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Structuralist Links through Real Asset Prices and Exchange Rates

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Changing Prospects, Speculative Swings:
Structuralist Links through Real Asset Prices and Exchange Rates

by Edmund S. Phelps[1]

In a set of papers beginning in the 1980s and my 1994 book I have been exploring the *structural sources* of lengthy changes, whether swings or permanent shifts, in the course of business activity. This has meant theoretical analyses and empirical studies of how non-monetary forces operate through *non-monetary* channels to alter the path of employment, unemployment, and hours – in contrast to Keynes and Friedman, who analyzed only employment effects transmitted through monetary channels. The earliest part of this research focused on the short-run and longer-run effects of *actual* changes in parameters and conditions – the world real interest rate and real oil price, the national rate of technical progress, the national wealth and domestic capital stock – which are, in turn, taken to reflect *actual* changes in current preferences, technologies and state variables. The latest part, which I am still caught up in, moves the focus to the long-run effects of economic *institutions* on employment through their impacts on the creativity and adeptness of firms.

In between are a series of papers on a wholly different category of influence on

[1] McVickar Professor of Political Economy and Director, Center on Capitalism & Society, Earth Institute, Columbia University. I am grateful to Hian Teck Hoon and Gylfi Zoega for their collaborations with me in the area of this lecture. I also thank David Jestaz for his comments and help.

economic activity, namely, the *future prospect* (or *prospects* if some people see a different prospect than others). In this view, at any moment there can occur a *prospective* shock, meaning a *new* future prospect – either a qualitatively different development or a quantitative change in the future prospect. This concept is not the “animal spirits” in Keynes (1936). The “prospect” refers to some *future event* (or the set of future events if there is more than one) the present (possibly uncertain) expectation of which has (theoretically at any rate) an influence on business “spirits” – thus on the willingness of existing firms and start-up firms to invest and the willingness of investment bankers and the stock market to finance them. Possibly Keynes thought entrepreneurs’ “spirits” depended on so many prospective future events that it would be arbitrary to solve for the spirits as a function of any particular subset of prospects. Neither does attention to future prospects mean a return to the “optimism” and “pessimism” dwelled on by A. C. Pigou (1927, Ch. VII). His thesis was that the response of investments to a class of future prospects exceeded what “rational” calculation would suggest (“errors in optimism”). My thesis here is that there is an important class of future prospects to which it is “rational” for investments of various kinds to respond.

In the first part of this lecture I consider three sorts of future events and show that, according to the model used, the prospect of each of them transmits through the capital market channel an impact on the course of economic activity. In each case I point to *topical* or *historical* evidence that bears out such an impact on economic activity. In the second part I look at share prices as a proxy for the shadow values of the business assets to get a sense of the *statistical* importance of future prospects in general – call it speculation about the future – relative to the importance of unexpected developments actually observed.

FUTURE 'DEBT BOMBS,' PRODUCTIVITY SURGES AND WARS

In the category of future prospects perhaps the oldest topic among economists is the prospect – for simplicity, the newly arisen prospect – of a delayed-fuse "debt bomb," as I have dubbed it – a "time bomb" of exploding public debt, such as the present enactment of a tax cut to become effective at a future date and with a sunset provision soon thereafter. (Thus there is some small interval over which there is a big government deficit). Another topic in this category is the sudden expectation of a future step-increase in productivity at some specific date. A third topic, which I bring up here, is the expectation of the start of a war or of the end of a war. Maybe a terrorist attack would be a more modern interpretation. In all these cases I will discuss – very informally – some piece of historical evidence.

I will *not* allow for differences of opinion about the size or the timing of the prospective events; where a probability is introduced, it is a subjective probability held by all. This restriction may block dynamics of interest in some cases.[2] Yet it does sometimes happen that a conventional view becomes nearly universal.

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[2] See Phelps (1983). Roman Frydman and Michael Goldberg have recently been engaged in explicitly modeling an economy of "bulls" and "bears."

Future 'debt bombs' and pension overhang

The literature on the present expectation of a future fiscal shock goes back quite far. In the 1980s Keynesian treatments were offered by Olivier Blanchard (1981) and by William Branson (198x). They obtain the proposition that enactment of an explosion of transfer payments or of temporary tax cuts in the neighborhood of some future date $t1$ may be a depressant for real asset prices at that time and, if so, the public's grasp of that prospect will have repercussions for the level of real asset prices in the present. However, the proposition undoubtedly antedates Keynesian modeling. And since many "future shocks" are several years off, few readers can be satisfied with an argument resting on the money wage/price stickiness of a Keynesian model.[3] A few years ago, however, Hian Teck Hoon and Phelps (2001) extended a structuralist model of the closed economy model, this one with a customer market, to show that the sudden prospect of a temporary future tax cut or temporary future transfer payment, if built at once into the expectations of firms, causes immediately – thus, ahead of the event – an anticipatory drop in the shadow price they attach to a unit of the business asset – with contractionary consequences for employment.

It will be easier to argue such a proposition from a structuralist model that less rich, namely, the *turnover/training model* of the closed economy (Hoon and Phelps, 1992). The increase in the public debt around some future date $t1$ can be seen to have

[3] It would be bizarre to apply Keynesian analysis to the pension benefit explosion centered around 2015. Furthermore, as I showed in a talk given in the 1980s at Queens University, Kingston, even when the future prospect is only several years away, if the economy can be projected to reach its medium-run natural rate in a prior year, the present expectation of fiscal stimulus *after* that year cannot cause a recession below the natural level *before* that year.

two contemporary effects: first, to rebalance the budget after the splash of debt issues, it will then be necessary to service the increased debt by an increase in tax rates: either tax rates on *wage income*, which will have deleterious effects on employees' quit rates and thus raise business costs, or on business income, which will directly reduce after-tax profits; second, it will force an elevation of real interest rates at that time, provided that we exclude the Ricardo-Ramsey-Barro case where government debt is not net wealth. Both of these impacts will cause the shadow price of the business asset – the shadow price of an extra job-ready employee – to be lower at that time and beyond than it otherwise would have been, evaluated at the original, or reference, level of employment. By a standard inductive argument it follows that the shadow price at the present moment $t0$ is also depressed below what it was; in fact, we don't need such an inductive argument, since the integral giving the present shadow price involves increased interest rates after $t1$ and decreased gross profits (or quasi-rents) after $t1$, so the impact on the value of the integral from $t0$ is unambiguously negative.

A beautiful observation by Hian Teck is that the short term real interest rate may actual drop at $t0$, since consumption will jump up and thereupon be steadily falling, thus causing the real rate of interest required by savers to be gradually falling toward their elevated future level. Thus the argument of skeptics that the specter of bulging future deficits must not be contractionary, otherwise we would observe an elevation of real interest rates, is unsatisfactory because, theoretically, the contractionary effect does not imply and does not require any such elevation of interest rates – only a drop in the shadow value attached to the business asset.

In the small *open-economy* version of the turnover-training model, in which output is sold at unchanging terms in the world product market, the public debt's net wealth impact on *future real interest rates* will not be operative, since domestic interest rates are given by overseas real interest rates, which the country is too small to affect. Yet the increase in public debt at *t*1, most clearly if it results from a tax cut on wage incomes, has the effect of making workers richer (at the expense of future generations of tax payers). And this extra net wealth may increase employment costs by worsening employees' quit rates, shirking and unreliability.[4]

Some cross-section evidence. There is evidence of the empirical significance of such future fiscal prospects for the present level of economic activity. Investors in many countries have come to recognize a huge looming overhang of pension liabilities in relation to present projections of GDP and tax revenues, owing either to the government's having overestimated the growth of tax revenue when they were setting benefit levels or to having shrunk from raising tax rates by the amount that was necessary for intertemporal budget balance in view of the bulge of baby boomers soon to retire. Allison Schrager, a doctoral candidate at Columbia, has regressed the average price-dividend ratio (and soon the price-earnings ratio) on the projected pension benefits to GDP ratio alongside standard

[4] There exists also an open-economy version of the structuralist model based on customer markets at home and abroad (Hoon and Phelps, 2004). Thanks to these customer markets and its non-Ricardian property that public debt is net wealth, the future step-increase of public debt causes domestic real interest rates to be elevated at that time, which crowds out overseas or domestic customers. As a result, customers are worth less in the present, which, if recognized, immediately prompts firms to raise mark ups and decrease employment. Hian Teck has proved that, on certain

explanatory variables for a cross-section of OECD economies. The results show a statistically significant coefficient of the right (negative) sign on the pension variable. If right, the result means that prospect of delayed increases in public debt and of paper wealth from pension entitlements do indeed impact on the capital market, just as the theory implies. There is also ample evidence that a decrease of share prices has, in turn, contractionary consequences for the level of economic activity as measured by unemployment and participation rates.

Future productivity surges

To analyze the sudden expectation of a future step-increase, or lift, to productivity we can revert to the turnover-training model, which is so convenient. A simple analysis is provided in two recent papers (Fitoussi, Jestaz, Phelps and Zoega, 2000; Phelps and Zoega, 2001.[5]) The basic proposition there is illustrated by a phase diagram in Figure 1 below. Here I have simplified the model further by replacing the premise of rising marginal hiring costs with the premise of constant hiring costs. As a result the locus of points at which the stock of employees is constant at a firm is horizontal. (If employment is increased, the quit rate is increased as a result, with the consequence that there must be an equal increase in the hire rate; but since the derivative of the hire rate with respect to the shadow price of the employee is infinite in the constant-costs case, no increase in the

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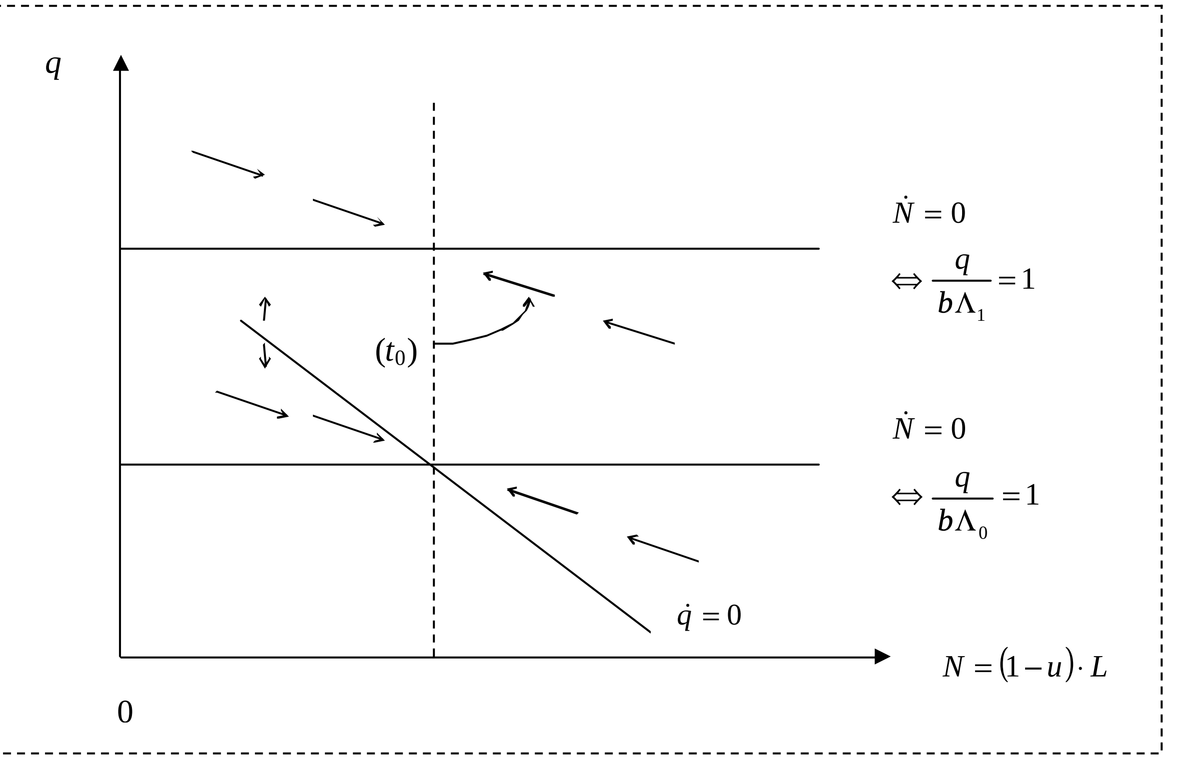
conditions, the real exchange rate abruptly *depreciates* at $t0$, then gradually recovers to its long-run purchasing-power-parity level.

[5] The ink had hardly dried on the manuscript for the April 2000 Brookings meeting where the idea was first presented when another paper emerged, that by Beaudry and Portier (2001), with the same theme. See also the related paper by Steffen Reichold (2002).

shadow price is required to maintain a steady state at the increased employment level.) The phase diagram shows that the shadow price jumps up, causing employment to grow until $t1$, at which point the path of the system must have just reached the new saddle path; from that point, the system follows the new saddle path, proceeding toward the new rest point. The equations of the dynamic system are in the Appendix.



$$\Lambda = \begin{cases} \Lambda_0, & t_0 \le t < t_1 \\ \Lambda_1, & t \ge t_1 \end{cases}$$

Figure 1: Anticipatory Effects of the Prospect and the Realization of a Future Step-Increase of Total Factor Productivity

To gain the essential insight we need only consider an integral expression giving the value of the shadow price at the present time, $t0$. The step-increase in the prospective future rents on the business asset – the employees – unambiguously increases the value of the integral, evaluated at the initial employment path. And, again, any such increase in the shadow price of the employee, unaccompanied by any increase in the opportunity cost of training additional employees, unambiguously stimulates a sharp increase in hiring, which pulls up employment.

Some historical evidence. How can we adduce evidence that the investment boom of the late 1990s in the US economy and several others did rest, at least to an important degree, on newfound expectations of a lift to productivity on the horizon? And, similarly, how can we test the thought that the great investment boom of the 1920s was likewise driven by expectations of rapid productivity growth over the future? Perhaps we can never obtain strong enough evidence to satisfy all skeptics. However, for me at any rate, it is important circumstantial evidence supporting that interpretation of the 1990s boom that productivity growth has in fact been startlingly rapid in the four years beginning in 2000 and appears to be slowing down only very gradually. With productivity growth so rapid in those years, it is easy for me to believe that many managers in industry had information in the second half of the 1990s leading them to expect a very substantial lift to productivity and hence to investment returns in the next several years.

Now consider the 1920s boom. The parallels of that boom with the 1990s boom have led several of us to dig out the Kendrick data on productivity growth in that bygone era. I was stunned to see in Commerce Department's *Long Term Economic Growth 1860-1965* that productivity lifted off like a rocket during the 1930s.[6] Alex Field's calculation in a paper a few months later showed that growth rates of total factor productivity were unprecedented between 1929 and 1941.

I alluded to the productivity gains in the 1930s and, to date, in the 2000s in a couple of pieces in the financial press where I argued that Alan Greenspan was mistaken to think that the recent spate of productivity gains translates into high employment: if the productivity gains were already anticipated in the mid- and late 1990s and were precisely the inspiration for the wave of new investments at that time, then the realization of these gains will not occasion another wave of investment; the realized gains are "how booms end, not how they begin." [7] Employment in this decade too is still pretty slumpy, though now recovering at a rate so rapid that – if it holds up – the unemployment rate ought to reach the neighborhood of 5 per cent by the end of the year. The question is only whether other forces may stall that march back to normalcy, as happened in the late 1930s when the clouds of war stopped in its tracks the recovery from the depression.

War prospects.

The essence of my thesis is as follows. At the present time, the value, to be denoted $q(0)$, that a firm's manager would put on having an additional functioning employee is a

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[6] Phelps (2003b). See also Field (2003).

[7] Phelps, 2003a, 2004a. These and two other essays are combined in Phelps, 2004b.

probability mixture of the value of that employee in the scenario in which war breaks out, weighted by the subjective probability of war, π, and the value in the scenario in which war does not break out, weighted by the probability the war does not break out, $1 - \pi$. The war scenario gives a lower value, since the manager anticipates that there will be an increased tax burden on the firm's profits or sales or both in the event of the war. The conclusion that can be deduced is that any *small increase* in the subjective probability of war *lowers* the value of the probability mixture – the so called "expected value" of the two integrals (the one the no-war integral, the other the war integral). The argument for that conclusion involves the point that the firm's reactions in the event of war do not have to be factored into the result, since small adjustments by the firm in its hiring rate will not have a first-order effect on the value of the integral, the hiring rates having been in the neighborhood of their q-maximizing levels to begin with.

Another proposition that is obvious at least to economists is that, with the passage of time, the date at which the war is feared to break out draws *nearer* – unless $t1$ is pushed back one day (or more!) for every day that goes by after $t0$. So the present discounted value of having an extra employee, which means discounting back to the current time t, not to the initial time, $t0$, is *falling*, since the *losses from the war* in the event it occurs are getting nearer, hence *discounted less heavily*.

Once a war has broken out, the passage of time is the firm's friend: The date at which the war is hoped to *end* draws nearer unless that date, $t2$, say, is pushed back one day or more for every day that the war goes on after $t1$. Here the *gains* from the war's end are being discounted less heavily as the end of the war nears.

Some evidence. If I am not mistaken, then, this analysis leads to the proposition that the prospect of war ahead causes a drop in the shadow prices put on business assets. In almost any theory, there will be, in reflection of that drop, a sympathetic drop in share prices too. And if, during a war, the prospective time left to go before the war's end keeps shrinking as expected or even faster than expected, these shadow prices – and share prices too – will tend to be recovering. Is this what happens, at least in normal cases? Certainly the evidence in the years leading up to World War II bear out this story. Painting with a broad brush, I would say, going largely by my recollection of the data, that share prices fell and fixed investment expenditures as a share of GDP fell in the United States from 1937 to 1941. The same was true, I remember from a look at the data years ago, in the Netherlands over the late 1930s. Then, during the war years 1942 to 1945, the stock market in the United States was strongly rising – in a recovery mode.

I would just add that, as you may know, the real prices of shares did not recover fully to their lofty levels of 1936 and 1937 for quite some time – not until the last years of the 1960s, if I remember correctly. I would say by way of explanation – entirely in the spirit of my thesis that future prospects are important – that the cloud of the cold war came over the US economy by 1948, blocking any chance of a full recovery. With the Korean War of the early 1950s this tension broke out into open conflict.

Drawing conclusions.

If these future prospects and possibly others not treated here are empirically important, then we can conclude that real-life economies with an active commercial character are almost *never* vibrating up and down along their saddle paths. They are *almost always* off the saddle path. Somewhat surprisingly, the trajectory of shadow value of the employee in the above model jumps off the saddle path in spite of the simplifying postulate there of constant (rather than increasing) marginal hiring costs.

The pressing question now is whether the changes in future prospects are pronounced enough from one year to the next or from one decade or era to the next to generate a generally important – and typically fluctuating – discrepancy from the saddle path. I would like in the second part of this lecture to tackle that question.

JUST HOW MUTABLE IS THE OVERALL FUTURE PROSPECT?

A long-time theme of mine regarding fluctuations is that most of the national economies of the past few centuries are *mutable* – especially the more capitalist economies and those highly interdependent with the capitalist world.[8] I mean that a capitalist economy is always changing qualitatively and often lastingly. So the description of a theoretical economy given by a stochastic steady-state model does not really fit this sort of economy. Maybe some macro statistics will pass some tests for stationarity but, if so, that may indicate only that it takes a few decades for an economy to transform itself; it doesn't mean that we

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[8] In *Webster's*: **mutable** adj. **1** prone to change **2** capable of or liable to mutation. (froaLatinmutare to change).

can use a model estimated on 19th century data to obtain the best possible prediction of, say, the rate of technical progress or the long-term natural unemployment rate. Although some of these "parameters" appear to be trendless, they also appear to be capable of shifting perceptibly from one half-century to another. Some theorists speak of regime change or model change, but why not admit that the regime is always evolving, sometimes abruptly, and the model with it? I have to add that I am not exactly sure what it means to speak of the best possible, or true, prediction or the expected value of these things: using what model?

As Part I showed, the shadow value of the business asset is capable of jumping off the saddle path; in fact, the shadow value may never be on the saddle path for a single day of its life except to pass through to the other side on some occasions. (This is true even though I posited constant costs of hiring.) But how much do these shadow prices move in fact? And do their movements, such as they are, match up with shifts (surges) and swings in investment activities of the various kinds – hiring, customer chasing (advertising, cutting markups), plant and office construction, etc.?

Inferential movements in the shadow values

Hian Teck Hoon came across a paper by Casey Mulligan (2002) that examines the part played by public finance distortion in the swings in the American labor supply over the period 1889-1996. For his neoclassical model Mulligan adopts the neoclassical model of labor-leisure choice, with its condition $\mathrm{MRS}(C, \overline{L} - L) = v^h$, where the MRS function gives the marginal rate of substitution (*MRS*) between consumption and work, or "marginal value of time" in terms of the final good, and is increasing in current consumption C and in hours worked L, hence decreasing in leisure; the right-hand side variable, v^h, is the after-tax hourly wage rate. The latter is related to the firms' demand wage v^f and to the proportional tax rate τ on after-tax wage income by $v^h \equiv (1+t)^{-1} v^f$. Invoking pure competition, he equates v^f to the marginal product of labor, MPL. The result is $\mathrm{MRS}(C, \overline{L} - L) = (1+t)^{-1} MPL$. The implication is that an increase of τ, in decreasing the right-hand side, operates to decrease hours, given consumption and the value of MPL. Mulligan argues from his empirical exercise that marginal tax rates are well correlated with labor-leisure distortions at low frequencies, but they cannot explain the distortions during the Great Depression, the Second World War and the 1980s: the decade-to-decade fluctuations in consumption, wages, and labor supply do not jibe very well with this competitive equilibrium model.

From the perspective of my structuralist models, the difficulty with this competitive-equilibrium theory – adopted wholesale by the real-business-cycle school in the 1980s – is that it lacks business assets and the possibility of corresponding fluctuations in the shadow values attaching to those assets; as a result, the model is hopelessly myopic. Hian Teck, viewing the matter accordingly, reasoned that to understand the depth of the downturn in the 1930s it might be of crucial help to introduce such shadow prices. From customer market theory, Hian Teck derived a contrasting employment equation: In the Phelps-Winter model, a firm generally profits from the sluggishness of information, for it can "mark up" its price above marginal cost without at once losing all its customers; this transient monopoly power gives value to its current stock of customers. Let m denote the markup $(P - MC)/P$, where P is price and MC is marginal cost. Then it is straightforward to deduce that $1 + m \equiv y$, where the function y makes m inversely related to $\tilde{q}$, the shadow price that firms attach to a customer when taken as a *ratio* to how much output a customer has to be supplied. (That ratio is fully analogous to Tobin's Q ratio.) In this model, the labor-market relation becomes $\text{MRS}(C, \bar{L} - L) = (1 + t)^{-1}[y(\tilde{q})]^{-1} MPL$. If we substitute for MPL the parameter Λ and, in the closed economy case, substitute ΛL for C in MRS, then L is fully determined. An increase of $\tilde{q}$ pulls up the right-hand side (i.e., it increases the v^h that firms are willing to offer); and, since $\text{MRS}(\Lambda L, \bar{L} - L)$ is doubly increasing in L, that induces an increase in hours supplied. Thus the *markup* wedge between net pay and labor's marginal value productivity joins the *tax* wedge as a potential factor in the determination of the equilibrium (i.e., correct-expectations) path of employment, here average hours. Sometimes both are needed in an analysis because they move in opposite directions, so the one helps to escape from the other.

My point here, after that lengthy exposition, is that we can *infer* what the 1930s shadow price of customers must have dropped to from the 1920s by solving for the $\tilde{q}$ ratio that solves the equation, given the data and given our "knowledge" of the functions appearing in the equations. We can do that for each decade of the past century, thus obtaining a century of inferred $\tilde{q}$ ratios attaching to the business asset we call the customer.

To do the same with the turnover-training model we can use the equation giving the incentive wage as a function of the unemployment rate and the shadow price of the functioning employee to solve for the shadow price that delivers the correct wage rate, taking account of tax rates. Thus we could calculate decadal levels of the shadow value of the employee.

Since these shadow values of the various business assets have a lot of work to do to reconcile the equation with the observed employment levels in the 1930s, the World War II years (1941-45) and the 1980s, one can presume that the required shadow values will exhibit quite a lot of fluctuation from decade to decade. This is one piece of circumstantial evidence for believing that future prospects are important. It suggests that, over the past century, the world real interest rate, trend growth rates of national productivity and tax rates have not shown enough variation to be able by themselves to push the shadow values enough to explain the huge swings of the 1930s, the war years and the 1980s.

What do share price time series say?

To obtain another somewhat indirect view of the movements of the shadow prices of business assets we might do well to examine the time-series of stock-price indexes, such as the Standard and Poor 500 index (and its predecessors).

We would like to find evidence that would help to establish (or to disestablish, as you like) the proposition that share prices are driven by subject understandings of future prospects to an important degree, not just by unexpected developments in the situation and performance of the economy. How to do that? To do that we need to distinguish the actual change of the share price level from the change that was previously expected; then we have to decompose this into the component attributable to surprises in observable things and the component presumably reflecting unanticipated revisions, based possibly on reappraisals of existing information or surprising new information, of the economy's future prospects. The dichotomy is between the unexpected changes in observed levels of present variables and the unexpected changes in the forecast future.

To this end, let Rx denote the logarithmic rate of change of any variable x; and let F (y) denote the expected, or forecast, value of any variable y. In this notation, the familiar Fisher equation applied to the expected proportionate rate of change of the real share price is

$$F(R(p)) = [F(r) - d/p\ ], \tag{1}$$

where p denotes the real share-price level, r is the short-term real rate of interest and d/p is the dividend per share as a ratio to price per share (hereafter, the dividend-price ratio). The utility of this equation lies in its implication that the right-hand side can serve as a proxy for what is not directly measurable, namely the expected algebraic real capital gain.

If we subtract the *actual* R(p) from both sides, add to and subtract from the right-hand side the current growth rate of real earnings per share, R(e), and multiply both sides by minus one we get

$$R(p) - F(R(p)) = d/p + R(e) - F(r) + [R(p) - R(e)]. \quad (2)$$

This equation is reminiscent of the thesis of John Bogle (2000) that there were in the history of the U.S. stock market a few decades in which the dividend yield plus the growth rate of real earnings per share, d/p + R(e), thus the rate of return that would have been earned on stocks if the price-earnings ratio had not changed – neglecting F(r), the right-side of (2) if the bracketed expression were zero – was less than the rate of return from the rise of the price-earnings ratio, R(p) – R(e). The 1950s were one such decade, Bogle observes. But there were not many.

For our purposes we want to look not at the returns to shares but rather at the real *price* of shares as a ratio to, say, GDP per share, since that can serve as a crude proxy for the shadow price of the business asset as a ratio to the asset's productivity and this cousin of the "Tobin Q ratio" is a key determinant of the current investment expenditure on the asset. That suggests rewriting the above equation in the form

$$R(p) - R(e) = [F(r) - d/p - R(e)] + R(p) - F(R(p)) . \quad (2')$$

This equation decomposes the *growth rate* of the price-earnings ratio into two components. The first of these, given by the bracketed terms, is the *expected* rate of real capital gain *net* of the growth rate of real earnings per share. That component can be thought of as the *determinable*, or *explicable*, part of the (proportionate) rate of change of the price-earnings ratio. The first two terms in the brackets theoretically give the *expected* growth rate of the real share price: the lower the ratio of dividend to price and the higher the expected real interest rate, the higher the expected growth rate of the real share is implied to be; and the third term in the brackets subtracts the growth rate of real earnings per share. The residual component, of course, is the expression given by the last two terms. As should be clear, the framework here portrays this latter term as driven by *changes* in future prospects. (Capital gains on shares based on the *nearing* of unchanging expected future events are theoretically reflected in the first two terms. Unexpected growth in earnings will, other things equal, also cause unexpected growth in the share price but not unexpected growth of the price-earnings ratio.) Thus the residual component may be thought of as the *speculative* and hence, from where we sit in real life, the *undeterminable* part of the rate of increase in the price-earnings ratio. There is no way by which an outside observer, even one well informed about social and economic developments and prospects, could know how much of that component is due to this future prospect, how much to that one.[9]

Figure 2 plots separately the two components, using 5-year backward growth rates and representing the expected real interest rate by the actual real rate, over the period 1920-2000. It is clear that the residual, which I interpret as speculative, is large, especially in some epochs, for example, the early part of the gathering boom in the second half of the 1990s. That suggests that changes in the future prospect, though heretofore neglected, are a powerful cyclic force driving employment swings.

[9] If doing these calculations over again I would prefer earnings per share to dividends per share.

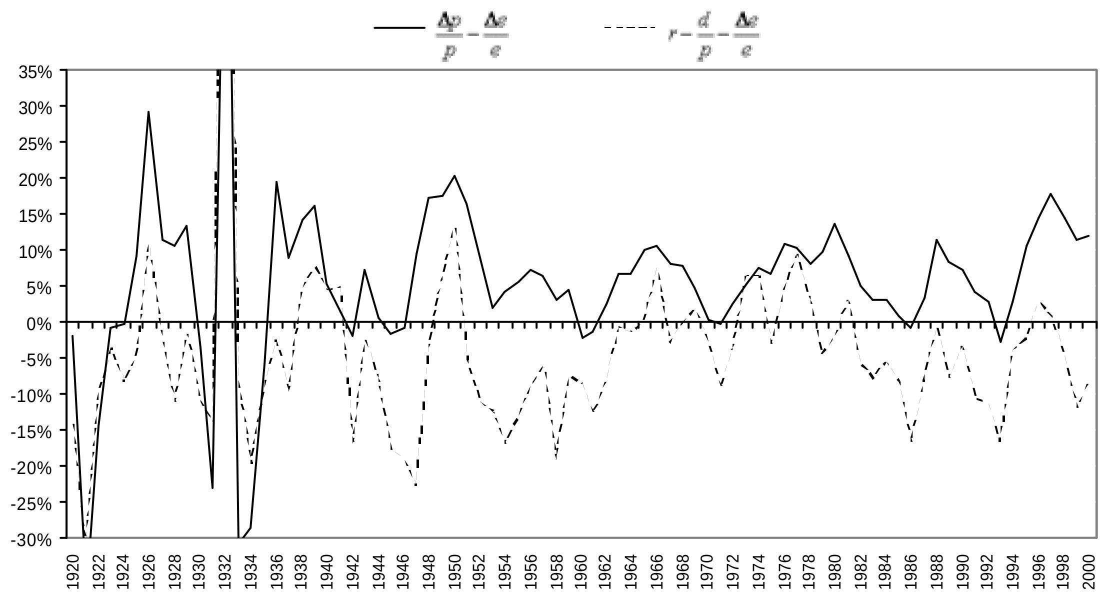

Figure 2: The 5-Year Growth Rate of the Average Price-Earnings Ratio of Standard and Poor 500 Stocks from 1920 to 2000 (Solid Line) and the Part Explained by the Expected Growth Rate of the Average Share Price Net of the Average Growth Rate of Earnings Per Share (Dashed Line).

I would remark that, in the theory here, there is no reason to think that the *determinate component* of the price-earning ratio growth rate, which is partly driven by the *expected* growth rate of the share price, is a more powerful influence on – or a better predictor of – the improvement ahead in business conditions than is the *actual* growth rate of the price-earnings ratio. However, it does seem that the episodes of rapid expansion – the last half of the 1920s, the years 1934-1937, the early 1950s and the latter half of the 1990s – are more strongly associated with a rise of the *speculative* component (i.e., the difference between the total, charted by the solid line and the determinate part, charted by the dashed line) than with the determinate component. However, this question is not central to my main thesis in this lecture.

CONCLUDING REMARKS

This lecture, which is part survey, part fresh look, has made a case that macroeconomics must incorporate future prospects if it is to capture the big swings in economic activity. A corollary is that, theoretically, the level of activity is *always* being driven – up or down – by the prospects for the future on the mind of entrepreneurs, financiers and holders of stocks. The logic of these propositions is straightforward. In the structuralist models that I have been using, firms' rates of investment in employees, customers, plant and office space are a key force determining the course of economic activity, as measured by employment and unemployment.[10] And future prospects are a driver of these investment decisions.

Not only that: Without the addition of future prospects our models will not be able to speak to many policy issues of the day. For example, the supply-siders say, "cut tax rates – after that, cut them again and again." The budgetary deficit is not important to them, it seems. Robert Rubin and Lawrence Summers hinted in the 1990s at a counter-theory implying that budgetary deficits, whatever the strength of their

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[10] A remark in Samuelson's *Economics* (1958) has stayed in my mind: "An outside observer would be struck with the fact that almost no one is producing *finished* goods. Almost everyone is doing work of a preparatory nature, with final consumption a distant goal." (p. 46) He stops short of advancing the thesis here, that an improvement of future prospects, in leading to a cutback in forward-looking production, would *increase* this future-oriented (and also total!) production.

expansionary effect in reducing marginal tax rates, have a *contractionary* effect operating through the capital market – the Wall Street channel. Hian Teck Hoon and I have managed to put the argument on a theoretical footing: A current and prospective pay-down of the public debt would operate to elevate asset prices – an effect that exists whether or not the long rate of interest is simultaneously lowered; and that effect *could* – again, theoretically – elevate the normalized shadow price of customers, $\tilde{q}$, by *enough* to pull up v^h and L by *more* than the contractionary effect from the *supply-sider* channel pushes them down. In this framework, one cannot expect to understand well the medium-term responses of employment (here hours) to fiscal shocks without considering the asset price responses to such shocks, in particular, to current as well as prospective tax changes. The increase in the tax rates in the mid-1990s may have served on balance to *boost* employment, contrary to what would be predicted by the competitive equilibrium framework, because expectations of decreased debt-GDP ratios boost asset values and reduce firms' markups.

What remain to be established are the conditions under which a future prospect will inspire sufficient hopes or fears in the minds of the entrepreneurs, financiers and stock owners to impact on investment activities of various kinds. As others have suggested in other contexts, it may be that only the most vivid and outsized prospects command the attention of the economy's main actors. When a new threat or opportunity arises on the horizon, it may not have been programmed on the right-hand side of their forecasting equation, so there may be a set-up cost to incorporate it into forecasts. And perhaps the more bureaucratic businesses are not moved to act until they expect others to be about to do the same. When future prospects are highly ambiguous, thus open to two or more interpretations, each actor will hesitate to bet on his or her own hunch unless and until he or she sees others doing so.

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APPENDIX

The Dynamic System of the Turnover-Training Model

A simple dynamic system to back the story in the phase diagram is the open economy model in Hoon-Phelps (1992) and Phelps (1994). The closed economy would also serve. Here, firms' assets are their employees, which are costly to train. This appendix posits *rising* marginal training costs. The real interest rate in terms of the economy's product is equal to the world real interest rate, r^*, which is taken to be fixed.

Output is an increasing function of "augmented" labor, $\Lambda_t N^P_t$, where Λ_t denotes labor augmentation at time t and N^P_t denotes the number of employees engaged in production rather than training. We add fixed capital in a simple way by admitting imports of equipment on short-term lease from overseas suppliers with zero transport costs. When employees move from producing to training they need the same equipment. The amount of capital per *augmented* employee, $K/\Lambda_t N$, is determined by the demand function, κ, which is decreasing in the given unit rental, $r^* + \delta$. Output per augmented employee allocated to *production* is given by $f(\kappa(r^* + \delta))$ and the rental per augmented employee is $(r^* + \delta)\kappa(r^* + \delta)$. Output and rental per *unaugmented* production worker are $\Lambda_t\varphi(r^* + \delta)$ and $\Lambda_t R(r^* + \delta)$, respectively.

In this setting, each identical firm, to maximize shareholder value, chooses its current hire rate, h, and its wage, v, to maximize a Hamiltonian function. That function involves the current proportion of employees engaged in training per hiree, given by $\beta(h)$, which is an increasing function of h; the mortality rate, θ; the quit rate, ζ, which is a function of the unemployment rate, u, of the current wage *expected* to be set at other firms *relative* to its own wage, v^e/v, and of nonwage income, y^W, as a ratio to its wage; the shadow price the firm optimally awards itself for every current employee, q; and its current stock of employees, N. The current-value Hamiltonian is

$$\begin{aligned}\{\Lambda_t\varphi(r^* + \delta) - \beta(h)\,\Lambda_t\varphi(r^* + \delta) - \Lambda_t R(r^* + \delta) - v \\ + q\,[h - \zeta((1-u)v^e/v,\, y^W/v) - \theta\,]\}\,N.\end{aligned}$$

The necessary conditions for a maximum give three equations. These equations together with the equilibrium (i.e., correct-expectations) condition, $v^e = v$, yield the three basic equations of the equilibrium path. It is perhaps more convenient to express these three equations in terms of the *normalized* wage, $v/\Lambda\varphi$, the *normalized* shadow price, $q/\Lambda\varphi$, and *normalized* nonwage income, $y^W/\Lambda\varphi$. This introduces the actual and expected growth rate of Λ, to be denoted λ.

For a maximum, q must satisfy the arbitrage equation

$$d(q/\Lambda\varphi)/dt = -[1 + h\,\beta'(h) - \beta(h) - R/\varphi - v/\Lambda\varphi] \\ + [\zeta\,(1-u, (y^W/\Lambda\varphi)/(v/\Lambda\varphi)) + \theta + r^* - \lambda]\, q/\Lambda\varphi. \qquad (1)$$

It says that a capital gain (loss) is needed to make up any shortfall (surplus) of the marginal profitability of employees, $\Lambda\varphi\,[1 + h\,\beta'(h) - \beta(h) - R/\varphi - v/\Lambda\varphi]$, over the economic interest and depreciation entailed, which is $q\,[\zeta + \theta + r^* - \lambda]$.

The optimal wage balances the marginal benefit of a small increase of the wage rate that results from the consequent reduction in the quit rate against the marginal cost in terms of the payroll on existing employees of the same small rise of the wage rate. This gives the condition

$$v/\Lambda\varphi = (q/\Lambda\varphi)[(1-u)\zeta_1(1-u, (y^W/\Lambda\varphi)/(v/\Lambda\varphi)) \\ + (y^W/\Lambda\varphi)/(v/\Lambda\varphi)\zeta_2(1-u, (y^W/\Lambda\varphi)/(v/\Lambda\varphi))]. \qquad (2)$$

Here both lefthand and righthand sides have been multiplied by $v/\Lambda\varphi$ for typographical simplicity. The original righthand side gives the two effects on the quit rate of an increase in pay, both effects multiplied by the normalized worth of the quits averted. The original righthand side is equal to one.

The optimum scale of current hiring is at the point where the cost of speeding up by the amount of one new hire (as a ratio to the employee stock) would be just worth the gain per unit time from adding employees at that faster rate. The condition is $\beta'(h) = q/\Lambda\varphi$, which is convenient to write in the form

$$h = \phi\,(q/\Lambda\varphi), \qquad (3)$$

where $\phi'(q/\Lambda\varphi) > 0$. Using that, we have the equation of motion for employment,

$$dN/dt = [\phi\,(q/\Lambda\varphi) - \zeta\,(1-u, (y^W/\Lambda\varphi)/(v/\Lambda\varphi)) - \theta\,](1-u), \qquad (4)$$

where without loss of generality units are chosen such that $N \equiv 1 - u$.

The astute reader may have noticed that the above paragraph makes use of "rising marginal hiring costs" to ensure an interior maximum with some positive hiring, generally speaking, and always positive output. In contrast, the phase diagram referred to in the text simplifies by invoking "constant hiring costs," so that a small jump of q induces the firms to switch their entire work forces from the producing mode to the training/orientation mode. The conclusions that are the focus are not lost if we follow instead we posit rising marginal hiring costs as in this Appendix.

The stationary loci. To obtain the Asset Price Curve, which is the stationary locus for normalized q in the phase diagram we need only set the left-hand side of equation (1) equal to zero, use (3) to substitute for h, and use (2), which implicitly gives $v/\Lambda\varphi$ as a function, say, $V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi)$. This gives the stationary locus

$$0= -[1+\phi(q/\Lambda\varphi)\beta'(\phi(q/\Lambda\varphi)) - \beta(\phi(q/\Lambda\varphi)) - R/\varphi - V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi)] \\ + [\zeta(1-u, (y^W/\Lambda\varphi)/V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi) + \theta + r^* - \lambda]\ q/\Lambda\varphi. \quad (5)$$

Given $y^W/\Lambda\varphi$, the normalized share price can be shown to be decreasing in $1-u$. With a standard Blanchard-Yaari formulation of the accumulation of nonwage income, Hoon and Phelps show that the long run relationship is also negatively sloped.

To obtain the Employment Curve we proceed similarly, setting the left-hand side equal to zero and again using (2) to substitute $V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi)$ for $v/\Lambda\varphi$. This gives the stationary locus

$$0 = [\phi(q/\Lambda\varphi) - \zeta(1-u, (y^W/\Lambda\varphi)/V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi)) - \theta](1-u). \quad (6)$$

Given $y^W/\Lambda\varphi$, the employment variable can be shown to be increasing in the normalized shadow price. Again, with a Blanchard-Yaari formulation, the long run relationship is also positively sloped.

Dynamics. A common short cut in analyzing dynamic systems takes the more slow-moving of the two state variables, here the non-wage income variable, to be temporarily constant and analyzes the dynamics of the faster-moving of these variables, employment, accordingly. Here, this subsystem is simply equations (1) and (4) after making the substitutions for v and h from (2) and (3):

$$d(q/\Lambda\varphi)/dt = -[1+\phi(q/\Lambda\varphi)\beta'(\phi(q/\Lambda\varphi)) - \beta(\phi(q/\Lambda\varphi)) - R/\varphi - V^s(1-u, q/\Lambda\varphi)] \\ + [\zeta(1-u, (y^W/\Lambda\varphi)/V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi)) + \theta + r^* - \lambda]\ q/\Lambda\varphi, \quad (7)$$

$$d(1-u)/dt = [\phi(q/\Lambda\varphi) - \zeta(1-u, (y^W/\Lambda\varphi)/V^s(1-u,\ q/\Lambda\varphi; y^W/\Lambda\varphi)) - \theta](1-u). \quad (8)$$

Analysis of this medium-run system gives the equilibrium motion along a negatively sloped "saddle path" leading (from either side) to the intersection of the Asset Price Curve and the Employment Curve corresponding to the given $y^W/\Lambda\varphi$ – dubbed here the medium-term rest point.

One kind of shock to this system is a sudden increase in the expected rate of labor augmentation, λ. Analysis of this system yields the intuitive result that such a shift of λ generates an upward shift of both the Asset Price Curve and the saddle path, hence a jump of the normalized share price, followed by a gradual sinking of that variable to its higher medium-term rest-point value and a gradual rise of employment toward its likewise higher medium-term rest-point value.

Even if real-life economies fluctuated only up and down this saddle path, there might be a reason to add a normalized stock-market indicator to the employment growth equation. Such an indicator could serve as a proxy for omitted asset stocks, such as customers and even fixed capital, which is rarely well measured.

The shock highlighted in the phase diagram brings out the major value added of a stock-market indicator. This shock is a sudden anticipation of a one-time shift at a future date in the path of productivity and thus of profits per unit of assets. That shock requires an involved analysis with respect to the *aftermath* of the shock, since the quantum jump in productivity, once it actually occurs, has a quantum effect on the wealth-to-productivity ratio, so that ratio can no longer be held constant for analytical simplicity. But our interest is only in the existence of an expansion phase following the sudden anticipation of the future productivity shift. The reasoning to our conclusions that the asset price immediately jumps and that employment, if initially steady, will then be rising until the moment of the productivity shift appears inescapable. In such a 'bubble' scenario, a normalized stock-market indicator can serve to pick up the expectation of the future parameter shift – in our example, the productivity shift.

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