely be reduced, and private charity contributions may also be reduced as a result of a lower output.

This theoretical finding sheds light on why empirical tests have given us ambiguous results. Regardless of whether government support and private charity are substitutes or complementary, there always exist both crowd-in effect and crowd-out effect on private charity donation when government funding changes. In particular, the ambiguity appears to be more significant in the long run with the presence of capital accumulation, although the short-run effects are clear-cut for both cases. Since most empirical studies on this issue have not developed a dynamic framework with private investment (see Kingma, 1989, for a detailed review of the literature), a new empirical test involving the dynamics of charity contributions and wealth accumulation seems to be justified.

VI.4 Conclusion

In an extended growth model, I have examined the effects of the capitalist spirit and the altruist sentiment on long-run capital accumulation and private charity donation. It has been shown clearly that a higher capitalist spirit in the long run leads to more capital accumulation, more consumption and more charity contributions; when the altruistic sentiment rises in a society, it has an ambiguous effect on private charity contributions in the long run; in addition, this rising altruistic sentiment definitely reduces private wealth and consumption in the long run.

In this study, three more results are worth while to be emphasized. First, a tax deduction on charity contribution may lead to more or less charity donation and more or less capital accumulation depending on the elasticity of charity with respect to tax deduction. Second, government support may crowd in or crowd out private charity regardless of whether government funding and private contribution are substitutes or complementary, because government support also impacts on private capital accumulation and output production. Finally, if the capitalist spirit parameter is not incorporated into the
model, then charity contributions, tax incentives for charity and government support will not affect the long-run capital accumulation. This is why the capitalist-spirit model provides an interesting framework to study the relationship between charity and wealth accumulation.
Chapter VII

The Spirit of Capitalism and a Resolution of the Savings Puzzles

Saving was for old age or for your children; but this was only in theory—the virtue of the cake was that it was never to be consumed, neither by you nor by your children after you.

—John Maynard Keynes, *The Economic Consequences of the Peace.*

What determines savings? This has been a major issue of macroeconomics since the publication of Keynes' *General Theory* (1936). Major breakthrough in understanding savings based on consumer utility maximization was achieved in 1950s by the life-cycle hypothesis of Franco Modigliani and Richard Brumberg (1954) and the permanent-income hypothesis of Milton Friedman (1957). For many years, countless studies were devoted to test and refine these two hypothesis. But since the 1970's, many empirical studies have suggested that the life-cycle theory of consumption cannot explain the "savings puzzle": why wealth does not decumulate after retirement, and why wealth holdings tend to increase with age (Atkinson, 1971; Atkinson and Harrison, 1978; Mirer, 1979; Thurow, 1976; Danziger, *et al.*, 1984). Moreover, Kotlikoff and Summers (1981) demonstrat that the pure life-cycle component of aggregate U.S. savings has been very small and that most capital accumulation in the US occurs through intergenerational transfers. Like the life-cycle model, however, the theory of intergenerational transfer cannot fully explain why there exists no significant difference in the rate of asset decumulation between the elderly who have children and those who do not, which is shown by Hurd (1986); nor can it explain why there exists a positive relation between transfers and recipient's income as demonstrated in Cox (1987).
This chapter proposes a possible solution to these anomalies by applying the capitalist-spirit model to an overlapping-generations framework. This extended model makes it possible to incorporate the standard intertemporal savings and bequest motives as special cases. But in this new framework, the empirical evidence already reported in the literature can be reinterpreted from this more general point of view. The present approach is strictly complementary to the existing life-cycle theory and the theory of bequest. My contribution is to explain the part of savings which cannot be explained when the capitalist spirit is not incorporated. In other words, there are three motives for savings: for retirement, for bequest, and accumulation for its own sake. Or just as Wicksell (1934, 1977) has emphasized: savings "depend on a number of motives - partly selfish, partly altruistic, but in any case very complex. People save for themselves, but also for their successors. Some people often save merely for the pleasure of saving. Exceptional people may save and accumulate capital simply because they cannot help themselves". (pp. 207-208)

VII.1 The Capitalist Spirit: In An Overlapping Generations Model of Savings

Consider a typical agent of the i-th generation who lives for two periods. He consumes \( c_{i,t} \) in period 1 and \( c_{i,t} \) in period 2, saves \( w_{i,t} \) in period 1 and \( w_{i,t} \) in period 2, and derives a discounted utility over the two periods:

\[
u(c_{i,t}) + \beta v(w_{i,t}) + \frac{u(c_{i,t}) + \beta v(w_{i,t})}{1 + \delta}, \tag{7.1}
\]

where \((1 + \delta)^t\) is the positive time discount factor; \( \beta v(.) \) is the utility derived from wealth accumulation itself and the parameter \( \beta \) is used to measure the capitalist spirit, and can take any value from zero to positive infinity. [I exclude negative values of \( \beta \) or Wittgenstein's view that money is a nuisance (Russell, 1968, p. 144).] When \( \beta \) equals zero, this is the standard utility function as in Diamond (1965); when the
term $\delta v(w_{i,1})$ is dropped for the first period but retained for the second, this is the standard bequest models like Blinder's (1973). It is further assumed that both functions $u(.)$ and $v(.)$ are increasing, concave and differentiable in their arguments: $u'(.) > 0, v'(.) > 0, u''(.) < 0$, and $v''(.) < 0$.

For simplicity, population growth is assumed to be zero. I normalize the number of individuals in each cohort to be one. Thus generation $i$ or agent $i$ receives an amount of wealth $w_{i+1,1}$ from the generation $(i-1)$. This wealth is left behind by agent $(i-1)$, while the old generation has already derived the discounted utility $(1+\delta)^i \beta v(w_{i+1,1})$ from the holding of wealth $w_{i+1,2}$. In addition to the wealth left over by the old generation, individual $i$ receives an income $y$ when he is young. Again for simplicity, this income is assumed to be the same for all generations and the interest rate on savings is also fixed at a constant $r$ for all generations. Therefore, we can write the budget constraint for the typical generation $i$ as follows:

$$w_{i,1} = y + (1+r)w_{i-1,2} - c_{i,1}, \quad (7.2)$$

$$w_{i,2} = (1+r)w_{i,1} - c_{i,2}. \quad (7.3)$$

Here equation (7.2) says that generation $i$'s total income $[y + (1+r)w_{i+1,1}]$ is allocated between first-period consumption $c_{i,1}$ and first-period savings $w_{i,1}$. Equation (7.3) says that the total first period savings plus the interest income is used for the second period consumption $c_{i,2}$ and the second period savings $w_{i,2}$.

Maximizing (7.1) subject to (7.2) and (7.3) yields the first-order conditions:

$$\beta v'(w_{i,2}) = u'(c_{i,2}), \quad (7.4)$$

$$\beta v'(w_{i,1}) + \frac{(1+r)}{(1+\delta)}u'(c_{i,2}) = u'(c_{i,1}). \quad (7.5)$$
Expression (7.4) implies that the marginal utility of consumption and the marginal utility of savings in the second period are equal at optimum. Condition (7.5) indicates that, if consuming one unit at period 1, its utility is given by \( u'(c_{1,1}) \); if saving one unit, its marginal utility comprises two parts: the marginal utility from period 1's savings \( \beta v'(w_{i,1}) \) and the marginal utility of the second period consumption weighed by the time discount rate and the interest rate; at optimum, period i's marginal utility of consumption equals the marginal utility of savings in period 1 and period 2.

Combining (7.2)-(7.5), savings in periods 1 and 2 can be expressed as:

\[
\beta v'(w_{i,2}) = u'((1+r)w_{i,1} - w_{i,2}).
\] (7.6)

\[
\beta v'(w_{i,1}) + \frac{(1+r)}{(1+\delta)} \beta v'(w_{i,2}) = u'(y + (1+r)w_{i-1,2} - w_{i,1}).
\] (7.7)

Differentiating \( w_{i,j}, j = 1,2 \), with respect to \( \beta \), I obtain:

**Proposition 7.1:** The higher the capitalist spirit, the higher the savings in both periods 1 and 2.

**Proof:** Differentiating with respect to the capitalist-spirit parameter \( \beta \) in (7.7) and (7.8) yields:

\[
\frac{dw_{i,1}}{d\beta} = \frac{\beta v''(w_{i,2}) + u''((1+r)w_{i,1} - w_{i,2})}{\Delta_w} > 0,
\]

\[
\frac{dw_{i,2}}{d\beta} = \frac{u''(c_{i,2})(1+r)[v'(w_{i,1}) + b v'(w_{i,2})] + v'(w_{i,2})[\beta v''(w_{i,1}) + u''(c_{i,1})]}{\Delta_w} > 0
\]

where

\[
\Delta_w = -u''(c_{i,2})(1+r)^2 \beta v''(w_{i,2}) - [\beta v''(w_{i,2}) + u''(c_{i,2})][\beta v''(w_{i,1}) + u''(c_{i,1})] < 0.
\]

\[
b = (1+r)(1+\delta)^{-1}.
\]

QED.

Rearranging optimal conditions (7.4) and (7.5), I have:
\[
\frac{v'(w_{t,1})}{v'(w_{t,2})} = \frac{u'(c_{t,1})}{u'(c_{t,2})} - \frac{(1+r)}{(1+\delta)} \tag{7.8}
\]

From which, the movement of the wealth ratio \(w_{t,1}/w_{t,2}\) can be seen:

**Proposition 7.2:** Savings increase (decrease) with age, that is, \(w_{t,1}/w_{t,2} < 1\) \((w_{t,1}/w_{t,2} > 1)\), if the marginal rate of substitution between consumption in period 1 and consumption in period 2 is larger (smaller) than \((2+r+\delta)/(1+\delta)^t\).

The proof comes directly from expression (7.8). Suppose that \(w_{t,1}/w_{t,2}\) is less than one, that is to say, savings in the second period are higher than in the first period. Then the left-hand side of equation (7.8) is larger than one since the function \(v(\cdot)\) is concave. To maintain equality, the right-hand side has to be bigger than one, which means that the marginal rate of substitution between consumption in period 1 and consumption in period 2 minus \((1+r)/(1+\delta)^t\) is larger than one, or the marginal rate of substitution is larger than \((2+r+\delta)/(1+\delta)^t\). The proof of the other case is similar.

From proposition 7.2, we can see the movement of consumption in the two periods corresponding to changes in savings. If the wealth ratio \(w_{t,1}/w_{t,2}\) is less than, or equal to, one, the marginal rate of substitution \(u'(c_{t,1})/u'(c_{t,2})\) is greater than, or equal to, \((2+r+\delta)/(1+\delta)^t\), which is greater than one. Then, by concavity of \(u(\cdot)\), the ratio of the consumption in period 1 over that in period 2, \(c_{t,1}/c_{t,2}\), is less than one, or \(c_{t,1} < c_{t,2}\). This observation leads to:

**Proposition 7.3:** If second-period savings are larger than, or equal to, first-period savings: \(w_{t,2} \geq w_{t,1}\), then second-period consumption is no less than first-period consumption: \(c_{t,2} \geq c_{t,1}\).

In order to see the effect of the capitalist spirit on the wealth ratio clearly, let \(u(c) = \log c\) and \(v(w) = \log w\). Then, the first-order conditions become:
\[
\frac{\beta}{w_{t,2}} = \frac{1}{c_{t,2}}, \quad (7.9)
\]

\[
\frac{\beta}{w_{t,1}} + \frac{(1+r)}{(1+\delta) c_{t,2}} = \frac{1}{c_{t,1}}. \quad (7.10)
\]

Substituting (7.9) into the budget constraint (7.3):

\[
\frac{w_{t,2}}{w_{t,1}} = \frac{(1+r)\beta}{1+\beta}. \quad (7.11)
\]

This gives:

**Proposition 7.4:** Second-period savings are higher (less) than first-period savings if \( r\beta > ( < j) \) \( I \) or if the capitalist spirit \( \beta \) is larger (smaller) than \( (1/r) \).

In this special case, Proposition 7.2 can be strengthened:

**Proposition 7.5:** The ratio of savings over the two periods, \( \frac{w_{t,2}}{w_{t,1}} \), increases in the capitalist spirit \( \beta \).

That is,

\[
\frac{d}{d\beta} \left[ \frac{w_{t,2}}{w_{t,1}} \right] = \frac{(1+r)}{(1+\beta)^2} > 0. \quad (7.12)
\]

I continue to use the special case to illustrate the path of wealth accumulation or savings over time and from one generation to another generation. Using the budget constraints (7.2) and (7.3) and the first-order conditions (7.9) and (7.10), I obtain the following relation between second-period savings of the \( i \)-th generation and second-period savings of the \( (i-1) \)-th generation:

\[
w_{i,2} = \frac{(1+r)(2+\delta)\beta^2 + \beta(1+r)[y + (1+r)w_{i-1,2}]}{(1+\beta)^2(2+\delta)}. \quad (7.13)
\]
From this, it follows that:

**Proposition 7.6:** When the capitalist spirit is strong, each generation will bestow more and more wealth to the next generation.

That is,

\[
\frac{dW_{t,2}}{dW_{t-1,2}} \to (1+r)^2 > 1 \text{ for large values of } \beta. 
\]  

(7.14)

**VII.2 Empirical Evidence**

**VII.2.1 Savings Behavior of the Old in Empirical Studies**

According to the standard life-cycle theory of savings, old people are supposed to decumulate their wealth after retirement. But from the perspective of the capitalist-spirit model, savings in old age can be higher than in young age as suggested by propositions 4 and 5. This theoretical result has strong support in empirical studies on the savings behavior of the old since the 1970s.

Atkinson (1971) and Atkinson and Harrison (1978) show that average wealth accumulation in Britain increases in old age. Brittain (1978) finds a positive relationship between age and wealth holdings in the United States. Mirer (1979) examines wealth holding patterns among aged married couples from the 1968 survey of the Demographic and Economic Characteristics of the Aged and finds that wealth (not including the capital value of pensions, social security, etc) declines modestly, or perhaps not at all, with age. This observation not only applies to the very rich, but also holds for all other levels of wealth. Furthermore, after correcting for intercohort differences in wealth at retirement, he shows that wealth increases with age. Menchik and David (1983) also fail to show individuals decumulating wealth in old age, and, on the contrary, the opposite result seems to hold in their study. As for the saving rate, Thurow (1976) finds positive saving rates for all age groups. Danziger et al (1983) show that the elderly not only do not dissave to finance their consumption during retirement, they spend less on consumption goods and
services (save significantly more) than the nonelderly at all levels of income. Moreover, the oldest of the elderly save the most at given levels of income.

Intergenerational transfers have been used to explain this increasing relationship between wealth and age. But empirical studies have cast some doubt on this motive. According to the bequest theory, children with low income should receive more transfer income from their parents than the children with high income from the same family. But statistical studies have shown the opposite. For example, Sussman et al (1970), Brittain (1978) and Menchik (1980) all have found that wealth bequeathed to children is shared equally, while Cox (1987) finds a positive relation between the transfers and the recipient’s income.

All these facts are consistent with the capitalist-spirit model of savings. Since savings themselves also generate utility, the old keep saving even though the life-cycle motive tends to reduce savings. Furthermore, as strong capitalist-spirit-minded parents may encourage their children to have the same spirit, they will give equal or more money to those children with a strong capitalist spirit and high income than to their children with low income. This positive association between recipients’ income and bequest also points out that the parents have tried to encourage industriousness and savings of their children. It is extremely surprising that Montesquieu (1748, 1893) has already emphasized the relationship among frugality, hard work, and equal share of inheritance as a principle in a democracy: "In a commercial republic, the law giving all children an equal portion in the inheritance of the fathers is very good. In this way, whatever fortune the father may have made, his children, always less rich than he, are led to flee luxury and work as he did." "Certainly, when democracy is founded on commerce, it may very well happen that individuals have great wealth, yet that the mores are not corrupted. This is because the spirit of commerce brings with it the spirit of frugality, economy, moderation, work, wisdom, tranquility, order and rule." (p. 48)
VII.2.2 Savings Behavior of Households with and without Children

Perhaps the most important challenge to the bequest theory of savings, and a more significant piece of supporting evidence for the capitalist-spirit theory of savings, comes from Hurd (1986). One may expect that the bequest motive depends on whether the old have children. But, with the data from the Longitudinal Retirement History Survey (RHS), Hurd finds that households with children and without children do not show any significant difference in their disavings. In fact the opposite is true: "the households with children have less bequeathable wealth than households without children. If the observed rates of decumulation continue beyond the ages of the RHS households, the households with children will always have less wealth than households without children" (p. 32-33). Hurd also finds that the saving rates of the households without children are always higher than the saving rates of the households with children. While Hurd's finding challenges the bequest motive of savings, it implies that savings can be undertaken for the sake of savings regardless of whether a household has children or not. Hurd hints that the existing methods cannot be used to study the savings behavior of the very wealthy: "If one wants to understand how the capital stock is accumulated, one would probably want to study the very wealthy. However, the standard consumption models may not apply: time constraints prevent the very wealthy from consuming even the interest from their wealth" (p. 35). The capitalist-spirit theory of savings seems to offer an alternative to the existing models of savings.

VII.2.3 Savings Psychology of the Rich

The rich have most of the wealth in most countries. For example, in Britain, the top 1 percent of the adult population own about a third of the total personal wealth and the top 10 percent as much as three-quarters (Atkinson, 1971, p. 239). Empirical studies have demonstrated some different patterns of savings for the rich. Burbridge and Robb (1985) show that, among Canadian households, there exists a
significant difference in accumulation behavior among the rich and the poor; on average, "blue-collar" households decumulate after retirement and "white-collar" do not.

While it is difficult to offer a regression analysis about the savings behavior of the very rich and the "captains of industry", their savings habit and their "spirit of accumulation" can be seen from their confessions and many case studies. The first example is taken from Weber (1958):

"When Jacob Fugger, in speaking to a business associate who had retired and who wanted to persuade him to do the same, since he had made enough money and should let others have a chance, (they are the followers of the life-cycle theory, added), rejected that as pusillanimité and answered that 'he (Fugger) thought otherwise, he wanted to make money as long as he could.'" (p. 51).

Many examples are presented in Sombart’s (1915) book. For example, Sombart cites Andrew Carnegie’s autobiography: "We were always hoping … that there would come a time when extension of business would no longer be necessary; but we invariably found that to put off expanding would mean retrogression." (p. 174) He also quotes Rockefeller: "The more the business grew the more capital we put into it, the object being always the same: to extend our business." (p. 174)

Having studied the money-making careers of many "captains of industry", Sombart offers the following observation on their savings psychology: "It frequently happens that he really does not want to expand further, but he must. Many a captain of industry has confessed as much…. Most capitalist undertakers think nothing else but this desire for extension and expansion, which to the outside observer appears so meaningless" (pp. 174-175). This expansion psychology leads to ever-increasing savings. If you interpret their behavior as saving and investing for the future or for next generation, captains of industry will quickly dismiss this intention and "regard you with a kind of mild surprise" (p. 175).

Wicksteed (1933) has the following description of the savings psychology of the rich:

A millionaire is not only able to save but unable not to save, because he cannot spend all his accumulation at once, and he is always able to transmute present
into future command of wealth. (p. 294). Indeed to the rich man the problem often is how he can avoid saving too much. The exigencies of his business may drain him of his income. It is always demanding to be extended, till he no longer controls it, but it controls him. It has become a kind of Frankenstein's monster that dominates his life. It must grow or die. And he cannot let it die, partly because he is dependent upon it, and partly because it has become a kind of entity to him, and, independently of all the things in the circle of exchange that it represents to him, has acquired a kind of independent claim upon his affection and his imagination, and is bound up with all manner of personal relations and obligations. (p. 298)

VII.2.4 The Connection Between the Capitalist Spirit and Savings Over Time

The role of the capitalist spirit in the economic take-off from a traditional society to a modern capitalist economy is manifested in two aspects: first, the capitalist spirit contributes to a higher saving rate; and second, the capitalist spirit cannot be separated from entrepreneurship in the sense of Joseph Schumpeter as I have argued in chapter 2. As observed by Rostow (1960), the economic take-off from a traditional society to a industrialized society requires a significant increase in the saving or investment rate from about 5 percent of national income to about 10 percent. How does one explain this phenomenon? According to Weber and Sombart (see chapter 1), the attitudes towards acquisition, savings and wealth accumulation are very different between traditional society on one hand and capitalist society on the other. While in the traditional society the normal situation for mankind is that rationally acquisitive activities are oriented to a traditionally fixed standard of living and the saving rate is rather low, in the capitalist era, the traditional practice is broken down and acquisition has become an endless process. From the historical perspective, the Protestant ethic is the psychological origin of this capitalist spirit
because the Protestant ethic—hard work, thrift, austerity—"must have been the most powerful conceivable lever for the expansion of that attitude toward life which we have called the spirit of capitalism." These ethos also have direct implication for the rising saving rates: "when the limitation of consumption is combined with this release of acquisitive activity, the inevitable practical result is obvious: accumulation of capital through ascetic compulsion to save." (Weber, p.172, italics added.)

Mill (1848) paid particular attention to the puzzle between low returns and rapid accumulation in his time. His explanation emphasizes the role played by the spirit of accumulation. As long as the spirit of accumulation is strong, high returns are not needed to stimulate savings: "In England and Holland, then, for a long time past, and now in most other countries in Europe... the desire of accumulation does not require, to make it effective, the copious returns which it requires in Asia, but is sufficiently called into action by a rate of profit so low, that instead of slackening, accumulation seems now to proceed more rapidly than ever." (p. 175, italics added.)

Keynes (1920) also stresses the role of "the saving for the sake of saving" in the vast accumulation of capital in the 19th-century Europe. But he warns that this psychology is not stable if social and political conditions change: "It was not natural for a population, of whom so few enjoyed the comforts of life, to accumulate so hugely. The war (World War I, added) has disclosed the possibility of consumption to all and the vanity of abstinence to many. Thus the bluff is discovered; ... the capitalist classes, no longer confident of the future, may seek to enjoy more fully their liberties of consumption so long as they last, and thus precipitate the hour of their confiscation." (p. 19) Keynes' prediction in fact has been proved by history. While a strong capitalist spirit has led to rapid capital accumulation and fast economic growth, the waning of the capitalist spirit has been the main cause of the "British disease" as diagnosed by Sombart (1915), Henry Rosovsky [in Harrison (1992)], and Wiener (1982). Once the "captains of industry" have lost their wholehearted pursuit of money and profits, and once people have developed their contempt for the capitalist spirit, then a declining trend of savings and economic growth
is inevitable. While blaming large government deficits and borrowing as the main cause of very low saving rates in the US, Harrison (1992, also see chapter 3) is very careful to point out the fundamental change in the American cultural values. According to Harrison, the traditional American values such as hard work, frugality and austerity, namely, the strong capitalist spirit of America, have been eroded gradually, "disrespect for thrift and austerity, driven by increased focus on the present and reduced focus on the future, has a lot to do with our low national levels of savings and investment." (p. 230)

VII.2.5 The Confucianist Ethic of Frugality and High Saving Rates of East Asia

Many studies on high saving rates in East Asian countries and regions like Japan, Taiwan, South Korea, Singapore and Hong Kong have taken the capitalist-spirit approach modified to the Confucianist ethic of frugality. In explaining the economic success of Japan, Morishima (1982) places the Confucianist ethic of frugality on equal footing with the Protestant ethic: while the Protestant ethic is the origin of the capitalist spirit in the West, the Confucianist ethic of frugality is the origin of the capitalist spirit in Japan (see details in chapter 3). Japan's story is not exceptional. South Korea, Taiwan, Singapore, Hong Kong and now mainland China have followed the Japanese example. As observed by Roderick MacFarquhar (1985), for all these countries, "the significant coincidence is culture, the shared heritage of centuries of inculcation with Confucianism. That ideology is as important to the rise of the East Asian hyper-growth economies as the conjunction of Protestantism and the rise of capitalism in the west." "Post-Confucian economic man works hard and plays hard, buys much and saves more." Since Morishima does not explain the Confucianist moral of frugality, I present some idea of the Confucianist teaching on frugality here. In addition, as Morishima has already made a strong case for Japan, I will focus on China and South Korea.

The Confucianist ethic of frugality is expressed in the doctrine of Confucius (born 552 B.C.), the founder of the Confucianist school. Since the early Han Dynasty (B.C. 206-220 A.D.) until
early 20th century, Confucianism was the official ideology of China. The adoption of Confucianism in Korea and Japan resulted in the Korean Confucianism and the Japanese Confucianism. Even today, the moral teachings in these countries and other countries like Taiwan, Singapore and Hong Kong all have their origin directly from Confucianism. In the most famous Chinese classic *The Analects* (1986, English edition), Confucius states the following moral codes on frugality:

The Master (Confucius) said, ‘In guiding a state of a thousand chariots, approach your duties with reverence and be trustworthy in what you say; be frugal in spending and love your fellow men’. (Book I, 5)

Lin Fang asked about the basis of the rites. The Master said, ‘A noble question indeed! With the rites, it is better to err on the side of frugality than on the side of extravagance’. (Book III. 4)

The Master said, ‘Extravagance means ostentation, frugality means shabbiness. I would rather shabby than ostentatious’. (Book VII.36)

Frugality is not only advocated by Confucianists, it is also the central part of the Taoist and Mohist schools, which are antithetical to the Confucian school. According to the Taoist founder, Lao Zi (551-479, B.C.), we have the following teaching on frugality as an art of governing a state:

In ruling the people and in serving heaven it is best for a ruler to be sparing.
It is because he is sparing
That he may be said to follow the way from the start;
Following the way from the start he may be said to accumulate abundance of virtue;
When there is nothing he cannot overcome, no one knows his limit;
When no one knows his limit
He can possess a state;
When he possesses the mother of a state
He can then endure.
This is called the way of deep roots and firm stems
by which one lives to see many days

(The Tao Te Ching, Book Two, Chapter LXIX)

Frugality is also regarded as one of the three treasures in Lao Zi's doctrine:
I have three treasures
Which I hold and cherish
The first is known as compassion,
The second is known as frugality,
The third is known as not daring to take lead in the empire;
Being compassionate one could afford to be courageous,
Being frugal one could afford to extend one's territory,
Not daring to take the lead in the empire one could afford to be
lord over the vessels.
Now, to forsake compassion for courage, to forsake frugality for
expansion, to forsake the rear for the lead, is sure to end in death.

(The Tao Te Ching, Book Two, Chapter LXVII)

According to Mo Zi, (c. 468 - c.367 B.C.), the founder of the Mohist school. "Those who
practice frugality will thrive" (On Frugality, Mo Zi, or The work of Mo Di). From the principle of
frugality, Mo Zi is against all forms of extravagance and indulgence. He sets a common standard for
simplicity in food, clothes, house and means of communication and advises people to refrain from useless
luxuries such as extra spending on rites, music and funeral. He provides us the following picture of his
ideal society:

The ideal "is not the primitive situation in which men lived in holes in the
ground and wore animal skins. It is the unadorned purely functional culture
created by the first sage-kings. They built house high enough above the ground
to avoid the damp, with walls sturdy enough to keep out the wind and cold,
roofs solid enough to keep out the snow, sleet, and rain, and inner walls high
enough to separate the sexes. They made houses convenient for living and not for show. They invented textiles to keep people warm in winter and cool in summer, and not for display. There was an abundance of necessities and complete absence of frills." (Schwartz, 1985, p. 154)

Thus, according to Mo Zi, the worthy men would live lives of the greatest simplicity. The rulers of a society should always avoid waste and excess because the rulers' cultivation of luxury and display can be attained only through the impoverishment of the people.

We should never underestimate the moral force of frugality teaching in the Chinese traditional thinking, in particular, the Confucianist ethos of thrift. In China, for about two thousand years, Confucianism was the official ideology and the moral code of the common people. Due to the lack of a popular and dominant religion over the long history, the Confucianist teaching has been deeply implanted in people's mind. This is true for China, Taiwan, Hong Kong, and Singapore, because all these countries have essentially the Chineses and Confucianist culture.

Confucianist ethic of frugality plays a very important role in promoting high savings in China. It is absolutely right to attribute fast economic growth in the past 15 years to economic reforms initiated by Deng Xiaoping. But why have the Chinese people with a low per capita income kept an average saving rate of 34%? Perhaps this is the reason why most experts on China and East Asia have advocated so much the role of Confucianist values in generating high saving rates and fast economic growth in those countries; see Harrison (1992) and many references in Harrison's book.

The influence of Confucianism in South Korea deserves our attention. With the Founding of the Yi dynasty in 1392, Confucianism was declared the state religion. In many schools there were shrines for the worship of Confucius and his disciples, and Confucian ritual was encouraged in the court and at every level of society (Ro, 1989, p.1). In the 16th century, two great Neo-Confucian scholars, Yi T'oegye (1501-70) and Yi Yulgok (1536-85) developed a system of Korean Confucianism. In this system,
hard work, profits and wealth accumulation have their great importance. In fact, Yi Yulgok "formulated the work ethic remarkably similar to the Protestant ethic" in Weber’s thinking. "In Yulgok’s view work is sacred, and the desire to accumulate wealth is a natural and beneficial instinct. Government, he believed, has no right to prevent the individual from reaping economic profit or accumulate wealth." (Ro, 1989, p.120)

VII.3 Conclusion

Our theoretical model which includes the life-cycle motive and the bequest motive captures the essence of wealth accumulation in a capitalist economy: accumulation for the sake of accumulation. It indicates that, with a strong capitalist spirit, people may not decumulate their wealth in retirement, but continue to accumulate generation after generation. The empirical evidence strongly supports the role of the accumulation motive. First, the old do not generally decumulate wealth during retirement. On the contrary, they tend to keep saving until they die. Second, households with and without children do not have significant differences in their savings behavior. Moreover, the capitalist-spirit model of savings realistically characterizes the savings behavior of the very wealthy, and explains why there is a significant upward jump in the saving rates when a traditional society becomes a modern capitalist economy. It implies that saving rates will be different across countries if the intensity of the capitalist spirit is different. In particular, the model sheds light on high saving rates in East Asian countries endowed with the Confucianist ethic of frugality.
Chapter VIII

The Spirit of Capitalism and Stock Market Prices
Gurdip S. Bakshi and Zhiwu Chen with Heng-fu Zou

In this chapter, we first formalize the spirit-of-capitalism hypothesis by assuming that the representative investor has a wealth-dependent time-additive expected utility function of the form, \( \int_0^\infty e^{-\rho t} \mathbb{E}_t [u(C_t, W_t)] dt \), where \( C_t \) is consumption, \( W_t \) wealth, and \( \rho \) the time preference parameter. The marginal utility of \( u(C_t, W_t) \) with respect to wealth is positive. Then, we show economies populated with capitalists exhibit distinctly different characteristics than economies populated only with the standard agents whose desire for wealth is solely driven by its implied consumption possibilities. To mention a few examples of the distinct characteristics of a capitalist economy, the intertemporal marginal rate of substitution in consumption is no longer a function of only aggregate consumption. Instead, it is a function of both aggregate consumption and wealth. As a result, even when the aggregate consumption process is smooth, stock prices can be volatile—as long as the wealth process is so. The spirit of capitalism is therefore the essential driving force behind the stock market volatility, and asset prices will fluctuate more in economies with the capitalist spirit than without it. With the spirit of capitalism, the equilibrium risk premium for any risky asset is linear in both the consumption and the market betas. This means that the equilibrium asset pricing model for such an economy is a combination of the standard CAPM and the consumption-based CAPM. In addition, for an investor with the capitalist spirit, the relative risk aversion is no longer the reciprocal of the elasticity of intertemporal substitution in consumption, as is the case in the standard state-independent time-additive expected utility models.\(^5\)

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\(^5\) For discussions on the relationship between the risk aversion and the intertemporal elasticity coefficients under both expected and non-expected preferences, see, among others, Black (1990), Constantinides (1990), Epstein and Zin (1990), Hall (1988) and Mehra and Prescott (1985).
There is, on the other hand, a possible negative effect of wealth on consumption taste formation. That is, for a given level of consumption, the amount of consumption utility that one obtains from it can be negatively related to the investor's wealth status: the wealthier the investor, the less utility from a given level of consumption. In some sense, this means an increase in wealth can "spoil" the investor's tastes. In the literature on utility theory, Machina (1982) refers to this as the Markowitz hypothesis. According to Markowitz (1952), an increase (decrease) in wealth will shift an investor's utility-of-consumption curve horizontally to the right (left). An interpretation of his hypothesis is that each time an investor's wealth status changes, it essentially causes him to go back and re-rank the entire consumption set.

To see whether the spirit of capitalism is a statistically significant motive behind wealth acquisition (and hence whether the spirit-of-capitalism hypothesis or the Markowitz hypothesis holds in reality), we apply Hansen's (1982) generalized method of moments (GMM) to test the implied Euler equation of the wealth-dependent utility. We also subject the Euler equation to the Hansen-Jagannathan (1991) bound test, which is not conditional on information instruments. Based on monthly stock returns and per capita consumption, the Euler equation is sometimes supported in the GMM test, but rejected in the Hansen-Jagannathan bound test. In both tests, however, the estimated preference parameters suggest that the spirit of capitalism is statistically significant and it dominates the Markowitz negative effect of wealth on taste formation. For this reason, we will refer mainly to the spirit-of-capitalism hypothesis when we give economic interpretations to the analytical derivations, with the understanding that the analytical results also hold under the Markowitz hypothesis.

Related work includes the recursive utility-based models in Duffie and Epstein (1990), Epstein and Zin (1989, 1991), and Kandel and Stambaugh (1991), as well as the habit formation-based expected utility models in Abel (1988), Constantinides (1990), and Sundaresan (1989). Like our wealth-dependent utility model, their models allow the separation of the relative risk aversion and the intertemporal
elasticity coefficients. Furthermore, as in our case, the equilibrium pricing model in economies with recursive preferences is a combination of the standard CAPM and the consumption-based CAPM (Duffie and Epstein, 1990). However, the underlying economic assumptions that lead to the results are quite different. We derive our conclusions from the assumption that investors have the drive to make more money not just out of the desire to increase future consumption possibilities, but also because wealth status gives them a sense of security and anticipation, prestige, power, and so on. In the recursive utility approach, the assumption is that investors care about the timing of the resolution of uncertainty.

The chapter is organized as follows. In Section VIII.1, we outline a multiperiod representative agent economy populated with capitalist-spirited investors and derive the first-order conditions for the investor’s consumption-investment problem. Section VIII.2 takes the discrete-time economy of Section VIII.1 to its continuous-time limit and characterizes the equilibrium pricing relations. By examining the closed-form solutions to the consumption-portfolio problem with a special utility function, it also shows that the relative risk aversion and the intertemporal elasticity coefficients are no longer reciprocals of one another. Section VIII.3 describes the data used in the empirical studies. In Section VIII.4, we test the Euler equation using the Hansen GMM and discuss the estimation results. The focus of Section VIII.5 is on using the Hansen-Jagannathan bound diagnostics to test the unconditional version of the Euler equation. Section VIII offers concluding remarks.

VIII.1 An Economy with Capitalist-Spirited Investors

As in Cox, Ingersoll and Ross (1985) and Lucas (1978), we consider a multiperiod representative-agent economy with a single perishable good that is used as the value numeraire. In this economy, the capital market is frictionless. Traded on it are one riskfree asset, with its constant rate of return given by \( r_0 \) and \( N \) risky assets with their prices at time \( t \) denoted by \( P_{it} \) for \( i = 1, \ldots, N \) and \( t \in [0, \infty) \).
The asset prices follow a vector diffusion process:

\[
\frac{dP_{i,t}}{P_{i,t}} = \mu_{i,t}dt + \sigma_{i,t}d\omega_{i,t}
\]  

(8.1)

where \( \mu_{i,t} \) and \( \sigma_{i,t} \) are respectively the conditional expected value, and the standard deviation, of the rate of return per unit time on asset \( i \), and \( \omega_{i,t} \) is a standard Wiener process. The parameters, \( \mu_{i,t} \) and \( \sigma_{i,t} \), in general depend on the time-\( t \) state of the economy (for simplicity of notation, state variables are not explicitly given here).

Consumption adjustment and portfolio rebalancing by the representative investor take place, however, not continuously over time but rather at discrete intervals of length \( \Delta t \). Specifically, \( C_t \) and \( \alpha_t = (\alpha_{0,t}, \alpha_{1,t}, \ldots, \alpha_{N,t}) \) be respectively the consumption flow and the portfolio chosen at time \( t \), where \( \alpha_{i,t} \) is the fraction of time-\( t \) savings invested in asset \( i \) and \( \sum_{i=0}^{N} \alpha_i = 1 \). Then, from time \( t \) to \( t + \Delta t \), the investor stays at his consumption \( C_t \) and portfolio \( \alpha_t \) until time \( t + \Delta t \) when the investor can readjust, for \( t = 0, \Delta t, 2\Delta t, \ldots, \infty \). With the capitalist spirit, the infinitely-lived investor makes consumption and portfolio decisions so as to maximize his expected life-time utility:

\[
\max_{C_t, \alpha_t : t=0, \Delta t, \ldots, \infty} \sum_{t=0}^{\infty} e^{-pt}E_0[\mu(C_t, W_t)]\Delta t
\]  

(8.2)

subject to the budget constraints

\[
W_{t+\Delta t} - W_t = (r_0 W_t - C_t + \sum_{i=1}^{N} \alpha_{i,t}(r_{i,t} - r_0))\Delta t + \sum_{i=1}^{N} \alpha_{i,t} \sigma_{i,t} \Delta \omega_{i,t} \quad \forall t=0, \Delta t, \ldots, \infty
\]  

(8.3)

where \( W_t \) is the remaining wealth at time \( t \) and \( \rho > 0 \) is the time preference parameter. In (8.2), the utility of consumption function \( u(C_t, W_t) \) reflects the dependence of consumption felicity on wealth and is assumed to be thrice continuously differentiable in both \( C_t \) and \( W_t \). As is standard in the literature, we
require that \( u_c(C_t, W_t) > 0 \) and \( u_{cc}(C_t, W_t) < 0 \), where the subscript \( C \) denotes the partial derivatives of the utility function with respect to consumption.

The partial derivative of \( u \) with respect to wealth \( W_t \), \( u_w(C_t, W_t) \), can be either positive or negative, depending on whether the spirit of capitalism dominates the effect of wealth on the utility of consumption. If the spirit of capitalism reflects the representative investor's true preference relations, we should have \( u_w(C_t, W_t) > 0 \). If the Markowitz negative effect of wealth on taste formation dominates, it should be the case that \( u_w(C_t, W_t) < 0 \). Otherwise, when the period utility function is independent of wealth, we should simply have \( u_w(C_t, W_t) = 0 \). Since the discussion in this and the next section does not rely on the exact sign of \( u_w(C_t, W_t) \), we leave this issue to be resolved by actual stock market data in Section 5. For now, we nonetheless use the spirit of capitalism to motivate the discussion.

To derive the first-order necessary condition for the optimization problem (8.2), assume that \( \{C^t, \alpha^t : t = 0, \Delta t, \ldots, \infty \} \) is an optimal life-time policy. Then, as in the variational arguments of Grossman and Shiller (1982), any variation of this policy should not yield higher expected life-time utility. Specifically, suppose that the investor increases consumption by epsilon units per unit time through some interval \([t, t + \Delta t]\) and finances it by selling short \( \frac{\varepsilon \Delta t}{P_{t^k}} \) shares of asset \( i \). During the next short interval \([t + \Delta t, t + 2\Delta t]\), the investor decreases consumption by \( \frac{\varepsilon P_{t^k} + \Delta t}{P_{t^k}} \) per unit time and uses the savings to purchase \( \frac{\varepsilon \Delta t}{P_{t^k}} \) shares of asset \( i \) so as to close out the short position. This self-financed variation of the optimal policy \( \{C^t, \alpha^t : t = 0, \Delta t, \ldots, \infty \} \), will not affect the investor's decisions at other times. It will, however, change the investor's expected life-time utility by

\[
\Delta U(e) = e^{-p t} \mathbb{E} \left[u(C_t^*, e_t, W_t^*) - u(C_{t^*}, W_t^*)\right]
+ e^{-p \Delta t} \mathbb{E} \left[u(C_{t^*}^* - e \frac{P_{t^k} + \Delta t}{P_{t^k}}, W_{t^*}^* - e \frac{P_{t^k} + \Delta t}{P_{t^k}} \Delta t)\right]
- u(C_{t}^*, W_{t^*}^*))] \Delta t.
\]
Since \( \{C^*_t, \alpha^*_t: t=0, \Delta t, \ldots, \infty\} \), is optimal for the investor, a necessary condition is
\[
\frac{d(\Delta U(e))}{de} = 0 \text{ at } e = 0, \quad \text{that is,}
\]
\[
E_t[u_c(C^*_t, W^*_t) - e^{-\rho \Delta t} u_c(C^*_t, W^*_t + \Delta t) + u_w(C^*_t, W^*_t + \Delta t) \cdot \Delta t] \cdot \frac{P_{t \rightarrow t+\Delta t}}{P_{t+\Delta t}} = 0. \quad (8.5)
\]

The Euler equation for the investor's problem is hence as follows:
\[
P_{t \rightarrow t+\Delta t} = e^{-\rho \Delta t} E_t\left(\frac{u_c(C^*_t, W^*_t) + u_w(C^*_t, W^*_t + \Delta t) \cdot \Delta t}{u_c(C^*_t, W^*_t)}\right). \quad (8.6)
\]

It says essentially that the price of an asset at any time should equal the expected future benefit that the asset can generate in terms of today's utility. This Euler equation differs from the standard, state-independent utility-based Euler equation in that the intertemporal marginal rate of substitution in consumption (IMRS) is now a function of both consumption and wealth:
\[
IMRS = e^{-\rho \Delta t} \frac{u_c(C^*_t, W^*_t + \Delta t) + u_w(C^*_t, W^*_t + \Delta t) \cdot \Delta t}{u_c(C^*_t, W^*_t)}. \quad (8.7)
\]

Therefore, in an economy populated with capitalist-spirited investors, we expect its IMRS to be volatile when its wealth process is so. This is true even if the consumption process is quite smooth.

For the sections to follow, we will use the following utility function to derive testable implications and closed-form solutions to the investor's problem:
\[
u(C, W) = \frac{C^{1-\gamma} W^{-\lambda}}{1-\gamma}, \quad (8.8)
\]
where gamma \( \gamma \geq 0 \). However, the sign of \( \lambda \) depends on whether the spirit of capitalism or the negative effect of wealth on consumption tastes dominates:
* If the spirit-of-capitalism hypothesis holds, we should have: \( \lambda < 0 \) when \( \gamma < 1 \) and \( \lambda > 0 \) when \( \gamma \geq 1 \). In this case, we refer to the coefficient \( \lambda \) as the spirit-of-capitalism parameter. Clearly, the higher the coefficient \( \lambda \), the stronger the spirit of capitalism, whether \( \gamma < 1 \) or \( \gamma \geq 1 \).

* Otherwise, if the Markowitz hypothesis (the negative effect) holds, we should have: \( \lambda > 0 \) when \( \gamma < 1 \) and \( \lambda < 0 \) when \( \gamma \geq 1 \).

Note that a power utility function is often used in the existing literature. Thus, the choice of the functional form in (8.8) can facilitate easy comparisons with what we have learnt from the standard state-independent expected utility theory. In addition, the utility function in (8.8) offers technical tractability.

For this utility function, the Euler equation in (8.6) becomes

\[
e^{-\rho t}E_t\left(\frac{C_t}{W_t}\right)^{-\gamma}\left(\frac{W_t}{C_t}\right)^{-\lambda}\left(1+\frac{C_t}{W_t}\frac{\lambda}{\gamma-1}\frac{P_{t+\Delta t}}{P_t}\right)^{\Delta t} = 1.
\]  

(8.9)

Equation (8.9) is the basis for the empirical tests in Sections VIII.4 and VIII.5.

VIII.2 Asset Pricing and Consumption-Portfolio Decisions

In this section, we examine equilibrium asset prices and optimal consumption-portfolio choice. For this purpose, we take the discrete-time model of the previous section to its continuous-time limit, since this improves technical clarity and makes closed-form solutions easier to interpret.

VIII.2.1 Equilibrium Asset Prices

Rewrite equation (8.6) as follows:

\[
e^{-\rho t}E_t\left(u_c(C_t, W_t) + u_p(C_t, W_t)\frac{\Delta t}{P_t}\right) = 1,
\]  

(8.10)
for any risky asset \( i \) and the riskfree asset, where \( \Delta P_{i,t} = P_{i,t+\Delta t} - P_{i,t} \). Subtracting the riskfree asset counterpart of (8.10) from equation (8.10) yields

\[
E_t^u\left[ \frac{\mu_C(C^*_{i+\Delta t}W^*_{i+\Delta t}) + u_C'(C^*_{i+\Delta t}W^*_{i+\Delta t})\cdot \Delta t}{\mu_C(C^*,W^*)} \right] \left( \frac{\Delta P_{i,t}}{P_{i,t}} - r_0 \Delta t \right) = 0. \tag{8.11}
\]

Thus, in equilibrium, the excess return on a risky asset over the riskfree rate has to be orthogonal to the investor's IMRS. That is, \( P_{i,t} \) for \( i = 1, \ldots, N \) and \( r_0 \) have to be determined by the representative agent's IMRS so that no arbitrage profit is possible on the capital market.

Notice that as \( \Delta t \to 0 \), the portfolio and consumption decision process converges to a continuous-time path (see Grossman and Shiller, 1982). In the consumption-based asset pricing literature, it is usually assumed that when asset prices follow a diffusion process, so will the optimal consumption path in the limit, i.e.,

\[
\frac{dC^*_t}{C^*_t} = \mu_C dt + \sigma_C d\omega^*_t, \tag{8.12}
\]

where \( \mu_C \) and \( \sigma_C \), generally dependent on the state of the economy, are the time-\( t \) conditional expected value and standard deviation of optimal consumption growth, and \( \omega^*_t \) is a standard Wiener process. As asset prices are assumed to follow a diffusion process, the investor's wealth must do so as well.

**Proposition 8.1** As \( \Delta t \to 0 \), a necessary condition for the existence of equilibrium in the economy is that

\[
\mu_C - r_0 = -\frac{C^*_t u_{CC}}{u_C} \sigma_{i,e} - \frac{W^*_t u_{CW}}{u_C} \sigma_{i,W} \quad \forall i = 1, \ldots, N, \tag{8.13}
\]

where \( \sigma_{i,e} \) and \( \sigma_{i,w} \) are the covariances of asset \( i \)'s return with, respectively, the representative agent's consumption growth and his wealth growth, i.e.,
\[ \sigma \left( \frac{dP}{P_t}, \frac{dC_t}{c_t} \right) \quad \text{and} \quad \sigma \left( \frac{dP}{P_t}, \frac{dW_t^*}{W_t^*} \right) \quad \text{with} \quad \text{cov} \left( \cdot ; \cdot \right) \]

being the time-\( t \) conditional covariance operator.

To prove this result, note that the term \( u_w(C_{t+\Delta t}^*, W_{t+\Delta t}^*) \cdot \Delta t \) in (8.11) becomes negligible as \( \Delta t \to 0 \). Then, we can take the Taylor series of \( u(C_{t+\Delta t}^*, W_{t+\Delta t}^*) \) at the point \( (C_t^*, W_t^*) \) in equation (8.11) and apply Ito's Lemma to the resulting equation. Simplifying and rearranging the final terms will yield equation (8.13). The details are omitted here.

The pricing equation in (8.13) implies that in an economy populated with capitalist-spirited investors, consumption risk is not the only risk that should be compensated in equilibrium. Instead, the expected risk premium for a risky asset is determined by its covariation with both aggregate consumption and capital stock (i.e., the value of the market portfolio). In other words, the equilibrium pricing model in such economies is a combination of the consumption-based CAPM and the standard Lintner-Mossin-Sharpe CAPM. This is in contrast with the conclusion of the Breeden (1979) consumption-based CAPM.⁶

Substituting the utility function in (8.8) into equation (8.13) yields the following special case:

\[ \mu_{\text{l}} \cdot r_0 = \gamma \sigma_{\text{l}, \gamma} + \lambda \sigma_{\text{l}, \text{w}}, \quad (8.14) \]

which is similar in form to the pricing relation derived by Duffie and Epstein (1990) with recursive utility functions. However, the interpretation of the parameters \( \gamma \) and \( \lambda \) is different under their framework: the parameters measure the investor's non-indifference to the timing of the resolution of uncertainty (see also Epstein and Zin, 1991). As mentioned before (and in the next subsection), under our framework, the

⁶ As examples in the next subsection demonstrate, optimal consumption may be a function of wealth alone when the investment opportunity set does not change stochastically over time. In that case, the equilibrium pricing model collapses to either the consumption-based CAPM (i.e., consumption captures all pricing-related risks) or the standard CAPM (i.e., the market portfolio reflects all relevant pricing risks). However, we are concerned here with the more general case in which investment opportunities do change stochastically.
parameter $\gamma$ reflects the intertemporal elasticity in consumption while $\lambda$ is a coefficient measuring either the spirit of capitalism or the Markowitz taste-shifting effect of wealth.

We can also express equation (8.13) independent of the preference terms. To do so, we can form a portfolio mimicking the aggregate consumption process and then substitute the resulting portfolio together with the market portfolio into (8.13), which yields a system of two equations. Solving the equation system and rearranging the terms, we obtain

$$
\mu_{L^*} - r_0 = \beta_{Lc}(\mu_{c^*} - r_0) + \beta_{Lw}(\mu_{w^*} - r_0),
$$

where

$$
\beta_{Lc} = \frac{\sigma_{Lc}^2 - \sigma_{Lw}^2 - \sigma_{c,w}^2}{\sigma_{Lc}^2 - \sigma_{c,w}^2}, \quad \beta_{Lw} = \frac{\sigma_{Lw}^2 - \sigma_{Lc}^2 - \sigma_{c,w}^2}{\sigma_{Lw}^2 - \sigma_{c,w}^2};
$$

$\mu_{w^*}$ is the expected growth rate of the market portfolio (capital stock), and $(\mu_{c^*} - r_0)$ is the risk premium on the consumption-mimicking portfolio. Thus, the expected risk premium for a risky asset is linear and increasing in its consumption and market betas (it is increasing since both $(\mu_{c^*} - r_0)$ and $(\mu_{w^*} - r_0)$ are positive). Interestingly, Mankiw and Shapiro (1986) tested this pricing equation even before this pricing model is derived under the necessary economic setup. They found that in explaining observed asset returns, equation (8.15) performed better than either the traditional CAPM or the consumption CAPM alone. Given the discussion here, their finding may not seem surprising because both consumption and market portfolio risks will represent distinct determinants of risk compensation if wealth in reality does affect investors’ indirect utility of consumption.

VIII.2.2 Consumption and Investment Policies: the i.i.d. return case

In this subsection we specialize the investor’s problem in (8.2) to include only two assets: one riskfree and the other one risky. In particular, the rate of return on the risky asset is independently and identically distributed (i.i.d.) over time, that is, the investment opportunity set in this economy is constant over time.
This restrictive assumption allows us to easily derive closed-form solutions to the problem in (8.2). In addition, together with the utility function in (8.8), we can identify the investor’s relative risk aversion in wealth with the sum $\gamma + \lambda$.

By the i.i.d. return assumption, the expected rate of return $\mu_t$, and the standard deviation $\sigma_t$ of the sole risky asset are then independent of time $t$ and of the state of the economy. Hence, we write them simply as $\mu$ and $\sigma$. In this continuous-time, two-asset economy, the representative investor’s problem at any time $t$ is rewritten as follows:

$$ J(W_t) = \max_{C_t, \xi_t; t \in [t, \infty)} E_t \left[ \int_t^\infty e^{-r_s} u(C_s W_s) \, ds \right], \tag{8.16} $$

subject to

$$ dW_t = (W_t \{ r_0 + \alpha_t (\mu - r_0) - C_t \} dt + \alpha_t \sigma_t \sqrt{W_t} \, d\omega_t, \tag{8.17} $$

where $\alpha_t$ is now the fraction of time-$t$ savings invested in the sole risky asset and the other notation has the same interpretation as before. The optimal value of the objective function, $J(W_t)$, is referred to as the indirect utility of wealth. Note that due to the i.i.d. return assumption, $J(W_t)$ and optimal policies for (8.16) will be stationary and independent of time $t$. The Hamilton-Jacobi-Bellman equation for this problem is then:

$$ 0 = \max_{\alpha} \left[ u(C_t W_t) + \frac{1}{2} \alpha_t^2 \sigma_t^2 W_t \frac{\partial^2 J(W_t)}{\partial W_t^2} + \left( W_t [r_0 + \alpha_t (\mu - r_0)] - C_t \right) \frac{\partial J(W_t)}{\partial W_t} \right]. \tag{8.18} $$

From the first-order condition for (8.18), we have

$$ u_C(C_t W_t) = \frac{\partial J(W_t)}{\partial W_t}, \tag{8.19} $$

$$ \alpha_t = \frac{(\mu - r_0)}{\sigma^2} \frac{1}{RRA}, \tag{8.20} $$
where equation (8.19) is the envelope condition, and \( RRA = \frac{W_{f}w_{w}}{J_{w}} \) is the Arrow-Pratt relative risk aversion in wealth. Thus, even with wealth-dependent tastes, the optimal proportion of savings invested in the risky asset is linear in both the market price of risk and the investor's relative risk tolerance.

For the special utility function in (8.8), we present the optimal solution to (8.18) in the following proposition. Since the solution technique is standard (e.g., Merton, 1971), we choose to omit the detailed steps.

**Proposition 8.2:** When the investor's utility function is as given in (8.8), the optimal solution to the consumption-portfolio problem (8.18) is

\[
C_{t}^{*} = \eta W_{t}^{*}.
\]

\[
\alpha_{t}^{*} = -\frac{\mu-r_{0}}{\sigma^{2}} \frac{1}{\gamma+\lambda},
\]

\[
J(W_{t}) = \eta \frac{W_{t}^{1-\gamma-\lambda}}{1-\gamma-\lambda},
\]

where

\[
\eta = \frac{\gamma-1}{\gamma} \left( \frac{1}{2} \left( \frac{\mu-r_{0}}{\sigma} \right)^{2} + r_{0} + \frac{\rho}{\gamma+\lambda-1} \right), \quad \eta > 0, \quad \gamma + \lambda \geq 1,
\]

The restriction that \( \eta \geq 0 \) and \( \gamma + \lambda \geq 1 \) is demanded by the transversality condition for the infinite horizon problem. It is clear that when the return on the risky asset is i.i.d., optimal solutions to the investor's problem for the class of power utility functions in (8.8) are not different in form, whether the spirit of capitalism plays a role or not. In all cases, optimal consumption is proportional to wealth and optimal demand for the risky asset is linear in the market price of risk (recall that the standard wealth-independent power utility function is a special case of (8.8), with \( \lambda = 0 \)).
As the empirical estimation demonstrates in Section 5, the parameter $\gamma$ in general has a value greater than 1. In that case, the propensity to consume, $\eta$, is a decreasing function of $\lambda$ because

$$
\frac{\partial \eta}{\partial \lambda} = -\gamma^{-1} \left( \frac{\mu - \mu_0}{\sigma^2} \right) \frac{1}{\gamma + \lambda} < 0.
$$

Intuitively, it means that the higher the spirit of capitalism, the lower the proportion of wealth that the investor wants to consume and thus the higher the savings rate. This implication is plausible since, when the investor can get utility out of wealth-holding, it is rational to save more and generate more future wealth.

In the standard wealth-independent utility case, it is well-known that the relative risk aversion coefficient is simply $\gamma$. However, with wealth-dependent utility of consumption, the coefficient from (8.23) is the sum of two parameters: $\text{RRA} = \gamma + \lambda$. Thus, depending on the magnitude of $\gamma$, investors in a wealth-driven economy can be either more or less risk averse than their otherwise-identical twins in a non-wealth-driven economy.

VIII.2.3 Economic Growth: the one-asset case

In growth models, it is often assumed that there is only one asset to which consumers can allocate their savings. The idea is that with only one asset available, the investors' attitudes toward risk taking will not matter in consumption-portfolio decisions. Rather, their attitudes toward intertemporal substitution in consumption will play an exclusive role in determining their optimal consumption and savings. In this context, we can relate the elasticity of intertemporal substitution in consumption to the two preference parameters and also see how the spirit of capitalism can boost economic growth.

Specifically, continuing with the i.i.d. case of the preceding subsection, suppose that the sole asset is risky with its expected rate of return and standard deviation given by $\mu$ and $\sigma$. Then, substituting
\( \alpha_i = 1 \) into (8.18) and solving the resulting consumption-savings problem, we find that with the representative investor's utility function in (8.8), his optimal consumption is

\[
C_t^* = (1 - \frac{1}{\gamma}) \cdot \left( \mu - \frac{\sigma^2 (\gamma + \lambda)}{2} + \frac{\rho}{\gamma + \lambda - 1} \right) W_t^*. \tag{8.24}
\]

Note that with only one investment asset, the budget constraint becomes

\[
dW_t^* = (W_t^* \mu - C_t^*) dt + \sigma W_t^* d\omega_t = W_t^* \mu \omega dt + \sigma W_t^* d\omega_t, \tag{8.25}
\]

which, together with (8.24), implies

\[
\frac{dW_t^*}{W_t^*} = \frac{dC_t^*}{C_t^*} = (1 - \frac{1}{\gamma}) \left( \frac{\sigma^2 (\gamma + \lambda)}{2} + \frac{\rho}{\gamma + \lambda - 1} \right) dt + \sigma d\omega_t = \mu_c dt + \sigma d\omega, \tag{8.26}
\]

where \( \mu_c = (1 - \frac{1}{\gamma}) \left( \frac{\sigma^2 (\gamma + \lambda)}{2} + \frac{\rho}{\gamma + \lambda - 1} + \frac{\mu}{\gamma} \right) \) is the expected consumption growth rate. Evidently, the expected growth rate in wealth equals that in per capita consumption: \( \mu_c = \mu_c. \)

By definition (see, among others, Constantinides (1990) and Hall (1988)), the elasticity of intertemporal substitution in consumption, denoted by \( \pi \), is the response of the consumption growth rate \( \mu_c \) to a change in the marginal product of capital \( \mu \). From equation (8.26), it is apparent that \( \pi = 1/\gamma \).

That is, the elasticity coefficient is simply the reciprocal of the parameter \( \gamma \).

In summary, the exercise in this and the previous subsection has demonstrated that when the investor's expected utility is wealth-dependent and as given in (8.8), the elasticity of intertemporal substitution is captured by the parameter \( 1/\gamma \) while the relative risk aversion coefficient is represented by \( \gamma + \lambda \). Thus, unlike in the standard expected utility case, the intertemporal elasticity and the risk aversion coefficients are not reciprocals of one another.

---

\(^7\) In continuous-time deterministic growth models, the growth rate in consumption is also found to equal that in capital stock along a balanced growth path. See, for instance, Lucas (1988).
Note that in the special i.i.d. case under consideration, the transversality condition implies $\gamma > 1$. Then, as in the two asset case examined in the previous subsection, the propensity to consume is decreasing and the saving rate increasing in the spirit-of-capitalism parameter $\lambda$. Furthermore, the expected growth rate in wealth or capital stock and that in per capita consumption are both increasing functions of $\lambda$, because in this case \[
\frac{\partial \mu_w}{\partial \lambda} = \frac{\partial \mu_c}{\partial \lambda} = \frac{\gamma - 1}{\gamma} \frac{\sigma^2}{2} + \frac{\rho}{(1 - \gamma - \lambda)^2} > 0.
\] In other words, the stronger the spirit of capitalism, the faster the capital stock (aggregate wealth) and aggregate consumption will grow.

VIII.3 Data Description

To test the Euler equation in (8.9) and estimate the parameters $\gamma$ and $\lambda$, we choose to use monthly observations on stock returns, per capita consumption and per capita wealth in the United States. We select the monthly frequency partly because, as Epstein and Zin (1991) point out, it most likely corresponds to the investment horizon of investors. Besides, monthly data has been used in numerous empirical studies of asset pricing including, among others, Hansen and Singleton (1982), Bossaerts and Green (1989), and Ferson and Constantinides (1991).

Another choice that we have to make concerns the aggregate wealth variable. As Roll (1977) argues, aggregate wealth or the market portfolio is almost impossible to estimate. For that reason, researchers often have to find some proxy. For example, Hall (1978) employs the market value of corporate stocks as a proxy for aggregate wealth in his empirical tests of the life cycle-permanent income hypothesis. In testing the predictions of Tobin's q-theory of investments, Barro (1990) utilizes stock market prices to measure the value of the capital stock or that of aggregate wealth. In tests of the CAPM and related asset pricing models, some market index is also used to approximate the value of the
market portfolio. Following this common practice, we decide to use the broadly-based New York Stock Exchange value-weighted index as a proxy for the representative agent's wealth. The variables employed in our tests and their sources are as follows:

* $C_t$: per capita real consumption in nondurables and services during month $t$. Source: CITIBASE. It equals real consumption expenditures divided by the residential population. The variable $DCON_t$ is the percentage change in $C_t$ from month $(t-1)$ to month $t$.

* $INF_t$: percentage change in the nondurables plus services consumption deflator from month $(t-1)$ to $t$. Source: CITIBASE.

* $RDEC_{it}$: real return on the $i$-th decile stock portfolio in month $t$, for $i = 1, \ldots, 10$. The decile portfolios are the 10 standard CRSP size-based portfolios, with each monthly return for any decile portfolio given by the value-weighted average of the component stock returns in that decile. Decile 1 includes the smallest 10 percent stocks; decile 2 the next smallest 10 percent; and so on. The nominal returns on the deciles are then adjusted by the nondurables and services consumption deflator to get the real returns. The data source for the nominal returns is the Center of Research for Security Prices (CRSP), University of Chicago.

* $TBILL$: real return on one-month Treasury bills, which is the nominal return, obtained from Ibbotson Associates, adjusted by the nondurables and services consumption deflator.

* $RLTGB$: real return on a portfolio of long-term government bonds. It is the nominal return (source: Ibbotson Associates) minus the nondurables and services inflation rate.

* $RLTCB$: real return on a portfolio of long-term corporate bonds. It is again the nominal return (source: Ibbotson Associates) minus the nondurables and services inflation rate.

* $TERM$: term premium, which is the difference between the nominal return on a portfolio of long-term government bonds and the nominal return on the Treasury bills. Source: Ibbotson Associates.

* $DEF$: default premium, which is the excess return on long-term corporate bonds over the short-term interest rate from the one-month Treasury bills. Source: Ibbotson Associates.

* $W_t$: real value of the New York Stock Exchange value-weighted stock price index, which is the nominal index deflated by the time-$t$ nondurables and services consumption deflator. This variable is used as a proxy for aggregate wealth. Source: CRSP.

* $RVWI$: real rate of return on the value-weighted index $W_t$.

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Tables 8.1 and 8.2 report the summary statistics and the contemporaneous correlations for the variables. Many of the stylized facts on seasonally adjusted consumption and asset returns are well known. For instance, decile 1 (corresponding to the smallest firms) has the highest average return and the highest standard deviation while decile 10 has the lowest standard deviation and the lowest average return. In addition, there are distinct patterns in autocorrelations across the size portfolios. Deciles 1 and 2 are more highly autocorrelated at lag 1 than the other size portfolios, which is consistent with what is reported in, among others, Fama and French (1988). The smaller decile portfolios are also more autocorrelated at lag 12, highlighting the January effect.

The average growth rate in real, seasonally-adjusted nondurables and services consumption is 0.0016 with a standard deviation of 0.004. Consumption is therefore quite smooth, relative to the volatility of the returns on the 10 stock portfolios. Figure 8.1 displays the growth rate of consumption along with the growth rate of wealth approximated by the value-weighted index of the NYSE stocks. Consumption growth is negatively autocorrelated at lag 1, with the autocorrelation coefficient being -0.24. Contemporaneous correlations between the consumption growth rate and the stock portfolios are in the range 0.11 - 0.15.

VIII.4 Generalized-Method-of-Moments Tests of the Euler Equation

For the monthly data, we first need to specialize the Euler equation in (8.9) by letting $\Delta t = 1$. The resulting pricing equation is rewritten below:

$$
\delta E \left( \frac{C_{t+1}}{c_t} \right)^{-\gamma} \left( \frac{W_{t+1}}{w_t} \right)^{-\lambda} (1 + \frac{C_{t+1}}{W_{t+1}} \frac{\lambda}{\gamma - 1}) (1 + RDEC_{t+1} | Z_t) = 1
$$

(8.27)

where $\delta = e^\nu$ and $Z_t$ is the time-$t$ information set with respect to which the conditional expectation is taken. Note that the variable $RDEC_{t+1}$ can be replaced by any asset or portfolio return and the Euler
equation still holds. The purpose of this section is to apply Hansen's (1982) generalized method of moments (GMM) to test the above Euler equation.

To briefly explain the implementation of the GMM test, suppose the i-th portfolio is included in the test (we stack the following disturbance for each portfolio into a vector if more than one portfolio is included in the test) and define the disturbance:

\[ \epsilon_{r+1} = \delta \left( \frac{C_{r+1}}{C_r} \right)^{-\gamma} \left( \frac{W_{r+1}}{W_r} \right)^{-\lambda} \left( 1 + \frac{C_{r+1}}{W_{r+1}} \gamma - 1 \right) \left( 1 + RDEC_{r+1} \right) - 1. \]

Then, under the null that the model holds, we have \( E(\epsilon_r; Z_r) = 0 \), i.e., the disturbance must be orthogonal to the information variables in \( Z_r \). The GMM estimation is based on minimizing the quadratic form, \( J_r = g_r^T \Omega_r^{-1} g_r \), where \( T \) is the number of monthly observations; \( g_r \) is the sample analog of the process \( \{ \epsilon_r, Z_r \} \); and \( \Omega_r \) is a positive-definite, symmetric weighting matrix. The minimized value of the quadratic form, called the \( J(\text{df}) \) statistic, is \( \chi^2 \)-distributed under the null hypothesis that the model is true with degrees of freedom, \( \text{df} \), equal to the number of orthogonality conditions net of the number of parameters to be estimated. The \( J(\text{df}) \) statistic provides a goodness-of-fit measure for the model, and a high value implies that the model is mispecified.

The next issue concerns the choice of the information instruments to be contained in \( Z_r \). In this regard, theory has little guidance (Hansen and Singleton, 1982). Like Epstein and Zin (1991), Ferson and Constantinides (1991), and Ferson and Harvey (1992), we replicate our results using different sets of instruments. Many researchers in the past have used lagged values of consumption growth and asset returns to estimate the parameters of the Euler equation. However, as pointed out by Ferson and Constantinides (1991) and Braun, Ferson, and Constantinides (1993), measurement errors in the consumption data and possible mismatching of the consumption deflator with stock returns can lead to spurious rejections of the Euler equation and hence bias the test results. Thus, we exclude consumption
growth from $Z_t$. On the other hand, Fama and French (1989) show that the default premium and the term
premium track business conditions. Ferson and Harvey (1991) find that the return on the market portfolio
tracks a significant variation in a cross-section of size portfolios. Therefore, the set $Z_t$ of instrumental
variables used in the estimation contains a constant and three lags each of the default premium (DEF),
the term premium (TERM), and the nominal returns on the NYSE value-weighted stock price index. We
include three lags of each instrument because, as is well-known, having additional lags helps reduce the
effect of both time aggregation and the possible mismatching of time periods with planning horizons (see,
among others, Epstein and Zin (1991), and Braun, Ferson, and Constantinides, 1993). To check the
robustness of the estimation results under this set of instruments, we experiment with other sets of
instruments and find that the results do not differ significantly. To save space, we concentrate on the said
set of information instruments.

As is usually the case, nine one goal of the Euler equation test is to examine the model’s ability to
explain the variation in returns across assets and over time. In this paper, the other equally important task
is to test whether the spirit-of-capitalism hypothesis or the Markowitz hypothesis is supported by observed
stock market data. Recall that if the spirit of capitalism is empirically dominant, we should find $\lambda > 0$
when $\gamma \geq 1$ and $\lambda < 0$ when $\gamma < 1$, that is, wealth increases direct utility. Otherwise, if the Markowitz
hypothesis is supported, we should observe $\lambda < 0$ when $\gamma \geq 1$ and $\lambda > 0$ when $\gamma < 1$. In the latter
case, wealth "discounts" direct utility.

Table 8.3 reports the estimation results of the parameters $\{\delta, \gamma, \lambda\}$ using various sets of portfolios
and assets. For instance, the estimates for the first six rows in Panel A are obtained each by including
only one of the ten size-based portfolios. In these cases, the parameters are determined so that the Euler
equation for one portfolio’s return is satisfied. For the other cases in which there is more than one asset

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9 See, among others, Hansen and Singleton (1982, 1983), Braun, Ferson and Constantinides (1993),
included, the restriction on the parameter values is stronger because a simultaneous system of Euler equations (one for each asset) has to be satisfied (or as close as possible to being satisfied). The standard errors in parenthesis are calculated using the method outlined in Newey and West (1987) with a lag length of 1.\(^\text{10}\) The p-value in brackets tests the null hypothesis that the estimated parameter equals zero. While the GMM is a powerful test of the Euler equation restriction, the parameter estimates and hypothesis testing using the GMM are only justified through the asymptotic distribution theory. The p-value reported below the J(df) statistic indicates the probability that a $\chi^2$ variate exceeds the minimized sample value of the GMM criterion function.

Let us first focus on Panel A of Table 8.3, which covers the entire sample period 1959:1 - 1991:12. The estimates for the time preference parameter, $\delta$, are between 0.92 and 1.01 and statistically significant in all cases. When more than one asset is included, which presents a stronger restriction on the parameters because they are required to explain asset returns both over time and across assets, estimates of $\delta$ are in the range 0.99 - 1.0. The estimated range for the parameter $\gamma$ (the inverse of the intertemporal elasticity of substitution) is 1.07 - 10.51. The magnitude of $\gamma$ also tends to decrease with firm size. For instance, the point estimate of $\gamma$ in the case of decile 1 is 10.81, while in the cases of deciles 9 and 10 the estimates are respectively 1.40 and 1.54. With more than one asset included in the test, the range for the estimated value of $\gamma$ is 1.29 - 2.75, which is much narrower than in the single asset cases. In all cases, the estimated value for $\gamma$ is more than two standard errors away from zero and the p-value is less than 5%. The evidence thus indicates that the coefficient of intertemporal elasticity is less than one (Hall (1988) and Carroll and Summers, 1989), since $\gamma$ is persistently greater than one.

The point estimates for the spirit-of-capitalism parameter $\lambda$ are in the range 0.78 - 1.23, and in all cases they are many standard errors away from zero, with the lowest p-value being 0%. For example,

\(^{10}\) When a lag length of 12 was used, the obtained Newey-West standard errors were similar to those reported in Table 3.
when the decile portfolios 1, 5 and 10 are included in the test together with a portfolio each of long-term government bonds and of corporate bonds, the estimate for $\lambda$ is 0.79, with a standard error of 0.04 and a p-value of 0.00. Since the point estimates for $\gamma$ are uniformly greater than 1 and those for $\lambda$ uniformly positive, the monthly stock market data supports the spirit-of-capitalism hypothesis, not the Markowitz hypothesis. Therefore, the spirit of capitalism plays a statistically significant role in the stock market price movements.

Based on the estimated values for $\gamma$ and $\lambda$, the implied relative risk aversion in wealth, given by $\gamma + \lambda$, is in the range 2.23 - 11.72. This estimated range is consistent with the result in Friend and Blume (1975), where they conclude that the relative risk aversion coefficient in wealth is at least 2.0.

In 4 out of the 6 single asset cases (the first 10 rows in Panel A of Table 8.3), the overidentifying restrictions imposed by the model are not rejected as measured by the p-values, if we use the 5% acceptance criterion. The lowest p-value is 0% and the highest 58%. When the model is invited to rationalize the variation in returns across more than one asset, the p-values that test for the overidentifying restrictions are small, the highest being 5%. Recall that in the Euler equation-based tests of the consumption-based asset pricing theory, Ferson and Constantinides (1991), Ferson and Harvey (1992), Hansen and Jagannathan (1991) and Hansen and Singleton (1982, 1983), among many others, report rejections of the overidentifying restrictions. Braun, Ferson and Constantinides (1993) find that the time-nonseparability models do not provide a satisfactory explanation for the intertemporal behavior of consumption and asset returns in the U.S. and across other countries.\footnote{There is however U.S. evidence that supports overidentifying restrictions implied by the habit-formation and the recursive utility models. See Ferson and Constantinides (1991), Ferson and Harvey (1992) and Epstein and Zin (1991).} With the spirit of capitalism incorporated into the investor's objective function, the numerical values of the $J(df)$ statistic in the Euler equation tests are much smaller than those obtained under the standard state-independent expected utility
(see, for instance, Ferson and Harvey (1992) and Hansen and Singleton, 1982). Thus, incorporating the spirit of capitalism improves the fit of the model.

The above estimation results are robust to a change in the measure of aggregate consumption. For example, we re-estimated the parameters with the Euler equation, separately using seasonally-adjusted nondurables consumption and services consumption. But, that did not lead to any qualitatively different results. In addition, we report in Panel B of Table 8.3 the estimation results for the two sample subperiods 1959:1 - 1974:12 and 1975:1 - 1991:12. The estimates for γ and λ are similar in magnitude and in statistical significance to what is presented in Panel A. Thus, our conclusion reached above concerning the fitness of the model as well as the spirit-of-capitalism hypothesis is robust.

VIII.5 Hansen-Jagannathan Bound Tests

In addition to the tests reported in the previous section, we apply the Hansen-Jagannathan (1991) diagnostic method to check whether the IMRS implied by (8.8) satisfies the mean-variance bounds for every admissible IMRS or stochastic discount factor. To briefly see the logic behind their method, take a single-period economy from time t to t+1 as an example and suppose there are N traded securities at t, with their time-(t+1) gross returns given by \( R_{i,t+1} \). Then, when the law of one price holds at time t, any admissible IMRS \( m_{t+1} \) must satisfy

\[
E (m_{t+1} R_{u,t+1} | Z_t) = 1 \quad \text{for each } i = 1, \ldots, N, \tag{8.28}
\]

where \( Z_t \) is the time-t information. By the law of iterated expectations,

\[
E (m_{t+1} R_{i,t+1}) = 1 \quad \text{for each } i = 1, \ldots, N, \tag{8.29}
\]

Different asset pricing models may propose different forms for \( m_{t+1} \), but all of them have to satisfy the above equation for each asset i. According to the least squares regression theory, this means there must exist a benchmark portfolio return \( m_{t+1}^{*} \) such that
1. \( E \{ m_{t+1}^*, R_{t+1} \} = 1 \), where \( R_{t+1} \) is a column vector stacked with the \( N \) gross returns \( R_{t+1} \) and \( 1 \) is an \( N \)-vector of ones;

2. For every admissible IMRS, \( m_{t+1} \), it holds that \( m_{t+1} = m_{t+1}^* + \epsilon_{t+1} \), where \( \epsilon_{t+1} \) is the projection error or residual, uncorrelated with \( m_{t+1}^* \).

Clearly, if \( E(m_{t+1}) = E(m_{t+1}^*) \), the above argument implies that \( \text{var}(m_{t+1}) \geq \text{var}(m_{t+1}^*) \), where \( \text{var}(\cdot) \) stands for the unconditional variance operator. Thus, the variance of the benchmark \( m_{t+1}^* \) provides a lower bound for the variance of every admissible IMRS. Hansen and Jagannathan (1991) use this bound as an informal diagnostic test for any asset pricing model: if an asset pricing model is to fit the asset price data, a necessary condition is that its proposed IMRS have a variance at least as large as that of the corresponding benchmark \( m_{t+1}^* \).

To save space, we simply write down the Hansen-Jagannathan bound formula below and refer the reader to their paper (or Ferson and Harvey, 1992) for a detailed derivation (time subscripts are dropped here):

\[
\text{var}(m) \geq \begin{bmatrix} 1_N - E(m) & E(R) \end{bmatrix} \Sigma(R)^{-1} \begin{bmatrix} 1_N - E(m) & E(R) \end{bmatrix} \tag{8.30}
\]

where \( E(m) \) is the unconditional mean of the candidate IMRS, and \( \Sigma(R) \) is the unconditional variance-covariance matrix of the returns in \( R \). The variance bound is clearly easy to estimate.

With the spirit of capitalism taken into account, we have specified a candidate IMRS given by

\[
IMRS = \delta \left( \frac{C_{t+1}}{C_t} \right)^\gamma \left( \frac{W_{t+1}}{W_t} \right)^\gamma \left( 1 + \frac{C_{t+1}}{W_{t+1}} \frac{\lambda}{\gamma - 1} \right). \tag{8.31}
\]

Figures 8.2, 8.3 and 8.4 present the Hansen-Jagannathan bounds respectively constructed from the following three subsets of portfolios: the size-based decile portfolios 1 to 5; the decile portfolios 6 to 10; and all 10 decile portfolios. The mean-standard deviation pairs for the candidate IMRS in (8.31) are all computed by fixing the time preference parameter \( \delta = 1 \). In all the figures, the \( \square \)-curve indicates the mean-standard deviation pairs for the candidate IMRS obtained by fixing the value of \( \gamma \) and varying the value of \( \lambda \), and the \( \Delta \)-curve obtained by fixing \( \lambda \) and varying \( \gamma \).
Take Figure 8.3 as an example. For certain \( \{\gamma, \lambda\} \) parameter values, the resulting mean-standard deviation pairs for the IMRS are inside the Hansen-Jagannathan bounds. For instance, the Hansen-Jagannathan bounds are not violated when \( \gamma \) is fixed at 4.0 and the spirit-of-capitalism parameter \( \lambda \) is in the range 2.92 - 5.02, or when \( \lambda \) is fixed at 3.0 and \( \gamma \) is in the range 3.8 - 7.0. In such cases, the implied relative risk aversion in wealth, which equals \( \gamma + \lambda \), is about 7.0. For some other values of the two parameters, the Hansen-Jagannathan bounds are violated. For example, in Panel A of Table 8.3, the GMM estimates for the two parameters are \( \gamma = 1.53 \) and \( \lambda = 0.88 \), when the decile portfolios 6 through 10 are used in the estimation. The mean-standard deviation pair for the IMRS corresponding to these sample estimates, marked by \( \nabla \), lies outside of the bounds. Another observation that can be made is that the \( \Delta \)-curve corresponding to a fixed value for \( \lambda \) is virtually flat, relative to the \( \Box \)-curve corresponding to a fixed value for \( \gamma \). This phenomenon is due to the fact that with a smooth consumption series, varying the value of \( \gamma \) will mostly change the mean, but not the standard deviation, of the IMRS. On the other hand, given that aggregate wealth is volatile, varying the value of \( \lambda \) even by a small amount can increase the volatility of the IMRS by a large amount. Thus, the ability of our model to generate volatile stochastic discount factors comes mostly from the impact of the spirit of capitalism.

The same inference can be drawn from Figures 8.2 and 8.4 corresponding to the other two subsets of portfolios. The overall conclusion is that for the Hansen-Jagannathan bounds to be satisfied by the model with the data, the relative risk aversion in wealth has to be at least as high as 6.5, which is above the estimates given by Friend and Blume (1975). Since the necessary value for \( \gamma \) is generally higher than 3, the implied intertemporal elasticity coefficient is less than one.

The Euler equation in (8.9) is thus rejected in the Hansen-Jagannathan bound test, but sometimes not rejected in the GMM test reported in the previous section. This seemingly puzzling finding is due to the fact that the Hansen-Jagannathan bounds on the second moment of an admissible IMRS are based on the unconditional version of the Euler equation in (8.9). Hence, the Hansen-Jagannathan bound test can
be understood as a test of the unconditional Euler equation. On the other hand, in the previous section, we used instrumental information variables in the GMM estimation and effectively tested a conditional version of the Euler equation. The test results from this and the previous section suggest that a conditional version of the Euler equation in (8.9) performs better than its unconditional counterpart.

VIII.6 Conclusions
In this paper, we have examined the implications for stock market prices of the hypothesis that investors acquire wealth not just for its implied stream of consumption rewards but also for the social and political status and other benefits that wealth can bring. Among other things, we have found that when wealth acquisition is in part for its own sake, stock prices will tend to be more volatile than when the spirit of capitalism in Weber’s sense is absent. Therefore, even when the consumption process is smooth, stock prices can be volatile. By focussing attention on the implications of the capitalist spirit for stock market prices, we have moved one step closer to understanding the economic impact of social norms, culture and the pursuit of social status. Furthermore, our exercise has lead to explicitly testable restrictions relating the impact of such factors to stock prices and other economic variables. Based on actual stock market data, our test results are strongly supportive of the spirit-of-capitalism hypothesis.
Table 8.1: Summary Statistics

All variables are in monthly values. RDEC\textsubscript{1} through RDEC\textsubscript{10} are the value-weighted real returns on the 10 size-based portfolios. RVWI is the real return on the value-weighted index of the NYSE stocks. TBILL is the nominal Treasury bill return minus the nondurables and services inflation rate. TERM is the total return on a portfolio of long-term government bonds minus the nominal Treasury bill return. DEF is the total return on a portfolio of corporate bonds minus the nominal Treasury bill rate. DCON is the per capita growth rate of real nondurables plus services consumption. INF is the nondurables and services inflation rate. \( \theta \), autocorrelation at lag \( \tau \). The sample period is 1959:1-1991:12 (396 observations).

<table>
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<th>Variable</th>
<th>Mean</th>
<th>STD</th>
<th>( \theta_1 )</th>
<th>( \theta_2 )</th>
<th>( \theta_3 )</th>
<th>( \theta_6 )</th>
<th>( \theta_{12} )</th>
<th>( \theta_{24} )</th>
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<td>-0.03</td>
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</tr>
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<td>0.17</td>
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<td>0.02</td>
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Table 8.2: Correlation Matrix

All variables are as described in Table 8.1. Here, only some selective correlation coefficients are given in part for the purpose of data verification.

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Table 8.3: GMM Tests of the Euler Equation

Estimation of the following Euler Equation is based upon Hansen's (1982) generalized method of moments,

\[
\delta E \left\{ \frac{C_{t+1}}{c_t} \gamma \left( \frac{W_{t+1}}{w_t} \right)^{-\lambda} (1 + \frac{C_{t+1}}{W_{t+1}}) (1 + RDEC_{t+1}) \right\} | Z_t \right\} = 1,
\]

where \( C_t \) is per capita real consumption; \( W_t \) is aggregate wealth, approximated by the real value-weighted NYSE stock index; and \( Z_t \) is the set of time-\( t \) information instruments. For the estimation, \( Z_t \) contains a constant and three lags each of \( \text{TERM}_t, \text{DEF}_t \) and \( \text{RVWI}_t \). The reported results are robust when other instruments are also used. Standard errors, calculated using the Newey and West (1987) method with a lag length of 1, are in parenthesis and p-values indicating the probability that the estimated parameter equals zero are in brackets. The degree of freedom \( df \) is the number of instruments minus the number of parameters to be estimated. The statistic, \( J(df) \), is asymptotically \( \chi^2 \)-distributed and tests whether the overidentifying restrictions of the model are true with the degree of freedom \( df \). \( RRA \) is the implied relative risk aversion coefficient.
Panel A of Table 8.3: Sample Period 1959 - 1991

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Figure 1.1: Multiple Equilibria
Note: DCON is the percentage change in seasonally adjusted real consumption of nondurables and services. RVWI is the percentage change in the real value-weighted index of the New York Stock Exchange stocks.
Note: The H-J bounds, illustrated by the ◼-curve, are constructed from the monthly stock returns on size-based decile portfolios 1 through 5 for the period, 1959:1-1999:12. The candidate IMRS is given by:

\[
IMRS(t+1) = \delta \cdot \left( \frac{C(t+1)}{C(t)} \right)^{r} \cdot \left( \frac{W(t+1)}{W(t)} \right)^{r} \cdot \left( 1 + \frac{C(t+1)}{W(t+1)} \cdot \frac{\lambda}{\gamma-1} \right)
\]

The ◼-curve stands for the mean-standard deviation pairs of the IMRS obtained by fixing \(\delta=1\), \(\gamma=4.0\), and varying \(\lambda\). The ▲-curve stands for the mean-standard deviation pairs of the IMRS obtained by fixing \(\delta=1\), \(\lambda=3.0\), and varying \(\gamma\). The point marked by ▼ represents the mean-standard deviation pair obtained using the corresponding estimates of \(\{\gamma, \lambda\}\) reported in Panel A of Table 3; i.e., \(\gamma=2.75\), \(\lambda=1.22\).

Figure 8.2
Note: The H-J bounds, illustrated by the ◆-curve, are constructed from the monthly stock returns on size-based decile portfolios 6 through 10 for the period, 1959:1-1991:12. The candidate IMRS is given by:

\[
IMRS(t+1) = \delta \left( \frac{C(t+1)}{C(t)} \right)^{\gamma} \left( \frac{W(t+1)}{W(t)} \right)^{\lambda} \left[ 1 + \frac{C(t+1)}{W(t+1)} \left( \frac{\lambda}{\gamma-1} \right) \right]
\]

The ◆-curve stands for the mean-standard deviation pairs of the IMRS obtained by fixing δ = 1, γ = 4.0, and varying λ. The ◼-curve stands for the mean-standard deviation pairs of the IMRS obtained by fixing δ = 1, λ = 3.0, and varying γ. The point marked by △ represents the mean-standard deviation pair obtained using the corresponding estimates of {γ, λ} reported in Panel A of Table 3; i.e., γ = 1.53, λ = 0.88.

Figure 8.3
The H-J bounds, illustrated by the ◆-curve, are constructed from the monthly stock returns on size-based decile portfolios 1 through 10 for the period, 1959:1-1991:12. The candidate IMRS is given by:

\[
IMRS(t+1) = \delta \left( \frac{C(t+1)}{C(t)} \right)^{-\gamma} \cdot \left( \frac{W(t+1)}{W(t)} \right)^{-\lambda} \cdot \left( 1 + \frac{C(t+1)}{W(t+1)} \right)^{-\lambda / (1-\gamma)}
\]

The ◆-curve stands for the mean-standard deviation pairs of the IMRS obtained by fixing \( \delta = 1 \), \( \gamma = 5.0 \), and varying \( \lambda \). The ◆-curve stands for the mean-standard deviation pairs of the IMRS obtained by fixing \( \delta = 1 \), \( \lambda = 4.0 \), and varying \( \gamma \). The point marked by \( \nabla \) represents the mean-standard deviation pair obtained using the corresponding estimates of \( \{\gamma, \lambda\} \) reported in Panel A of Table 3; i.e., \( \gamma = 1.29 \), \( \lambda = 0.78 \).

Figure 8.4