

Twentieth Annual Conference of
The Irish Economic Association
The ESR/DEW Guest Lecture
Bunclody, Ireland, Saturday April 29th 2006

**Great Catch-Ups and Fall-Backs I Have Seen:
And their Misinterpretations**

by Edmund S. Phelps*

It is an honor to be invited to give this lecture and it's a kick to be speaking to this large group of economists in this exciting country.

My rather ambitious text is an attempt to interpret and model the great tectonic shifts in the global economy that I have witnessed and thought about since I got into the study of economics – around the mid-1950s.

I am first going to tell *three* stories of *gaining ground* on the world economic leader – of “catching up” – and one story of *losing* ground. First, there are the postwar “economic miracles” of fast growth and high activity in western continental Europe (which I abbreviate to “the Continent”) and the fact that the miracles in Germany, France and Italy stopped short, leaving their economies constantly trailing the United States – their prosperity steadily below the U.S. level and their productivity steadily behind. Second, there is the catching-up going on in several (though not all) economies of eastern Europe. Third, there is the extraordinary advance in technical know-how and resulting productivity made by the Chinese economy in recent decades. Then there is the *lost ground* in western continental Europe vis-à-vis the U. S. over the past 10 years – *declines* in relative productivity *level* (in Germany, Italy, Holland and Austria) and *declines* in prosperity as indicated by lower activity and investment rates (especially in Germany, Austria and Holland). Japan is another instance.

This rich historical experience can help us to get right our international macroeconomics. Both growth and business activity, I will argue, are driven by opportunities for *technical progress*, not by the neoclassical concept of human capital and not the taxation of labor, on which most supply-siders are focused. To an important degree globalization has helped countries to have a higher technical potential and to progress toward it more quickly through foreign direct investments and capital inflow generally. But this technical progress does not raise all boats.

This experience can also help us to get right the political economy of economic performance – though to talk about those things requires us to make some distinctions that are lost in some discussions. What I will call *capitalism*, or (for emphasis) a *well-functioning capitalism*, means a well-functioning system of *free enterprise* – a system that well motivates new entrepreneurial ideas and chooses well which ones to finance; it does not mean *laissez-faire*, or “free market” in the sense of a small public sector, minimal regulation and no social insurance, hence low tax rates.¹ Eastern European nations adopted *socialism* in the Interwar period and *market socialism* in the 1980s, systems with not much freedom of enterprise and with little or no private ownership. Continental western Europe in the Interwar period opted for what is known as *corporatism* (and in postwar terminology the *social market economy*) – a system that, while retaining private ownership, constricts enterprise by submitting it to demands of interest groups, reducing the rewards from innovation, and regulating start up and closings of businesses and plants.

It is necessary also to specify some notion of economic performance. For me, it is about productivity and prosperity. High productivity is to be valued by “advanced economies” in large part because the high wages it supports enable workers to afford to take jobs offering high job satisfaction. Prosperity means high job satisfaction – jobholders developing through the

* McVickar Professor of Political Economy, Department of Economics, and Director, Center on Capitalism and Society, Earth Institute, Columbia University. A grant from the Kauffman Foundation is gratefully acknowledged. JEL areas: E21, E22, G21, H50, O16 and others.

¹ So I do not regard the anarchistic Wild West as a species of capitalism. Similarly, a corporatist system mired in state corruption might not exemplify a well-functioning corporatism.

change and challenge of their work – and low unemployment, thus ample access to such jobs. High performance means making the best of existing conditions. It is not reliably measured by the growth rate of anything.

Expressed in the above terminologies, I will infer from the historical experience to be examined here that the *non*-capitalist economies tend not to be high-performance economies. They can – under *favorable market conditions* – grow very fast and have a high level of activity (and job satisfaction too) while doing it; but then, of course, they slow down as they “grow out of” those initial conditions. In the end they generally fail to pull up to the *levels* of either *productivity* or *prosperity* that the well-functioning capitalist economy tends to reach, thanks to its system for well-directed innovation and its culture of enterprise. They lack the dynamism needed to *sustain* the catch-up, the high job satisfaction and thus the high employment.

Another hypothesis supported by this review is that the high performance of which capitalism is capable (under ordinary circumstances) does not hinge on the side condition of a free market – a *laissez-faire* social policy that leaves low wage workers and unemployed workers without social insurance and that deprives the public of valuable services in order to keep tax rates low. The premise of corporatist Europe – that prosperity and human development and productivity are fine but not at the expense of any of the “social partners” and certainly not at the expense of its job security – is disastrously wrongheaded. (A society should view a policy move from the viewpoint of citizens’ *life* prospects rather than make the crude demand that every social partner gain from every transaction.) The economies built for job security have suffered the biggest swings in economic activity and have for two decades exhibited the highest unemployment in the OECD. The twin socialist goals of high development and high employment require the *dynamism* that only well-functioning institutions of capitalism can generate.

1. The Continental Economies’ Part-way Catch-Up (ca. 1953 – 1975)

As everyone knows, when World War II came to an end western continental Europe found itself with a large setback in hourly productivity and thus

income per worker relative to the level in the early 1940s.² On top of that, a widening gap between hourly productivity on the Continent and the level in the U.S. had developed throughout the Interwar period (more precisely, from the early 1920s to the early 1940s) – something Hitler vexed over. There followed the “economic miracles” of rapid productivity growth from the early 1950s well into the 1970s, in which Germany, then France and lastly Italy caught up *largely* but *not fully* with productivity in the U.S.³

What caused these miracles and why did the miracle economies stop short of matching productivity and activity to the U.S. levels? There is more than one interpretation. In the neoclassical view, the Continent’s loss of output per worker can be traced to a loss of physical capital, owing to the war-time destruction, and perhaps a loss of human capital too, as the death or retirement or flight of well-educated people was not offset during the war (and may not during the 1930s) by new entrants with similar education.⁴ Symmetrically, the economic miracles were simply the result of rebuilding capital and when that wound down the curtain fell on the miracles. A failing of this theory, among many shortcomings, is that to the extent the Continent’s catch-up was just a matter of putting the railroad ties and bricks back together, much or most of the benefit in terms of hourly productivity would have been achieved by the mid-1950s. But in fact, the Continent’s catch-up did not even begin until the early 1950s: its output per man hour *relative* to U.S. output per man hour was *falling* until the early 1950s.⁵ Evidently the Continent had a steep mountain to climb just to come near the still-rising output per man hour in America’s dynamic economy, where productivity was growing almost as fast as in the 1920s and 1930s.⁶

² GDP *per capita* in Germany fell from 71.4% of the U.S. level in 1941 to 44.7% in 1950 according to data from Angus Maddison (1995). See his Groningen University website.

³ EU-15 GDP per hour worked went on catching up with the U.S. in the next 15 or 20 years, rising from about 70 per cent of the US level in the mid-1970s to nearly 90 per cent by the mid-1990s. But this gain represents catch-up by other economies (such as Greece, Spain, Portugal, and Ireland) more than further catch-up by Germany, France and Italy. See *Eurostat Structural Indicators*, 2004.

⁴ I do not know of a written neoclassical account of the Continent’s catch-up. I am simply applying the framework to produce one for discussion.

⁵ See the charts and discussion in Robert J. Gordon, “Two Centuries of Economic Growth: Europe Chasing the American Frontier,” NBER WP 10662, August 2004.

⁶ The stunning resilience of productivity growth – indeed, a significant acceleration of productivity – through the 1930s Depression (right to 1941) is studied in Alexander Field, “The Fastest Growing Decade,” *American Economic Review*, September 2003.

In the supply-siders' view, the onset of the Continent's catch-up was generated by Ludwig Erhard's 1948 injection into West Germany of tax cuts and a more pro-competition stance, a liberal economic policy (liberal in European terminology) that spread to most other countries on the Continent; and what halted the catching-up was a return of high tax rates and barriers to competition. It is true that the activity rate in Europe (the ratio of employment to working-age population) began rising strongly *relative* to the activity rate in the U.S. around 1952. But that might have been the result of a recovery of the marginal productivity of labor once the bricks and rail ties had been put back. Also, the relative activity rate regained only its 1929 level in the mid-1950s; a far higher relative activity was reached from the mid-1950s through most or all of the 1960s; moreover, as I will argue later, that was more the result of wealth falling behind wages than after-tax wages rising thanks to a 1948 tax cut. In any case, I do not believe the reduction of tax rates in the late *1940s* can be credited with the speed-up of productivity growth that started rather abruptly in the *late 1950s* and extended over the 1960s – the high years of the economic miracles.

The correct view, to my mind, is that the fast two-decade-long climb of productivity from the mid- or late 1950s to the mid- or late 1970s (depending on the country) and the accompanying fall of unemployment to very low levels was driven by a rapid injection of new technologies – though it is a semantic issue whether we ought to call that “innovation.” This injection of technologies was so extensive that it could not have been primarily the result of one or more original innovations on the Continent. It largely depended on *technology transfer* from overseas.

One part of this technology transfer story – the growth part – is hardwired into the brain of every economist and does not require a manual or pictures.⁷ In this story, the best (and generally the latest) product or

⁷ Gershenkron is cited in this context. Recent work includes Richard Nelson, “A Program of Study of the Processes Involved in Technological and Economic Catch-Up,” ms., Earth Institute, Columbia University, 2004; Philippe Aghion and Peter Howitt, “Growth with Quality-Improving Innovations,” September 2004, forthcoming, *Handbook of Economic Growth*; Gylfi Zoega, “Notes on Institutions, Innovation and Economic Performance,” ms., Center on Capitalism and Society, Earth Institute, Columbia University, July 2005.

method available from supplying sector i of country j is called the *best practice* technology from that sector. In general, any economy will have one or more sectors in which even this best technology, B_{ij} , falls short of the best in the *world*, \bar{B}_i . A measure of the gap between the two is $1 - (B_{ij}/\bar{B}_i)$; another is $\log \bar{B}_i - \log B_{ij}$. In these terms, the key point is that, other things equal, the emergence of such a gap is an opportunity for the country to advance its best practice by “transferring” to itself the world’s best practice. The *larger* the gap the greater will be the advance in best practice achieved by the transfer. Furthermore, the more widespread such gaps in the economy are the wider the opportunities for such advances. This suggests a simple macroeconomic hypothesis: the *growth rate* of a country’s mean best-practice – its best-practice technology *as a whole* – is faster the larger is the *gap* between the country’s mean best practice and the *world* level. What happened in Germany, France and Italy was that, once the war and the postwar political unrest was over and the bricks and rail ties were back together, the external gap between best practice at home and best-practice technologies overseas (most of them first introduced in the U.S.) was so wide that those countries’ best practice grew faster than that in the U.S. The catching-up process, which had been delayed, went into full swing.

A more general formula for the growth rate of best practice contains an induced part, just discussed, and an autonomous part. In the former, $\psi(\cdot)$ is the coefficient of imitation and adaptation. The autonomous growth is the *innovation* of products and methods based on original, possibly indigenous ideas, rather than imitation and adaptation of overseas products and methods. An example of such a formula is

$$(1) \quad \frac{\dot{B}_j}{B_j} = \Psi(\bullet) \left(\frac{\bar{B} - B_j}{\bar{B}} \right) + \frac{I_j(1, \bar{B}/B_j, B_j/A_j, \dots)}{B_j}.$$

There is a little more to it than that. Productivity and employment too are largely influenced by *average* practice, not best practice. Average practice is driven by best practice yet the dynamics may be quite slow and several factors intervene in determining how close average practice comes to best practice. In the model by Nelson and Phelps, the rate at which the

best-practice technology in a country is diffused over the economy is a function of the internal productivity gap between best practice, B_j , and average practice, A_j , as well as the speed with which the best-practice technology travels across the economy.⁸ Let $\Phi(\cdot)$ denote the coefficient of diffusion, which measures the speed with which a new best-practice technology spreads through the economy. Then the familiar equation is

$$(2) \quad \frac{\dot{A}_j}{A_j} = \Phi(\bullet) \left(\frac{B_j - A_j}{B_j} \right).$$

It is now obvious that when best practice suddenly grows faster, average practice does not at first respond; only gradually does its growth rate rise to the growth rate of mean best practice.⁹

The *other* part of the story about the miracle period – the period of very fast growth from the late 1950s through the 1960s and into the early 1970s – is about employment. What were the employment effects of the prolonged rapid growth of average technical progress? Let me use a version of one of my models of the natural unemployment rate – a turnover-training model of a small open economy having a single good traded in a perfect global market (so the exchange rate is a constant).¹⁰ In this model and not only in that one, country's j 's technical progress rate, λ_j , influences the unemployment rate through two channels, one the fast-working asset value channel and the other the slow-working wealth-supply channel. (I will think of this pseudo-parameter as measuring the growth rates of both best practice and average practice, which are equal and constant over the medium term.)

In the former channel, ex ante λ_j is subtracted from the ex ante real interest rate in the equation giving the demand wage relative to productivity – the wage that employers can pay and still earn a normal return on their investments in their employees (hence a zero pure profit). The logic is that the expected growth of the technology, in causing the expected opportunity

⁸ Richard Nelson and Phelps, "Investment in Humans, Technological Diffusion and Economic Growth," *American Economic Review Papers and Proceedings*, 61, May 1966, 69-75.

⁹ This might explain the finding (which if I am right is an exaggeration) by Peter Temin that *best practice* on the Continent caught up to the U.S. by the mid-'50s. See Temin, 'The golden age of European growth reconsidered,' *European Review of Economic History*, 6, 2002, 3-22.

¹⁰ Three non-monetary models are built and studied in Phelps, *Structural Slumps*, Harvard, 1994.

cost of training to trend upwards, is a reason to advance some future training outlays into the present, just as the interest rate is a reason for deferring some present training outlays into the future.¹¹ A sudden *increase* of λ_j unaccompanied by a coincidental increase of the overseas real interest rate, r^* , causes an immediate speculative jump in the value per unit placed on the business asset, which is the job-ready employee, just as a sudden *decrease* of the interest rate would do; the effect of that, taken alone, is an immediate jump in the hiring rate and thus an expansion of employment. With unemployment falling and the quit rate rising, the asset price will be rising but not keeping up with productivity, and the ratio of the asset price to productivity will gradually subside back to its normal level.

In the other channel, the ex post λ_j is subtracted from the ex post real interest rate in the equation that determines the population's steady-growth income from wealth relative to productivity. A sudden increase of λ_j , unaccompanied by an equal increase of the overseas interest rate, generates a *gradual decline* of income-from-wealth relative to productivity, just as a fall of the interest rate would do; the effect, taken alone, is a decline in quit rates, which in turn causes a slow increase of employment – and slow decline of unemployment.

This model presents in one respect a classical picture of the catch-up process in a single country or region of a larger world. With the step-increase in λ_j , consumption jumps up more than wage income jumps, thus forcing the current account from balance into deficit for a time. Ultimately, the Continent's wealth slips back *relative* to the now faster-growing output and thus also *relative* to the corresponding valuation of domestic firms, so that some of the Continental firms' capital (in the form of employees with firm-specific know-how!) must be financed through debt or shares sold overseas. I would comment that this structural view of the Continent's mounting net debtor position is at 180 degrees to the monetary view held at

¹¹ This effect was first derived in Christopher Pissarides, *Equilibrium Unemployment Theory*, Oxford: Blackwell, 1990. The second edition treats the subject in an entirely non-monetary framework. *Structural Slumps* looked for a growth effect only in a closed-economy context and then with a model (the 2-sector) lacking a valuation effect.

the time. (Milton Friedman expressly denied that the “dollar shortage” was a “fundamental structural” phenomenon.¹²)

To get a sense of the size of this effect note that between 1955 and 1965 the U.S. current account was always in surplus and the cumulative surplus in the period mounted up to about 8 per cent of 1960 national income.¹³ (The previous decade’s total was half that amount; in the following 15 years there was a rough cumulative balance.)

How did this phenomenal Continental speed-up impact on the rest of the world? I finally worked out an answer from an extension of the model to a theoretical world of just two regions, say, the Continent and the U.S. The starting point is that the speed-up, in turning the U.S. into a net creditor nation, creates a *wedge* between the wealth owned by nationals and the capital in the U.S. economy – more precisely, a *positive excess* of national wealth over domestic capital, which is counterbalanced by the opposite difference on the Continent. This fall of domestic capital relative to national wealth in the U.S. translates into to a fall of output per worker and the *wage* relative to *national wealth*; the effect in turn is a *decrease* of employment.

A brief remark may help – as may the Appendix. If the Continent were the only region in the world and experienced a speed-up), the model would predict an immediate increase of the real interest rate exactly equal to the increase in the rate of technical progress – at least if the workers’ utility function is logarithmic in current consumption; and, as a consequence, there would have been no boost to to employment on the Continent. With the Continent only a part of the world, the speed-up *still drives up the world interest rate*, though not by as much as the increase in the rate of technical progress on the Continent. Clearly it is precisely through this rise of the world real interest that the U.S. is induced to save more and invest less, leading to its net creditor position (or increase in that position). Incidentally,

¹² “Why the Dollar Shortage?” *The Freeman*, 4, no. 6, December 14, 1953, reprinted in Friedman, *Dollars and Deficits*, Englewood Cliffs, N.J., Prentice-Hall, 1968, 211-217.

¹³ *Economic Report of the President*, February 2003, Tables B-103 and Table B-27. The trade surplus includes paid and unrequited exports but the calculation of the current account surplus subtracts an item that includes exports donated through foreign aid. The current would have been twice as large had there been no aid and Europe had paid for all the exports from the U.S.

data confirm that the world long-term interest rate was elevated from 1955 to 1970 compared with the 1970s and the present decade.¹⁴

This sheds light on an interesting way in which the globalized marketplace works. Although the economic policies of governments may be designed for economic justice, the private marketplace is not designed to be just – and in fact it is neither systematically just or unjust. It did *not* direct some private capital to the Continent because the Continent was poorer or less advantaged; it sent capital there only because the Continent’s technical progress rate soared above the U.S. rate, which pulled up the world interest rate and sucked capital out of the U.S. economy into the Continent, which it would have done even if the Continent had initially possessed superior technologies – as long as the expected and actual growth rate of that technology became faster than the U. S. growth rate. Nevertheless, it usually happens that when a nation or region suffers a catastrophe, such as wartime destruction, global private capital tends to flow to the affected area – if the area takes steps aimed at reconstruction and catching-up. The global marketplace can therefore be said to be humanitarian. The foreign aid of the Marshall Plan was small next to the private capital that helped fuel the Continent’s catch-up miracles.

Two final comments on the Continent’s catch-up. First, the major *slowdowns* that struck first Germany, then France, later Italy in the 1970s provide a test of the model. The model predicts that the fall of the expected rate of productivity growth had an *immediate* negative effect on employment through its impact on the *net* interest rate (net of the rate of technical progress) and a *gradual* effect through the resulting rise of wealth relative to capital, productivity and the wage. In fact there was an enormous climb of unemployment rates between 1975 and 1985 and in France and Italy a further upward trend from 1985 to 1995. (I will footnote two papers giving further evidence in the attached footnote.¹⁵)

¹⁴ See the chart on p. 320 of *Structural Slumps*, op. cit.

¹⁵ The proportionate increase of the unemployment rate is highly correlated with the magnitude of the slowdown of total factor productivity among the G7 economies. See Hian Teck Hoon and Phelps, “Growth, Wealth and the Natural Rate: Is Europe’s Jobs Crisis a Growth Crisis?” *European Economic Review*, May 1997, 549-57. See Fig. 2, p. 556. Evidence from wealth-

The other point is that the slower growth rates of productivity were nearly down to the U.S. rate. The productivity gaps in Germany, France and Italy contracted a little further until the early 1990s yet did not go any lower after that. The Solow-Bailey computations put hourly productivity in 1992 at 92% of the U.S. level in France and Germany.¹⁶ OECD data put men in the labor force in 1996 at about 75% of working-age population in France and Italy as against 87% in the U.S.¹⁷ (This is before any adjustment for demographic differences.) The unemployment disparities are well-known.

If my view is right, the Continent's leading economies were thus revealed in their true colors. The Continent's economies were not conducive to low unemployment and not suitable for reaching world-class productivity levels. The shortcoming of the system was the Continent's corporatist economic system (or systems), a system constructed of big unions, big employer confederations and big banks, all mediated by a big public sector – a system that had been built up starting in the 1920s on the belief that it would be better than capitalism, better for employment and productivity. That system had *seemed* in the catch-up years to prove itself a good system because it was not understood in those years that unemployment would go on being extraordinarily low only as long as growth would be extraordinarily rapid; and not understood that the growth rate differential between the Continent and the U.S. was sheer catch-up, so it had to end when the catch-up could not go further.

My research suggests that the root of the problem is the system's deficiency of dynamism, not the rule of law or high tax rates or poor schooling. I suspect there no single institution whose replacement or repair would make the corporatist system dynamic. The Nelson-Phelps model points to the dearth of higher education on the Continent; Amar Bhide extends that model to say that there will be no entrepreneur or financier to

income ratios is discussed in Phelps, 'Lessons in natural-rate dynamics,' *Oxford Economic Papers*, 52, January 2000, 51-71.

¹⁶ Robert M. Solow and Martin N. Bailey, "International Productivity Comparisons Built from the Firm Level," *Journal of Economic Perspectives*, 15, September 2001.

¹⁷ See Table 3 in Phelps and Gylfi Zoega, "The Search for Routes to Better Economic Performance," *CESifo Forum*, 1/2004, Spring 2004, 3-11.

demand innovations in an economy where there is no expectation of potential users with the willingness or capability to pioneer their adoption.¹⁸ Acemoglu, Aghion and Zilibotti say the rarity of higher education also impacts negatively on a would-be innovator's ability to develop an innovation.¹⁹ Furthermore, as I have theorized, the Continent's corporatist system – its capital markets, its corporate governance and labor union powers, its employment laws such as job protection legislation, and the state's and the public's corporatist attitudes toward enterprise – are important too and critically so.²⁰ (Phelps and Zoega, *op. cit.*, have looked at some of these indictments of corporatist institutions.)

Was it instead the case that the Continent's economic system had been better – perhaps superior to the capitalist systems – in the early postwar years, before the rot set in, as argued by Mancur Olson, by Enzo Tarantelli and by Michael Bruno and Jeffrey Sachs? Or, at the other extreme, was the system poor from the start of the postwar period as well as the prewar period, which Herbert Giersch and (more recently) I have supposed? It is an engaging historical issue, but there is no time to take it up here.

2. Catching-Up in Eastern European Economies (ca. 1995 – 2005)

For me there are two salient features of eastern Europe's "transition" since the early or mid-1990s. One is that the countries where productivity growth has been pretty fast – since 1995, say – are primarily those that had enjoyed a relatively high productivity level before their economies were converted to communism. The growth rate of labor productivity (per employee) since 1996 has averaged 5.4% in Poland, 4.0 % in the Slovak Republic, 3.0 % in Hungary and 2.8% in the Czech Republic. The other fact is that activity rates are quite depressed even in that fortunate group that had been relatively advanced before their communization. The activity rate – employment in per cent of working-age population – is about 52 % in

¹⁸ Amar Bhidé, "Non-destructive Creation: How Entrepreneurship Sustains Development," in G. T. Vinig and R. van der Voort (eds.) *The Emergence of Entrepreneurial Economics*, Elsevier Science, Amsterdam, forthcoming 2005.

¹⁹ Daron Acemoglu, Philippe Aghion and F. Zilibotti, "Distance to Frontier, Selection and Economic Growth," NBER Working Paper 9066, 2002.

²⁰ Phelps, "The Continent's High Unemployment: Possible Institutional Causes," Dec. 2002.

Poland (the unemployment rate about 19 %), 57 % in the Slovak Republic (unemployment about 18 %), 56% in Hungary (unemployment about 6 %) and 65 % in the Czech Republic (unemployment 8 %).²¹

It should not be surprising that these four countries have had better productivity growth than some other parts of eastern Europe: During the communist decades, there must have been a lot of leveling down, so the lifting of communism from the region gave the above four countries, whose economies had once excelled, the prospect of regaining their relatively high productivity through good investments and adoption of foreign technologies. Accordingly, the global capital market has awarded these countries large capital inflows, which have served to boost their investment rates and thus their growth rates, presumably on the same principle that we inferred earlier in looking at the catch-up on the western Continent: Capital inflow is attracted to economies whose *potential* levels of productivity are high relative to *actual* levels, so that their expected productivity growth rates are relatively high. Yes, capital markets equalize expected rates of return to investing of all kinds, but they achieve equalization by awarding an extra investment rate to the economies with the best growth prospects (otherwise expected rates of return would not be equal). OECD data confirm that since 1996 the four countries have run significant current account deficits while Russia and Ukraine have not.²²

I would observe about these growth rates that they are certainly not eye-popping. (The August 25 *FT* calls Poland's growth rate "steady but slow" – and Poland's is one of the faster growth rates!) In the high years of the western economic miracles, say, from 1960 to 1968, the growth rate of GDP per employee in Spain was 6.8 %, Italy 6.3 %, France 4.9 % and West Germany 4.3 %; Japan's growth rate was 8.9%.²³

²¹ The 2001 male activity rates are 59 % in Poland, 62% in Slovak Republic, 64% in Hungary and 74% in the Czech Republic. Western rates are much higher: Italy 69%, France 69%, Germany 73%, Spain 74%, Austria 76%, Sweden 77%, Holland 83% and Switzerland 88%. *OECD Labor Force Statistics, 1981-2001*, Part III, Paris, 2002.

²² *OECD Economic Outlook*, 77, June 2005, and *Transition Report 1999: Ten Years of Transition*, London, EBRD, 1999. The euro area is in current account surplus. (I suppose special factors are behind the huge current account deficits in Armenia and Azerbaijan.)

²³ *Historical Statistics 1960-1981*. OECD, Paris, 1983.

I observe also that the four eastern European leaders have low activity – in Poland and Slovakia it reflects huge unemployment – right in the midst of their economic miracles. With activity so low during the catch-up years, what will happen to activity and unemployment rates when the miracles end? If the model I set out earlier applies well enough to these four eastern countries, either because it is literally rather descriptive or there are other models having analogous implications (e.g., the customer model), the inevitable slowing of productivity in these nations – down, say, to the productivity growth rate in the U.S. – will add greatly to their unemployment. The 1996 paper by Hoon and Phelps found that a two-percentage-point slowdown of productivity in Germany and France was followed by a near-doubling of the unemployment rate.²⁴ Certainly such a slowdown might push unemployment well over 20% in Poland and Slovakia.

When I worked at the European Bank for Reconstruction and Development in the early 1990s we used to wonder: What sort of economic system will the economies of eastern Europe make a “transition” to? Will it be something like the corporatist systems on the western Continent – big banks, big enterprises, big bureaucracies and maybe big unions, with plenty of barriers to entry, state influence over financing, poor corporate governance and so forth – or something more like a well-functioning capitalist system? When around 2000 Vaclav Klaus came to Columbia, I asked him whether the Czech Republic was transiting to capitalism or to corporatism. He was cordial but he did not answer the question.

Each of these four countries made decisions that may have contributed to the disappointing growth and low activity rates (and in some cases high unemployment). In Poland, there is the overhang of its substantial state-enterprise sector, though perhaps that is compensated by its receptivity to new, small private enterprises. Outside Poland, there are the flawed privatizations, which left many enterprises under the managerial control of the old guard without any redress for share owners and left some industries with not even the oligopolistic competition that Schumpeter came to admire in his 1941 book *Capitalism, Socialism and Democracy*. Evidence supporting these and other charges has been gathered and examined in

²⁴ Hoon and Phelps, op. cit., Figure 2.

papers by Roman Frydman, Janos Kornai, Andrei Shleifer and others.²⁵ Part of the problem may be that these nations are so small that there is a tendency toward high concentration and toward interventionism and cronyism. The U.S. has the exceptional advantage that it is very big and even its larger cities are very big. (I recall John Reed's saying after years as CEO of Citibank, "I've never met the mayor. I don't want to – I might like him.")

Whatever the faults of the eastern countries' economic system, the macro evidence I have reviewed – the unspectacular growth despite a yawning productivity gap and the generally low activity rates – suggests to me that even the four relatively successful eastern countries have not managed so far to "transit" to a good economic system: they are simply pulled forward by the huge productivity gap vis-à-vis the west.

3. China's Rapid Catch-Up (ca. 1990 – 2005)

I am eager to discuss the remarkable catching-up going on in China, since Amar Bhidé and I have recently set out an interpretation of China's growth strategy China's resulting relationship with the west.²⁶

A great many of the facts about this phenomenon are well known – the very rapid growth rate of productivity, especially since 1990 (though also in the previous decade), and a very high rate of saving. A recent World Bank paper digs deeper: A large public-sector fiscal surplus contributes a significant chunk of current national saving. Business saving, that is, retained earnings (after interest), is an even larger contributor – the companies do not pay dividends to speak of.²⁷ Of course, households might be imagined to step up their consumption by an offsetting amount on the calculation that that they will enjoy capital gains as a result of the retained earnings. But the household sector is also a somewhat high saver compared

²⁵ Evidence from surveys is shown in Roman Frydman, Marek Hessel and Andrzej Rapaczynsky, "When Does Privatization Matter?" *Quarterly Journal of Economics*, November 1999, 1153-91, and the same authors' "Why Ownership Matters," C.V. Starr Report 98-22, April 1998.

²⁶ Bhidé and Phelps, "A Dynamic Theory of U.S.-China Trade: Making Sense of the Imbalances," CCS Working Paper no. 4, July 2005. See also Bhidé and Phelps, "Classical Theory vs. the Real World," *Wall Street Journal*, Monday, July 25, 2005.

²⁷ Louis Kuijs, "Investment and Saving in China," World Bank Policy Research Paper 3633, June 2005. Available at http://papers.ssrn.com/paper.taf?abstract_id=756985.

to the personal saving in comparator countries. Share owners, it seems, are not expecting high rates of return on the extant investment opportunities or they worry that business investments will be badly allocated over the opportunities. The financial sector thus faces a business sector making poor allocations of saving and creating investment risks with little accounting transparency and without good corporate governance. In these and some other respects China is not yet one of the advanced economies.

In view of how underdeveloped its institutions were in 1980 or even 1990, though, it is clear that China has made progress with its economic institutions. It is also clear that more decades of rapid growth will require further fundamental development on the institutional front. China is a highly practical and flexible country and the economy it has fashioned is highly entrepreneurial. There are myriad private entrepreneurs who submit projects to banks and municipal bodies for approval and backing; and there are public entrepreneurs, so to speak, operating in municipal councils and other governmental structures. The challenge now is to improve radically the quality of the entrepreneurship in China and the quality of the financiership that serves (or tries) to separate worthy investments from unworthy ones.

It is all the more remarkable, therefore, that China economic strategy's has succeeded in driving its growth through the acquisition and assimilation of advanced technologies – and this in a country in which large areas were fairly primitive not long ago and some still are. When the east Asian tigers embarked on their stage of rapid productivity growth, some students of the process characterized the increase in productivity as more a function of increased physical capital than of improved technologies – not that technologies did not improve (they did) but simply that the increase of physical capital was enormous and was presumed to account for the lion's share of the productivity increase. This is done through technological “transfers” by means of joints ventures, inward foreign direct investment (FDI), licensing and even purchase of foreign companies or parts of companies. All this is something qualitatively new. Some observers have suggested that new technologies can be imported more easily than in the past thanks to the digitalization of some methods of production. Technologies may also be more public than they were a century ago and

many of them are easily accessed through the Internet – such as the method for building a bomb. (Moreover, in Shanghai technological research centers are springing up that aim to be world-class.)

Observers in the west, however, have been fascinated by another element of the Chinese miracle – the extraordinary excess of saving over investment and thus a current account surplus. This was the impetus for the Bhidé-Phelps paper – the puzzle of the the huge trade surpluses that China is running with the west, especially with the U.S.; this is all the more puzzling in the context of rapid catch-up growth, which, as the review of the western Continental catch-up and the eastern European catch-up suggest, has generally been associated with current account *deficits* in the past. Some media commentators have termed the chronic trade surplus “mercantilist” though without offering a rationale for it or even admitting the possibility of a rationale. Academics taking the classical static view have regarded the trade surpluses as simply a policy error.

Bhidé-Phelps sets out a rudimentary model in which a trade surplus early on is central for an optimal growth trajectory. The novelty derives from two features of underdevelopment shaping trade between backward economies like China and advanced economies like the U.S. First, the initial comparative disadvantages in China are an artifact of the uneven technical advances made by the U.S., so China should be able to erase those disadvantages through technological transfers bought with surpluses of exports over imports in goods and services.²⁸ Furthermore, China may want to squirrel away precautionary balances in order to have the money to take advantage of big-ticket opportunities to buy technologies or whole companies that may present themselves in the future.

Second, the diffusion of new products requires learning, which takes time. The principle is Nelson-Phelps again, but Bhidé-Phelps applies it to consumer goods new to the Chinese. The initial dearth of familiarity in China with a wide range of western consumer goods operates as a drag on

²⁸ Inward FDI *can* finance domestic investment financed by an increase of imports or decrease of exports, thus possibly creating a trade *deficit*. But subsequent repatriation of future earnings requires a trade surplus. And much FDI inflow may be “sterilized” through purchase of offsetting assets overseas.

import demand for them. Clearly this may also tip the trade balances into surplus. In older terminology, deciding to adopt the novel and learning to master it takes time and may pose other “frictional” costs; such “investing” in the novel may even hit “absorptive capacity. The fact that consuming the novel is damped by this consideration is not necessarily a reason to fill in with increased consumption of the familiar; the optimum rate of saving may be quite high as long as it can be stored in overseas assets until such time as the reserves can be profitably invested. There will come a time when investment will exceed saving. We find no irrationality in this strategy.

One could imagine that the rest of the world, especially the United States, would write China a note thanking it for entrusting with us an excess of their saving over their investment, which permits us to invest more than we save. The reason so many in the west are ungrateful is that they think they live in a Keynesian world in which China’s restraint in expanding consumption demand is an outgoing tide that lowers all boats. You might think it is some kind of paranoia to believe that Keynesianism lives today, when every schoolboy knows that Milton Friedman and Ned Phelps, with their natural rate, killed off the Phillips Curve and the whole Keynesian apparatus for purposes of any medium- or long-term analysis decades ago. (Robert Lucas attacked that apparatus even for short-term analysis.) In fact, though, this Keynesian view is frequently expounded even in some of the most prominent and admired financial newspapers.

In the two-region version of my model of the natural rate, however, a decision by the other country – now China – drives down the world real interest rate, which induces our country to invest more and, in view of the reduced rate of return, to save less. This pulls up employment and the real wage as well, as we are pulled up our “wage curve.” Although the real interest rate on our saving will be reduced, the other side of the coin is an increase in the real wage per hour worked. A formal analysis would show that the Chinese shock operates to drive a beneficial *wedge* between the wealth of our country and the capital invested in our country – a wedge that has the effect of reducing propensities to quit and shirk and of lengthening the hours that we are willing to work, thanks to the rise of the wage relative to wealth (and the income therefrom). So Americans ought to thank China

for playing a positive and significant role in the generation of generally high asset prices and thus high investment and high employment by historical standards over the past ten years.

4. Recent Economic Declines in Continental Western Europe (1995 --)

It must be hard for Europeans to see the *rest* of the world economy enjoying the stimulus of the ICT revolution – having healthy investment, rapid growth and rather low unemployment (even five years after the boom’s peak). Since at least 1998 (if not 1996), most of western continental Europe has been gripped by a new slowdown, one that has brought the productivity growth rate *far below* the rate enjoyed in the U.S. and in most of the rest of the world – China, India, South Korea, Scandinavia, central Europe and Ireland, to name most of the buoyed up regions. In the eurozone, the growth rate of hourly productivity in the business sector grew at 2.1% per annum from 1988 to 1997, precisely as in 1978 to 1987; but grew at 0.9% since 1998. Although this slowdown is nothing next to the shuddering slowdown from the mid-70s the early ’80s, it is understandable that Europeans consider it far more dire than the earlier one. The question is the cause of that new slowdown – and how to make up the lost ground.

I started arguing in the year 2000 that the Continent – I was focused on the western part – had lacked the vibrancy and flexibility to latch on to the investment boom of the second half of the 1990s, which had been driven by the novel opportunities opening up for commercial development of the internet. In some recent papers I laid that failure to the under supply of higher education, the underdevelopment of the stockmarket, the bureaucratic red tape impeding or discouraging entrepreneurs from starting up firms and entrepreneurs generally for creating new plants or outlets – in short, several features of the western Continent’s corporatist system.²⁹ I had supposed that the present decade – the ‘00s – would be a good decade for the Continental economies, as they went about busily doing the necessary R&D to imitate and adapt what they found to be promising overseas, made the plant and

²⁹ Phelps and Zoega, ‘Structural booms,’ *Economic Policy*, 25, April 2001, and Phelps and Zoega, ‘The Search for Routes to Better Economic Performance in Continental Europe,’ *Forum*, CESifo, Spring 2004, 3-11.

equipment investments needed to produce, built the required distribution systems and did the marketing to create demand. But several economies on the Continent – one after the other – instead went into a *slowdown* in the waning years of the ‘90s and the present decade (the ‘00s). I was puzzled, since those economies had not experienced the boom and speed-up that came to the U.S., the U.K., Australia and Ireland in the mid-‘90s. It was only when forced to come up with an answer to this puzzle at a conference organized by Willi Semmler at the New School (formerly the New School for Social Research) in 2003 that a hypothesis came to me.³⁰

My thought was that the Continent had let too much time go by while several other nations had made the new investments to develop the internet. The result, I suggested, was that the Continent’s share of investment activity in the world would now be depressed for several years. I had in mind the capture of customers and also the cost advantage that first movers are apt to acquire. There must be few pieces of the internet remaining whose development has not long been underway and captured by one or more of the world’s economic players – from Samsung to Nokia. (That would further account for the low real interest rates of the past few years.) This would account for the inability at this point for the Continent to get into the game.³¹ Much the same hypothesis of first-mover advantage is stated in a paper by two Reati and Toporowski:

“In the uneven process of structural change that characterizes [long waves], the winners are the countries that adapt...more rapidly to the new techno-economic paradigm. The countries that do not succeed in [changing] are excluded from the benefits of the paradigm...”³²

While such an Anti-Gershenkron Effect – followers discouraged when the leader leaps forward so the catch-up is attenuated – might pan out, the theory of it appears to be ambiguous. It may be that the farther ahead the world leader goes in some sector(s), the *smaller the probability* that the

³⁰ Phelps, ‘Some notes on monetary policy and unemployment,’ in Willi Semmler, ed., *Monetary Policy and Unemployment*, London, Routledge, 2005, 16-19.

³¹ Angelo Reati and Jan Toporowski, ‘An economic policy for the fifth long wave,’ *Banca Nazionale del Lavoro*, 57, 231, December 2004, 395-437. The article surveys the literature on the “long wave” and the latest wave, which arises from new computerization and information technologies.

³² Reati and Toporowski, op. cit., p. 404.

laggards making a given research effort would “catch on” to the new technology over a given period; that, *taken alone*, does argue for their deciding to *reduce* their R&D effort. But the increased *size* of the gap and hence of the magnitude of the catch-up if researchers succeed, *taken alone*, warrants *stepping up* R&D efforts at imitation (or improvement) of the foreign technology. (My interpretation of the Continent’s economic miracle from the mid-‘50s into the ‘70s need only assume that its research effort at imitating/adapting/improving the superior foreign technologies was positive, however larger or smaller it *would have been* in the absence of the huge gap vis-à-vis the U.S.; the crux of the thesis is that this effort was extraordinarily productive because of the size of the gap.) The facts appear to be mildly supportive of the Anti-Gershenkron Effect though perhaps not persuasively so. The Continent’s R&D and its investment outlays have *not increased* as a share of output since advent of the ICT boom in the second half of the ‘90s and have *decreased* in Germany and France. Productivity growth has shown little or no sign of picking up since its abrupt drop around 1998.

A second hypothesis on the slowdowns (starting here and there between 1996 and 2001) has been slowly taking shape. Recall again the framework of Nelson and Phelps: Average practice on the Continent responds far more slowly to a given increase in best practice than does average practice in the U.S. owing to a range of burdens and barriers present on the Continent, such as a far narrower base of higher education on the Continent than in the U.S. The dearth of higher education causes entrepreneurs to face a longer wait to break than is the case in the U.S.; thus the *demand* for advances in best practice, so to speak, increased less on the Continent than in the U.S.³³ (The same dearth, in raising the cost of knowledgeable personnel, is also a drag on the *supply* of such advances, as argued by Aghion et al.³⁴) But why did this *demand* for advances in best practice actually *decrease* in the Continental economies. I suggest that part of the answer is that the *revolutionary* character of the new ICT technologies looming ahead in the mid-1990s effectively nullified the effect that the increased technological gap between the Continent and the U.S. would otherwise have had. In short, *novelty* is another factor influencing the

³³ Bhidé, *op. cit.*, 2004, and Phelps, 2003.

³⁴ Aghion

effectiveness of the technological gaps -- between average practice and best practice and between best practice at home and best practice overseas – in driving both innovation and diffusion in the home market. As a result, some of the European firms that *are* innovative prefer to market their more radically innovative products in the U.S. This hypothesis not only helps to explain why, ten years after the start of the boom, the Continent has not shown – not yet – the pick-up of productivity growth that the U.S. did in the second half of the '90s and more strikingly in the first half of the present decade. This hypothesis also help to explain why productivity *decelerated* on the Continent while the U.S. economy saw its productivity *accelerate* in the mid-'90s and then again more strongly in 2002): it made no sense on the Continent to innovate in the old technologies and the environment was not hospitable to innovations in the new technologies. It may be that the Continental consumers and firms on which an innovator in the Continent would have to depend for the adoption of new products were little equipped to cope with the novelty and unfamiliarity of the goods made possible by the ICT revolution; so the flow of new goods and techniques to Continental consumers and firms may have diminished as a result. (The Continent's economic miracles did not begin until the '50s and many of the technological advances taken from the U.S. were not technologically novel and not even very new.) The silver lining is that time will erode the novelty of the new technologies: So we can expect that the Continent will begin a long, belated catch up sooner or later

Another answer to the puzzle of the Continent's productivity slowdown that the entrepreneurs' prospects of large productivity advances in the U.S. as well as eastern Europe and some other regions, in bringing about high U.S. investment rates relative to saving rates, diverted capital investment from the Continent to the U.S. (Some of the Continent's firms not only launch their innovations in the U.S. but often find it convenient to conceptualize them, develop them and produce them there as well.) This is acute in Germany, where "crowding in" as redirected an appreciable part of national saving into a huge current account surplus – more exporting and less importing. But more exports do not translate into growth.

The absence of a pick-up of productivity growth (or even the deceleration) has deprived the Continent of a lift of entrepreneurial expectations that would boost a range of investment activities and thus lift economic activity. Furthermore, the strong investment expenditure in the U.S., now boosted by the “honorary investment” in the form of a huge budgetary deficit, in tending to decrease investment and increase saving on the Continent, [has](#) also operated to decrease the Continent’s economic activity, according to my theory. In fact, we do see higher unemployment rates in Germany, Switzerland, Austria and Luxembourg (and Japan too) than prevailed before the ICT boom started in 1996 while in the U.S. the unemployment rate is significantly reduced. (Yet the data on economic activity are complicated. Employment as a ratio to working age population has risen more strongly on the Continent than in the U.S. since 1996.³⁵)

It is not certain how this will end for the Continent. One would think that after the Internet is fully “deployed” and investment activity in the rest of the world has subsided as a result, the Continent would recover to its former productivity growth rate. But these growth rates meander quite a lot. In another decade or two another technological revolution may break out and – unless the Continent reforms itself – the Continent will again miss the boom and may have hurdles to pass in catching up.

To conclude: Opportunities to make up lost ground, as arose in postwar Europe, or increased capacities to gain ground, as in China, lead to faster growth and higher employment for a time. But, even if the growth and jobs are stimulating and gratifying, they do not signify a capability to reach high productivity and sustain high employment. Episodes of fast growth and high employment are no evidence that a nation’s economic institutions and economic culture enable high performance. The Continent’s slow growth now is no evidence that its institutions and culture perform worse than we thought. [Indeed, it is reasonable to expect that the productivity *growth* rate and, with it, the unemployment rate will soon return to their zone over most](#)

³⁵ Perhaps the decrease of labor force participation in the U.S. reflects the enormous rise of real-estate and stock-market wealth there. Part of the Continent’s increase reflects surely labor-market and welfare reforms on the Continent.

of the -'90s. And it is plausible to think that the Continent will ultimately gain back some of the cumulative lost ground.

Yet a comparison of mean unemployment rates and mean productivity levels in the past three decades suggests relatively poor economic performance on the Continent – not unlucky market forces. The Continent's meager response to the investment chances of the '90s suggests the main cause: It is an insufficiency of dynamism for high productivity, prosperity and job satisfaction – not too much welfare. Yet few in the public see it and many of them are averse to change. This situation is a danger to the world.

APPENDIX

This appendix will study the equations of the open-economy version of the turnover-training model specialized to an approximately *steady-growth state* in which the unemployment rate and normalized wealth are treated as constants: First, the zero pure profit condition gives an equation in the wage, v , as a ratio to the productivity, Λ , of employees on the production line,

$$v/\Lambda = 1 - \beta [\zeta(1-u, y_h^w/v) + \theta + r - \lambda], \quad (\text{A1})$$

where the quit rate $\zeta(\cdot)$ is increasing in employment per unit labor force, $1 - u$, and in the household's income from wealth, y_h^w . Second, incentive wage analysis gives another equation in v/Λ , the equation of the “wage curve”:

$$v/\Lambda = \beta [(1-u)\zeta_1(1-u, y_h^w/v) + (y_h^w/v)\zeta_2(1-u, y_h^w/v)] \equiv V(y_h^w/v, 1-u), \quad (\text{A2})$$

where the right-hand side – the V function – is increasing in $1 - u$ and in y_h^w . The pair (A1) and (A2) implicitly determine $1 - u$ as a decreasing function of y_h^w/v . (In this model, wealth is the root of all evil.) Third, defining y_h^w as spendable non-wage income, that is, $(r + \theta - \lambda) W$, where W denotes wealth, we derive from the Blanchard-Yaari-Euler equation the steady-state rate of interest:

$$r = \rho + \lambda + [1 + (v/y_h^w)(1-u)]^{-1} \theta. \quad (\text{A3})$$

This makes y_h^w/v increasing in $1 - u$ and in $r - \lambda$:

$$y_h^w/v = \{(r+\theta-\rho)/[\theta-(r+\theta-\rho)]\}(1-u) \equiv \Omega(r-\lambda, 1-u; \rho, \theta), \quad \Omega_1 > 0, \quad \Omega_2 > 0. \quad (\text{A3}')$$

For the *small* open economy the model may be closed by equating the (constant) real interest rate to the world real interest rate, r^* :

$$r = r^* \quad (\text{A4S})$$

To see the implications of that simple system first substitute (A4) and (A3') into (A1) and (A2). Then equate the demand wage given by the right-hand side of (A1) to the “incentive wage” given by the right-hand side of (A2).

The resulting equation determines $1 - u$ as a function of r^* and λ

$$1 - \beta [\zeta(1-u, \Omega(r^*-\lambda, 1-u)) + \theta + r^* - \lambda] = \beta [(1-u)\zeta_1(1-u, \Omega(r^*-\lambda, 1-u)) + \Omega(\cdot)\zeta_2(1-u, \Omega(r^*-\lambda, 1-u))] \quad (\text{A5S})$$

It follows that an increase in the country's λ alone, given the overseas interest rate, r^* , and growth rate, λ^* , has two effects, both expansionary. It shifts up the demand wage on the left-hand side *directly* by decreasing the *net* interest rate and *indirectly* by reducing nonwage income relative to the wage rate (which impacts on quitting); it shifts down the incentive-wage

curve on the right-hand side through its effect on the nonwage-income ratio. An increase in r^* has precisely the opposite effects throughout.

What are the associated effects on the country's net foreign assets?

To begin, define spendable nonwage income earned from domestic business assets (firms' "capital") per worker, y_f^w , as $(r + \theta - \lambda)\beta\Lambda(1 - u)$ including actuarial dividends. Then, by (A1), this income is given by domestic output net of wage and turnover cost:

$$y_f^w = [\Lambda - \beta\Lambda\zeta(1-u, y_h^w/v) - v](1-u) \equiv Z(r-\rho-\lambda, 1-u; \beta\Lambda, \theta), Z_1 < 0, Z_2 > 0. \quad (A1')$$

The income from nationals' wealth in (A3) equals the income from domestic capital in (A1') plus their income from net foreign assets, or capital export, to be denoted by x . Using (A3') and, upon dividing by v/Λ , (A1') gives

$$[1 - \beta\zeta(1-u, \Omega(\cdot)) - 1](1-u)/V(\Omega(\cdot), 1-u) + x = \{(r+\theta-\rho)/[\theta-(r+\theta-\rho)]\}(1-u) \quad (A6S)$$

The curve of this equation in the $(1 - u, r)$ plane is analogous to the Keynes-Hicks LM curve. This wealth-capital curve solves for the Wicksellian natural interest rate, which is the rate that "equilibrates" the asset market at given employment. If $x \approx 0$, the two *direct* effects of increasing $1 - u$, being equal, are counterbalancing, so the curve is flat in this respect: the required interest rate is independent of $1 - u$. Yet there are *indirect* effects, however weak, coming from increased quitting and (to the extent the domestic capital is owned by nationals) the increased y_h^w/v , both of which decrease the income from domestic capital, which in turn require a *decrease* in the Wicksellian r to get y_h^w/v back down. (If $x > 0$, the left-hand side will be less sensitive to an increase of $1 - u$ than is the right-hand side; hence, when $1 - u$ is increased the required r is decreased on this account as well.) For all x , an increase in x will at any given $1 - u$ shift *up* the required r , since the right-hand side is the more sensitive to r . The intuition is that a increase in the stock of net foreign assets drives up the interest rate required for asset market equilibrium just as a helicopter drop of public debt would.

This alternate framework can be closed by adopting the counterpart of (A5S):

$$1 - \beta [\zeta(1-u, \Omega(r-\lambda, 1-u)) + \theta + r - \lambda] = \beta [(1-u)\zeta_1(1-u, \Omega(r-\lambda, 1-u)) + \Omega(\cdot)\zeta_2(1-u, \Omega(r-\lambda, 1-u))]. \quad (A5')$$

The curve of this equation in the same Hicksian plane is analogous to the Keynes-Hicks IS curve. It solves for the employment level consistent with

“equilibrium” in the labor market. An increase in r , in increasing the income from wealth, impacts negatively on the left-hand side (thus shifting down the demand wage in the Marshallian plane) and, on standard assumptions, impacts positively on the right-hand side, thus shifting up the “wage curve.” So $1 - u$ must increase to satisfy the equation. The curve slopes downward.

Let us suppose that the latter curve is steeper than the former, which I believe is the “realistic” case. Then a given increase of x raises the required r and thus contracts $1 - u$. Hence, an externally caused increase of r^* , if it is to drive up r to match in the small open economy, must do so by inducing an increase of x ; that, in turn, forces a decline of $1 - u$. If the inequality between the slopes of the two curves were the reverse, the implied increase of r would required a *decrease* of x , which does not fit observation.

For the *large* open economy it is necessary to add more structure. Suppose there are two large and broadly similar countries. It appears helpful to invert (A3) to express $r - \lambda$ as a function of the wealth variable rather than the other way around, writing

$$r - \lambda = \rho + [1 + (v/y_h^w)(1 - u)]^{-1} \theta \equiv R(y_h^w/v, 1 - u; \rho, \theta). \quad (\text{A3L})$$

Then, using (A3L), we may replace (A5S) with

$$\begin{aligned} 1 - \beta [\zeta(1-u, y_h^w/v) + \theta + R(y_h^w/v, 1 - u; \rho, \theta)] \\ = \beta [(1 - u)\zeta_1(1-u, y_h^w/v) + (y_h^w/v)\zeta_2(1-u, y_h^w/v)] \end{aligned} \quad (\text{A5L})$$

In place of the previous (A4S) we use the steady-growth implication of the interest parity condition making the interest rate in the other country, r^* , which our country is large enough to affect, equal to our r :

$$\begin{aligned} \rho + \lambda + [1 + (v/y_h^w)(1 - u)]^{-1} \theta \\ = \rho^* + \lambda^* + [1 + (v/y_h^{w*})(1 - u^*)]^{-1} \theta^* \end{aligned} \quad (\text{A4L})$$

Defining y_f^w as the non-wage income *originating in domestic firms* and using it to rewrite (A1) gives the new structural equation

$$y_f^w/\Lambda = (1 - u)\{1 - \beta [\zeta(1-u, y_h^w/v) + \theta] - (v/\Lambda)\}. \quad (\text{A6L})$$

Upon dividing by v/Λ and using (A2) to substitute the incentive-wage function V for v/Λ ,

$$y_f^w/v = (1-u)\{1 - \beta[\zeta(1-u, y_h^w/v) + \theta] - V(1-u, y_h^w/v; \beta)\}/V(.). \quad (\text{A7L})$$

There is also the balance equation,

$$(y_h^w/v) - (y_f^w/v) = [(y_f^{w*}/v^*) - (y_h^{w*}/v^*)](v^*/v), \quad (\text{A8L})$$

where $V^*(.)$ can be substituted for v^* just as $V(.)$ can be substituted for v . Besides (A5L) and (A7L) there are the counterpart equations (A5L*) and (A7L*) describing the other country together with the linkages in (A4L) and (A8L). This is a six-equation system in the six variables u , u^* , y_h^w/v , y_f^w/v , y_f^w/v^* , and y_h^w/v^* .

A graphical analysis shows that if λ^* increases without an increase of the home country's λ (think of the Continent's speed-up in the '50s-'60s), y_h^w/v^* falls, which pushes up $1 - u^*$ and creates a positive wedge between capital and wealth, that is; $y_f^w/v^* > y_h^w/v^*$; the opposite wedge in the U.S. causes y_h^w/v to rise, which contracts $1 - u$.

Finally, it should be noted that the two countries modeled here can only come *close* (and only in transient fashion) to constant unemployment rates and balanced growth, each growing at its respective rate of technical progress, since net foreign assets (and the income therefrom) cannot be growing simultaneously at the two disparate rates. A proper dynamic analysis would be greatly impeded by the high dimensionality of such a model. I hope readers will nevertheless view the above mathematical analysis as providing significant support for the propositions in the text regarding the international transmission mechanism in non-monetary models of the structuralist kind.