Keynes, investment, unemployment and expectations

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Keynes, Investment, Unemployment and Expectations[1]

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Abstract

In Keynes' General Theory, investment determines effective demand, which determines unemployment and the labour market plays a negligible role. In New Keynesian models, labour market institutions determine the natural rate of unemployment and the speed at which unemployment adjusts to it. Investment is mostly ignored as a key variable behind the problem of high unemployment, despite a strong empirical association between investment and unemployment. We discuss the evolution of the 'Keynesian' model, and how in the process of domesticating the General Theory, the central relationship between unemployment and investment and the role of the state of confidence was bred out of the model. We then present some evidence of the centrality of investment and expectations to the long-term evolution of unemployment in OECD countries. We also argue that recent results in finance, which find that individuals do not behave rationally and, moreover, that there may be no basis for rational calculation, provides support for Keynes's notion that animal spirits play a central role in investment.

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Introduction

Keynes and Hayek disagreed profoundly on the causes and nature of business cycles, yet both would have taken for granted that the evolution of unemployment was determined by the dynamics of investment, driven by the state of confidence in expected returns on production. We will argue that these insights were forgotten by mainstream theory, but are now being rediscovered. In elementary economics, students are taught that the Keynesian model has investment driving effective demand, driving unemployment. In contrast, in graduate economics they are taught that unemployment is a labour market phenomenon, which adjusts – once prices and wages have fully responded – to equilibrium levels determined by institutions and the structure of markets. This has led Blanchard (2000) to label the medium-run relationship between investment and unemployment, which is very obvious in the data, as the 'Modigliani Puzzle', see also Modigliani (2000).

We will argue that to many economists, brought up in a general equilibrium tradition, the most unsettling feature of the General Theory, GT, Keynes (1936, CW, 7[2]) was that the central variable, investment, was left undetermined by any formal theory. In the process of domesticating the GT, that central argument, the close relationship between investment and unemployment got bred out of Keynesian models. This process of evolution produced the three-equation New-Keynesian model, which is the modern macroeconomic consensus. This has an expectations augmented Phillips Curve determining inflation as a function of the output gap, with a vertical long-run natural rate or NAIRU; an 'IS curve' determining output as a function of expected output and real interest rates; and a Taylor rule that describes Central Bank interest rate setting behaviour. There is little in this model that resembles the General Theory, or even the reformulation by Hicks, since the IS curve arises from the consumption Euler equation, investment and fiscal policy play no role and the money demand equation is discarded.

We begin by briefly discussing the old views and the role of the General Theory within them. We spend some time on the history because Keynes is often misrepresented. We then consider the process of domestication of the General Theory,

[2] References to Keynes will be given as original publication date, Collected Writings, CW, volume and page numbers.

provide new evidence on the strong relationship between investment and unemployment and finally discuss the determination of the state of confidence in expected returns in the light of modern theory. There are a variety of interpretations of the real meaning of the General Theory; Kerr (2005) provides a nice review, we merely argue that in the process of evolving into mainstream theory, two central relationship of the General Theory – that between unemployment and investment and that between both and the state of confidence – were forgotten. Of course, outside the mainstream it was not forgotten and Arestis and Sawyer (2005) provide a survey of an alternative framework where it plays an important role.

1. The General Theory

In Austrian business cycle theory the relationship between investment and unemployment is clear and undisputable. An economic expansion consists of the build-up of capital. An increase in the desire to save causes the rate of interest to fall and investment to rise. Moreover, such capital accumulation entails more roundabout production processes when capital gets located to earlier production stages. A monetary expansion has the undesirable effect of lowering the rate of interest below its natural level, which makes genuine saving fall and forced saving and investment increase, hence causing an unsustainable boom that is invariably followed by a bust. The artificial low rate of interest eventually gives way to a high real rate of interest as overcommitted investors bid for increasingly scarce resources. During the boom period workers are increasingly employed in the earlier stages of production while in the bust phase they are released from failing enterprises and unemployment goes up.

It is clear that the theory implies a positive relationship between investment and employment. Developments in the capital market determine the evolution of employment and unemployment. While the difficulty in Hayek (1931) in explaining the mechanics of the bust – in particular how the stock of capital falls – led to the success of Keynesian economics, the theory nevertheless offers interesting insights, which even Keynes admitted[3].

[3] He wrote: "What is the next move? I feel that the abyss yawns – and so do I," and then saying "Yet I can't help feeling that there is something interesting in it." Keynes (1932, CW, 13, 265).

One feature of the General Theory that we wish to emphasise is that the key ingredients of Keynes's model – such as liquidity preference theory and the multiplier – applied to the market for goods and services, the bond market and the market for capital. The labour market was neglected. In the GT Keynes provides an account of the workings of the goods and the asset markets. In goods markets, output was determined by demand and output then determined employment, the assumption being that there were reserves of labour available and that the real wage did not equilibrate the market. The labour market was hence only a sideshow in the general scheme and passively reacted to developments in goods and capital markets. In this model, the flow of labour services is whatever is needed to produce output demanded and it makes no difference how this labour input is divided between workers; whether all work half time or half work full time, for example. So in a strange paradox, what became the most accepted explanation for high unemployment during the 1930s had little to do with the market for labour. While the classical authors had tried to explain the causes of slow adjustment of real wages towards the full-employment equilibrium, Keynes simply threw out that market and put the problem in the goods market; it was deficient demand for goods – and the failure of interest rates to fall – which was the problem.

In contrast to New Keynesian models, Keynes did not assume nominal wages to be fixed, nor were real wages. This is very clear in the appendix to Chapter 19, discussing Pigou's theory of unemployment. In Keynes, if a firm were to offer lower nominal wages in response to unemployment, it would experience positive profits, which are incompatible with the assumed perfect competition in the goods market. Firm entry would then ensure that prices fell until real wages were restored at their original level. However, falling nominal wages and prices (holding real wages constant) would make the real money supply increase, which could: raise investment through lower interest rates – the *Keynes effect* – and raise consumption through increased wealth – the *Pigou effect* – which in turn raised effective demand – assuming investment is interest elastic – and hence also output and employment.

There is one place in the *General Theory* where Keynes uses tools from labour economics. This is when he uses a labour demand curve to account for the perceived negative relation between employment and real wages. This is apparently the only use

that the labour demand curve plays in his analysis. Hence, real wages are determined by labour demand, they are flexible, but do not adjust to clear the labour market. Ironically, post General Theory empirical work indicated that the relationship between employment and the real wage was positive, so he need not have bothered.

It is investment that plays the central role in the Keynesian business cycle. Keynes had argued in 1931 that a fall of investment was the cause of the depression because interest rates did not bring savings into equality with investment. Large and abrupt changes in the perceived or expected marginal efficiency of investment made firms change their investment plans quickly and unexpectedly. Such demand shocks induced firms to expand or contract production in response to observed changes in inventories and consumption and output adjusted further as the multiplier kicked in. Changes in the transaction demand for money then affected interest rates through the bond market and crowding out of investment occurred.

Keynes saw employment as driven by effective demand, of which investment was the most volatile component. In Chapter 11 of the General Theory he showed that investment depends on the relation between the rate of interest and the marginal efficiency of capital, which depended on the relation between the supply price of capital and its prospective yield. Chapter 12, considers the factors which determine the prospective yield of an asset, the state of long-term expectation, or confidence. It is here that he notes that human decisions affecting the future 'cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist', rather 'it is our innate urge to activity (animal spirits) which makes the wheels go round'. CW, 7, 161-3.

That the influence of the state of long-term expectations on investment was the central message of the GT, was emphasized in the 1937 *Quarterly Journal of Economics* article. There he also says: 'The theory can be summed up by saying given the psychology of the public, the level and output and employment as a whole depends on the amount of investment. I put it this way, not because this is the only factor on which aggregate output depends, but because it is usual in a complex system to regard as the *causa causans* that factor which is most prone to sudden and wide fluctuations.' CW, 14, 121. Similarly, in his review of Tinbergen (discussed by Pesaran and Smith

(1985)) he emphasized the likely structural instability of the investment functions that Tinbergen estimated.

2. The response

Leaving the central variable of the theory, investment, undetermined except by 'animal spirits' seemed quite unsatisfactory to many economists. The process of domesticating the GT began quickly. As soon as the GT became available, there was a race to cast it into equations and relate it to the orthodoxy. The race was won by Hicks (1937), who proposed a general equilibrium model with endogenous investment and IS-LM diagrams.

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The important role of the labour market came to the fore when Modigliani (1944) incorporated it into the IS-LM framework and showed that rigid nominal wages were required for an underemployment-equilibrium in the IS-LM version of the Keynesian model. It was widely pointed out, at the time and subsequently, that this interpretation was clearly contrary to what Keynes had argued. But such complaints had little influence and the dominant interpretation became that the Keynesian system was a special case of the neoclassical model; with flexible nominal wages we would have full employment and monetary neutrality. This soon lead to the conclusion that wage flexibility arises in the long run, and the economy tends to full employment if nominal wages are allowed time to adjust.[4]

What then became known as New Keynesian models were subsequently developed to provide microeconomic foundations for nominal-wage stickiness in the presence of rational expectations. But these have little in common with the GT[5] since the focus is almost exclusively on money-wage and price-stickiness in models with rational expectations, while Keynes had argued that wages and prices were flexible but expectations were erratic. The modern sense of rational expectations involves the mathematical expectations or expected value, but Keynes explicitly argued that such mathematical expectations did not exist and there was no basis for rational calculation, see for instance Dow and Dow (1985), a point we return to.

[4] This neoclassical-Keynesian synthesis was attacked by Clower (1965) and Leijonhufvud (1968).
[5] See Phelps (1990) and Leijonhufvud (1998).

More recent developments include attempts at explaining the presence of involuntary unemployment in the long run, how the classical long run equilibrium can be amended by the incorporation of market imperfections that explain real wage rigidity, persistent unemployment and long swings in the rate of unemployment. Phelps (1968) and Friedman (1968) argued that there was no trade-off between inflation and unemployment in the long run and proposed the existence of a *natural rate of unemployment*. There followed the literature on information frictions and the matching function (e.g. Pissarides, 2000) – explaining the existence of search unemployment – as well as the theory of efficiency wages (see Salop, 1979; Shapiro and Stiglitz, 1984; and Phelps, 1994; amongst others) – explaining the presence of involuntary unemployment in equilibrium.[6]

What is interesting is that the clock has turned full circle: Keynes threw the labour market out of the classical system, made output equilibrate the product market and employment be derived from output. Modigliani showed how the economy could revert to the classical equilibrium in the long run once all prices have adjusted. Finally, the classical view of the labour market has returned as a model of the long run and has been amended by the introduction of various market failures that prevent full employment from ever being attained.

It is clear that the investment-unemployment relationship does not hold a prominent place in most of the explanations and models put forward for persistently high unemployment. Bruno and Sachs (1985) explained the stagflation of the 1970s by a fall in the "warranted real wage"– the one implied by the level of technology and the price of other inputs – and the failure of actual real wages to fall accordingly. Jacques Dreze and co-authors, e.g. Bean and Dreze (1990), postulated that the failure of real wages to fall would – by reducing profits – lower the level of the capital stock and hence cause a persistent increase in unemployment. Lindbeck and Snower (1989) showed how a transient recession could leave a permanent dent in the unemployment rate by reducing the number of entrenched workers who could manipulate their wages

[6] In several cases the natural-rate models also have an investment dimension; wages are kept above their full-employment level in order to reduce quitting or attract skilled labour, to take two examples. In this case labour is a quasi-fixed asset due to hiring (training) costs.

so as to prevent the unemployed from getting back their jobs. Layard et al. (1991) showed how a transient recession could adversely affect the human capital of the long-term unemployed, their search intensity and the way they are received when they apply for jobs. . In a series of papers, the most recent Nickell et al. (2005), Nickell argues that labour-market institutions can explain both differences in unemployment across countries as well as differences over time for each country.[7]

There is one strand of recent research where investment does play a prominent role in explaining changes in equilibrium unemployment over time. Phelps (1994) lays out a set of general equilibrium models of the natural rate thatemphasise the role of investment in physical capital, trained workers and market share as determinants of the natural rate of unemployment. Based on this work Fitoussi et al. (2000) estimate equations where the response to global shocks (productivity growth rates, real interest rates and real oil prices) depended on a set of domestic institutions. In this work structural booms entail high investment and low unemployment and structural slumps low investment and high unemployment.

While there are exceptions, the mainstream continues to confine its search for the explanation of unemployment in the labour market, rather than the factors driving investment, like expected returns.[8] One of the reasons for this is that the focus is on the capital stock rather than investment. But the capital stock is trended, whereas unemployment is untrended, so that cannot be an explanation.[9] Another explanation is the absence of an empirically satisfactory neoclassical theory of investment. The main candidate, Tobin's Q has little predictive power for investment. In practice, investment as explained by accelerator models with distributed lags on past output and financial measures that reflect credit constraints and differences in the cost of capital on internal and external funds.. More recently there has been increasing emphasis on the need to model labour and capital adjustment jointly and the need to

[7] However, it should be noted, the model does not do well at explaining the evolution over time, e.g. Baker et al. (2004).
[8] Oi (1962) treated labour as a fixed factor of production and some of the current models of the natural rate of unemployment do emphasise the importance of employment adjustment costs. In Phelps (1994), the hiring decision is made to depend on interest rates and expected rates of productivity growth, hence hiring would be expected to respond to expected rates of return. Similarly, Pissarides (2000) models the decision by a firm to post a new vacancy as an inter-temporal investment decision.
[9] Malley and Moutos (2001) try to get around this problem by looking at relative capital stocks (domestic relative to world capital).

allow for the impact of uncertainty on investment, e.g. Bloom (2007). Expectations matter and they seem to be unpredictable. Early criticisms of Keynes' emphasis on expectations were that he had not provided a theory of expectations and if expectations were not determinate in the investment equation, they were not determinate in the other equations of the General Theory. But investment in physical capital is different in that it is largely irreversible and locks the firm into long-term and unknowable consequences, a point we return to.

3. Investment and unemployment

The macroeconomic data show a strong medium- to long-term relationship between investment and unemployment. This may come as a surprise to someone who has followed the recent unemployment literature reviewed above. Of course, no one would express surprise at seeing such a relationship over a business cycle but that is not what we are discussing here.

The post-war years have seen large decadal changes in average unemployment. The 1950s and 1960s were a period of low unemployment in the OECD while the 1970s and 1980s had high unemployment. Average unemployment varied greatly across countries in the 1990s. Such medium-term cycles dominate the short-term (business) cycle in most countries. The figures below plot investment against the employment rate (defined as 100 minus the rate of unemployment) for a set of countries that experienced a rise in average unemployment (Belgium, France, Germany and Italy) and another set of countries where employment has by now fully recovered after the turbulence of recent decades (the United Kingdom and the United States). Figure 1 shows the four problem countries. An obvious positive relationship appears: when employment falls from one plateau to another, investment falls also and when employment recovers, so does investment.

FIGURES 1 AND 2 ABOUT HERE

The move to a lower level of employment in the seventies and eighties coincided with a fall in investment (as a share of GDP). While the year-to-year correlation between the two series does not come as a surprise, it may be surprising to some that the

relation is strong when measured over longer periods. The stylised relationships shown in Figure 1 are not emphasised by the current strand of thinking about unemployment nor do they guide researchers in the search for an explanation. In fact, the discussion largely ignores the investment-unemployment relationship. When investment is mentioned it appears as a derived variable that passively responds to developments in the labour market. The following quote from Blanchard (2006, p31) is revealing: "The early 1970s were characterized by "adverse labor supply shifts" – that is, increases in bargained wages given unemployment. The effects of profit rates and interest rates on capital accumulation were also clearly visible, with low interest rates delaying the slowdown in capital accumulation to the 1980s." Note that Figure 1 does not support this interpretation in that the employment and investment series appear to move in tandem. In contrast, as shown in Figure 2, investment shows no trend in the United States where employment has remained stubbornly high and the same applies to the United Kingdom where employment has by now regained its earlier – that is the pre-seventies – level.

To examine this more formally, we use OECD data for twenty-one countries[10] and forty-three years (1960-2002) on the unemployment rate u_{it} in country i in year t, $i = 1, 2, ..., N; t = 1, 2, ..., T$, which we can stack in the $T \times N$, (43×21) matrix U. Standard tests do not reject a unit root in all 21 series. We assume that u_{it} has a factor structure

$$u_{it} = \lambda_i f_t + e_{it} \tag{1}$$

Similarly we have data on the investment rate, gross domestic fixed capital formation as a share of GDP, g_{it}, stacked as G. We standardise the data and calculate the underlying global factors as the principal components (PCs) of the correlation matrices of U and G. These are the orthogonal linear combinations of the data that explain the maximal variances of the data[11]. If the idiosyncratic errors, e_{it} above are I(0) the PC estimators for f_t are consistently estimated (large *N*) independently of whether all the factors are I(0) or whether some or all of the factors are I(1), Bai and

[10] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK and US.

[11] For forecasting, it may be more useful to estimate dynamic factors that take the principal components of the spectral density matrix. However, static factors are commonly used in the Factor Augmented VAR literature. Stock and Watson (2005) discuss the relation between dynamic and static factor analysis.

Ng (2004). We will assume that the errors are I(0) and that the long-memory in investment and unemployment comes from the persistent global factors and, in fact, national unemployment rates and the global factor do cointegrate in most countries.

The eigenvalues and proportion of variance explained by the first four PCs are given in Table 1. The first PC explains almost 70% of the variation in unemployment and almost 60% of the variation in investment; factors common to all countries clearly explain the bulk of the variation in both variables[12]. The first PC of unemployment is close to the mean with most countries having roughly equal weights, between 0.18 and 0.26, the main exception being the US, which has a low weight of 0.08, but a high weight in the second PC of unemployment.

Table 1. Principal components for unemployment and investment

	Unemployment			Investment		
Shocks	Eigen-values	% of var. explained	Cum. % explained	Eigen-values	% of var. explained	Cum. % explained
First PC	14.16	69%	69%	11.85	58%	58%
Second PC	3.15	15%	84%	2.44	12%	70%
Third PC	0.98	5%	89%	1.59	8%	78%
Fourth PC	0.74	4%	93%	1.00	5%	83%

Notice that we have calculated the factors for unemployment and investment independently and not imposed a shared factor structure. However, by plotting the unemployment and investment PCs together we can judge whether they share a common factor or whether there are only variable specific factors. The first two sets of PCs for unemployment and investment, respectively, are shown in Figure 3. Note that we draw the negative of the PC for unemployment in order to create a more visible fit with the investment PCs.

[12] The fact that a global factor is important for investment is also indicated by the Feldstein-Horioka literature, where there is substantial cross-section dependence in the residuals of panel regressions of investment shares on savings shares, e.g. Coakley et al. (2004).

The first PCs for investment and unemployment are almost identical, $R^2 = 0.92$. This relationship is not spurious, they cointegrate[13] and the (1,-1) restriction on the cointegrating vector is accepted at the 5% level, t=1.53. The disequilibrium term feeds back significantly on investment but not on unemployment. Since employment can be adjusted faster than capital stock this is not surprising. The contemporaneous residual correlation is very high, 0.81, so they both seem to be responding to the same shocks, which we interpret as innovations to expected returns. As can be seen from the graph the fit is less good in the 1960s, which is consistent with growing globalisation over this period, particularly after the end of the fixed exchange rate Bretton Woods system. There are some similarities between the second PCs, but the fit is not high, $R^2 = 0.25$.

FIGURE 3 ABOUT HERE

Below we conduct the analysis assuming that there is a single factor, though we test for the significance of the second factor. The first PC reflects some of the more important macroeconomic events of the past forty years: the oil shocks, the recessions of the mid-seventies, early eighties and early nineties and the gradual but only partial recovery in the second half of the eighties. This component describes the shocks causing the persistent slump that occurred in many countries in the seventies, eighties and nineties.[14]

As noted above, the expected return to production may depend on a large number of factors, many of which are difficult to measure. But in a globalised world the broad movements of the expected rate of return are likely to be quite similar across the advanced industrial countries, and reflected in their investment and employment decisions. Whereas investment and unemployment in any one country will be noisy measures of this, the common component across countries may be a better measure. While we do not observe expected returns, we do observe a variable related to it.

[13] The AIC chooses no intercept, no trend in the relationship and with this the trace test for the rejection of no cointegrating vectors has a p value of 0.0173, while the less reliable max eigenvalue test has a p value of 0.0519.

[14] There is a growing literature that seeks to explore the similarities and linkages between macroeconomic cycles across countries. For instance, Kose et al (2003) also find a common world cycle. But again they are examining the stationary component, rather than the persistent component that we focus on.

Figure 4 plots a discount factor calculated from the world real rate of interest: $d = 1/(1+r)$, where r is the average (long) real rate of interest for the G7 countries.[15]

FIGURE 4 ABOUT HERE

A clear relationship is present between the two PCs, on the one hand, and the discount factor, on the other hand. This suggests that the long swings of employment may trace their roots to factors affecting expected returns and the same factors drive investment. We discuss the theoretical interpretation of this pattern below.

To assess the explanatory power of our global factor, we estimated a model in which the parameters are constant over time but differ for each country:

$$\Delta u_{it} = c_i \Delta f_t + d_i (a_i + b_i f_{t-1} - u_{i,t-1}) + e_{1i} \Delta f_{t-1} + e_{2i} \Delta u_{i,t-1} + e_{3i} \Delta p_{it-1} + \varepsilon_{it} . \qquad (13)$$

The estimates for the individual countries are given in Table A2. For large N and T, Pesaran (2006) shows that, under relatively weak assumptions, such regressions using weighted averages, like f_t, as additional regressors give consistent estimates of the coefficients and reduce cross-section dependence in the residuals[16].

Using standard critical values Δf_t is significant in 17 countries; f_{t-1} is significant in 14; and Δf_{t-1} in 6. Only in Japan is no measure of the global factor significant. Lagged unemployment is significant in 16, the lagged change in 11 and lagged inflation in 6. The R^2 for changes in unemployment is below 0.5 in Iceland and Japan; and above 0.7 in 10 countries. Under the null of no long-run relationship the test statistics are non-standard. Pesaran Shin and Smith (2001) provide a bounds test for a long-run relationship, which is appropriate whether the variables are I(0) or I(1). Assuming the variables are I(1) we can reject the null hypothesis of no long-run relationship between unemployment and the global factor in 12 of the 21 countries at the 5% level. Another four are uncertain, lying between the 10% I(0) bound and the 5% I(1) band. The tests would not reject no long-run relation in Denmark, Germany, Ireland, New Zealand and Sweden. On balance this suggests that the national

[15] The world real rate of interest is calculated as the weighted average of the real rate of interest in the G7 countries; the real rates being the difference between the long nominal rates and annual inflation and the weights being the Heston-Summers relative GDP for each country.

[16] There is an issue as to whether it is better to use a priori weights (e.g. the mean) or estimated weights (e.g. the PC). Here it does not make much difference since the PC is very close to the mean and they both give very similar results. There is also an issue as to how one would endogenise the global factor. Both issues are discussed in Pesaran and Smith (2006).

idiosyncratic factors are I(0) in most countries and the stochastic trend in unemployment comes from the global factor. Panel cointegration tests would not be informative here, since the null hypothesis of such tests, no cointegration in any country, is not very interesting, because there is clearly cointegration in most countries.

The equation was estimated by the Swamy RCM method, which takes precision weighted averages of the individual country coefficients, with non-parametric standard errors, and by fixed effects, which imposes homogeneity of slopes across countries. The results are given in Table 2.

Table 2. Unemployment and global factors

Dependent variable Δu_{it}, $N = 21$, $T = 1963 - 2002$

	RCM		FE	
	Coef	T	Coef	T
Δf_t	0.59	8.8	0.62	13.3
f_{t-1}	0.12	4.0	0.07	7.0
Δf_{t-1}	-0.23	-6.0	-0.27	-5.8
u_{it-1}	-0.18	-5.8	-0.10	-9.0
Δu_{it-1}	0.38	8.0	0.44	9.1
Δp_{it-1}	0.82	2.7	0.69	1.6

For the fixed effect, $R^2 = 0.48$, $SER = 0.65$. The maximised log-likelihood for the fixed effect estimator -818 compared to a total MLL of –484 for the heterogeneous estimator given in A2. Homogeneity of the parameters is massively rejected, but if we are primarily interested in average effects, which is what most of the theory is concerned with, this may not matter. The Fixed Effect Estimates are very similar to the Swamy estimates, except that the speed of adjustment is lower, which is what one should expect from the heterogeneity bias discussed in Pesaran and Smith (1995). The long-run effect of the global factor is almost identical, 0.68 versus 0.7. Imposing homogeneity does not seem to influence the estimates of the average effect.

We examined the structural stability of the relationship by estimating the model over the period 1963-1982 and 1983-2002. The RCM estimates are given in Table 3. The estimates for the two periods are very similar, the biggest difference being that the

coefficient on lagged unemployment is larger in the first period. The long run effect of the global factor is 0.61 in the first period and 0.87 in the second, perhaps reflecting increased globalisation. It is probably safer not to put too much weight on this, since a trend interacted with the global factor was not significant. It is also noticeable that the coefficient of lagged unemployment is lower in both sub-periods than in the whole period. This may reflect the downward small T bias that results from reducing T from 40 to 20. The fixed effect estimates for the two periods showed similar features. With the fixed effect estimates one can test for coefficient equality in the two periods. Since the variances were very similar in the two periods, Chow's first test is appropriate. Each fixed effect regression estimates 6 slope parameters and 21 intercepts, so the distribution is F(27,786). The test statistic is 2.6 which would certainly reject the null of parameter constancy, given the large sample. But while significant the differences are not large.

Table 3. Structural Stability

Dependent variable Δu_{it}, $N = 21$, RCM estimates

	$T = 1963-1982$		$T = 1983-2002$	
	Coef	T	Coef	T
Δf_t	0.50	6.6	0.61	5.1
f_{t-1}	0.23	2.9	0.20	3.3
Δf_{t-1}	-0.18	-1.8	-0.23	2.7
u_{it-1}	-0.38	-4.0	-0.23	-3.6
Δu_{it-1}	0.32	3.0	0.36	4.9
Δp_{it-1}	0.42	2.6	0.46	1.2

In Smith and Zoega (2006) we further show that the global factor is much more important than institutions in determining national unemployment and that the implied equilibrium rate from the unemployment adjustment equation is the same as the implied equilibrium rate of unemployment in the Phillips Curve, both being functions of the global factor.

4 Expected Returns

In section 3 we suggested that perhaps Keynes was right, investment drives unemployment and both are driven by expected returns on production, hence the similarity in their common factor. While there will be idiosyncratic national factors, expected returns will be largely driven by global factors: there is a large common component in investment and unemployment and these common components are almost identical and can be given a natural interpretation as an expected rate of return. This prompts the question: what determines the expected rate of return? But perhaps Keynes was right on this also; the expected rate of return is not determinate, but a social product of animal spirits. Even among the heterodox community, 'Chapter 12 Keynesianism' has not been well received, being perceived as too nihilistic, leaving nothing to tie the model down. However, similar ideas have recently become influential within mainstream theory, albeit in narrow technical areas.

It is well established that such 'sunspot' beliefs can drive real factors. Animal spirits do live on in the literature, in the form of models with multiple equilibria, each with self-fullfilling expectations, driven by some irrelevant signal. For instance Xiao (2004) derives an International Real Business Cycle (IRBC) model with increasing returns in the production technology that generate sunspot equilibria. These sunspots are interpreted as self-fulfilling demand shocks, like animal spirits and generate positive international correlations of output, employment and investment, unlike most IRBC models. Entrepreneurs may lock onto such signals for the lack of anything better. Similarly Harrison and Weder (2006) find that a sunspot model driven by a measure of confidence, an interest rate spread, can explain the entire Great Depression era in the US, i.e. not only the decline 1929-32 and the slow recovery, but also the recession of 1937-8. Increasing returns are not necessary, Hashimzade and Ortigueira (2005) find that a neoclassical model with labour market frictions displays expectations driven business cycles where the indeterminacy of equilibrium stems from job search externalities.

The discussion in chapter 12 of the GT fits well with the large recent literature in behavioral finance that argues that individuals do not behave rationally but skew investment decisions under the pressure of psychological traits. These traits include overconfidence, reluctance to confront evidence that contradicts existing beliefs, becoming anchored to beliefs that can be heavily influenced by how they are framed,

inferring patterns from random sequences and herding. Shiller (2000) discusses these issues for stock markets, De Grauwe and Grimaldi (2006) for foreign exchange rates. But there is a difference. Most behavioral finance tends to argue that there is a right answer, a rational choice, but that people tend not to find it because they are unable to do the calculations or are swayed by psychological factors. Keynes made the more radical argument – based on his work on probability – that they could not behave rationally because there was no basis for a rational calculation. One case, which is emphasized by some within behavioral finance where there is no basis for calculation, corresponds to Keynes's beauty contest example where it is required to estimate what average opinion expects average opinion to be. Then with heterogeneous information, there is an infinite regress. Pesaran (1987) discusses such problems. It is often the case that the success of an investment depends on complementary actions by other firms so the investor must form expectations about the expectations of other firms: internet merchants depended on broadband provision by other firms. The dot-com boom was not merely a stock market phenomenon, it was accompanied by massive real investment, particularly in telecommunications.

In discussing such calculations it is useful to follow the common distinction between conditions of risk where one can identify the possible states of the world and assign probabilities to them; uncertainty where one can identify the possible states but cannot assign probabilities to them; and ignorance where one cannot even identify possible states.

The expected rate of return will depend on expectations about the elasticity of demand, which determines the mark-up and will reflect competition; the growth in the cost of wages and other inputs, which will reflect the speed of globalization; technological changes which influences products and processes and thus productivity; as well as a host of other factors. Thus it is quite possible that a firm cannot identify all of the possible states of the world that may influence these things, e.g. unrest in China disrupting component supplies. Firms that use scenario planning emphasize that these are not predictions, but ways of thinking about how to deal with the unexpected. Solow (2006) commenting on the lack of a good mechanism for the early financing of risky innovations, suggests that such innovations are subject to such

uncertainty that resists even the minimal regularity needed for the probability calculus to apply.

To avoid the problem of thinking of all the possible states, it is usual to focus on a single random variable, profits, and assume a distribution for, say, profits next year. Of course, profits depend on all the other events, many of which you cannot imagine, but this device circumvents the problem of not being able to enumerate the states of the world. It does not, however, fully circumvent the problem of calculating expected returns, because many distributions do not have mathematical expectations. The number of years required to get a PhD, for instance, does not have an expected value because many of those who start do not finish. In this case, one usually uses the median, the number of years for 50% to get a degree. In other cases, distributions with fat tails, there may not be a simple summary statistic. Distributions like the normal are said to have thin tails, the probability of outcomes many standard deviations from the mean are tiny. But many economic and financial variables show fat tails, higher probabilities of very large negative or positive outcomes. Any sample for a random variable that does not have an expected value will have a mean, but that mean will jump around wildly from sample to sample and not converge to any particular value as the sample gets larger. Standard deviations or variances can no longer be used to measure risk, because distributions without an expected value do not have a variance either. The importance of distributions without variances in finance was emphasized by Mandelbrot (1963) and Mandelbrot and Hudson (2004) extends the argument.

The usual calculations required in finance involve not just the expected value of profits next year, but of the infinite-horizon expected present value of all future profits. One typically calculates the expected profits by assuming that they will have a constant growth rate. For instance in the Gordon growth model with current profits *P*, expected to grow at rate g and discount rate *r*, the expected present value is P/(r-g). This present value is only defined if $r > g,$ and if r is only slightly greater than g, the expected present value will jump around wildly for even small variations in the parameters r and g. This carries over into less simple settings. Pesaran et al. (2007) examine the existence of such expected present values under uncertainty about the growth rate of future profits. They show that under quite plausible assumptions, such

expected present values may not converge. This happens because uncertainty about the growth rate increases at a faster rate than the discounting of future outcomes and there is some probability that the (constant) growth rate exceeds the interest rate causing the present value to diverge. Even if it does not diverge, when the growth rate and interest rate are close, the expected present value will jump around wildly.

The non-existence or extreme instability of conventionally calculated expected returns suggest that there are good reasons to believe that Keynes was right in saying that 'human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist'. But immediately before this he said 'We should not conclude from this that everything depends on waves of irrational psychology. On the contrary, the state of long-term expectations is often steady, and even when it is not, the other factors exert their compensating effects.' As Pesaran (1987) observes 'The fact that erratic changes in business expectations are not usually observed is largely due to the relatively stable nature of our economic and social institutions.' He argues that it is important to measure expectations by surveys, and then see whether they can be modeled. Manski (2004) takes a similar position.

Keynes noted 'The *state of confidence*, as they term it, is a matter to which practical men always pay the closest and most anxious attention.' (CW, 7, 148) and Central Banks certainly pay the closest and most anxious attention to surveys of expectations and the state of confidence when making monetary policy. It is clearly much easier to measure national business confidence, than global. But one may expect global expected returns to show stable patterns, plus large shifts, a characteristic shown by the common component of investment and unemployment discussed above.

5. Concluding thoughts

The history of economic thought is interesting, not because the pioneers knew more than we do, but because being pioneers facing new issues they were often willing to think radical thoughts. Sometimes those radical thoughts get forgotten. We have argued that this is the case with Keynes. Two of his radical insights, investment drives

unemployment and expected returns can show large shifts because there may be no probabilistic basis for their calculation, have been partly forgotten. The latter insight is being rediscovered in finance, but the former seems still widely ignored in economics.

The current literature on the causes of persistent unemployment in general, the problem of European unemployment in particular, seems strangely oblivious, with a couple of notable exceptions, to a strong long-run relationship between employment and investment. One of the few things that Hayek and Keynes did agree on in an earlier age has gone missing in the current search for a theory explaining the stubbornly high unemployment found in some of the European countries. The renewed emphasis on the labour market – the return to an almost classical approach – its institutions and equilibrating mechanisms, has deprived us of a larger view where product and capital markets are important pieces of the story. Yet, the stylised relationships between institutions and unemployment are much weaker than the investment-employment relationships shown in Figures 1 and 2 above. The latter are neglected by the mainstream literature, to the detriment of our understanding of the long swings in economic activity and the factors that drive expected returns including abrupt changes in expectations.

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Figure 1. The bad performers

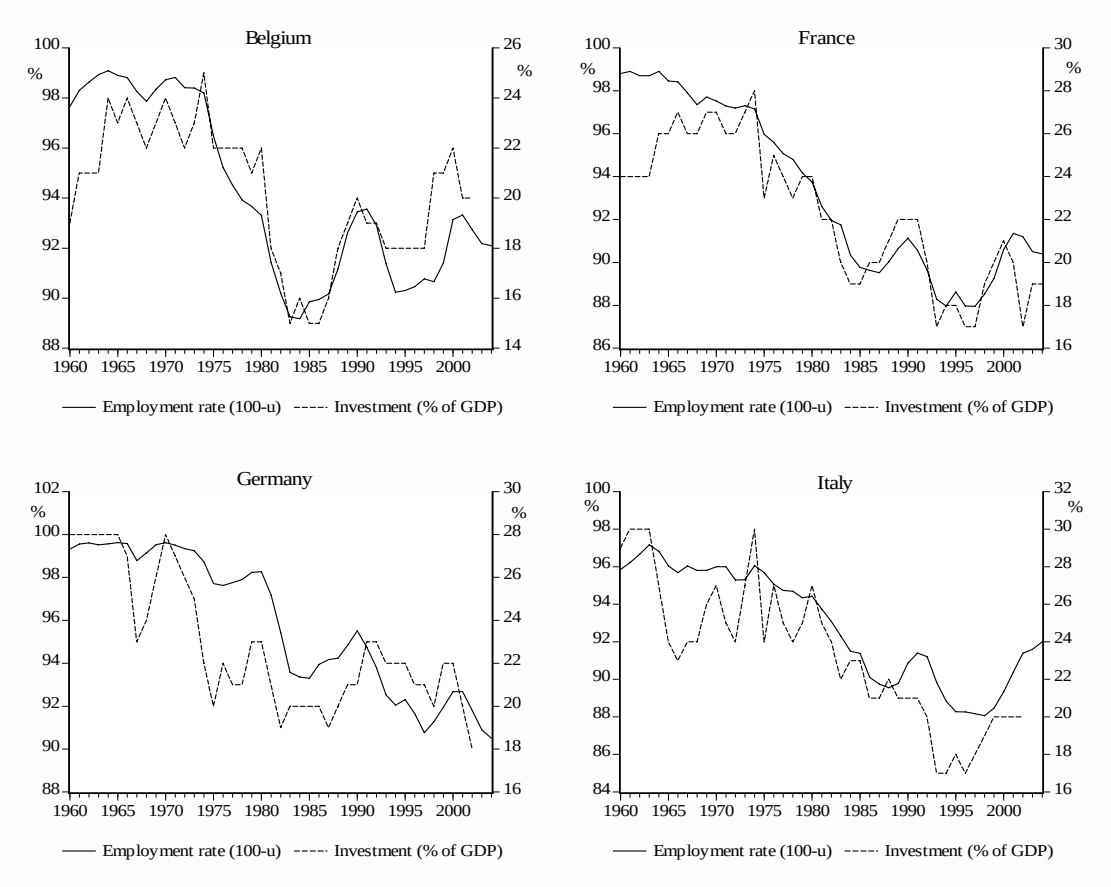

Figure 2. The good performers

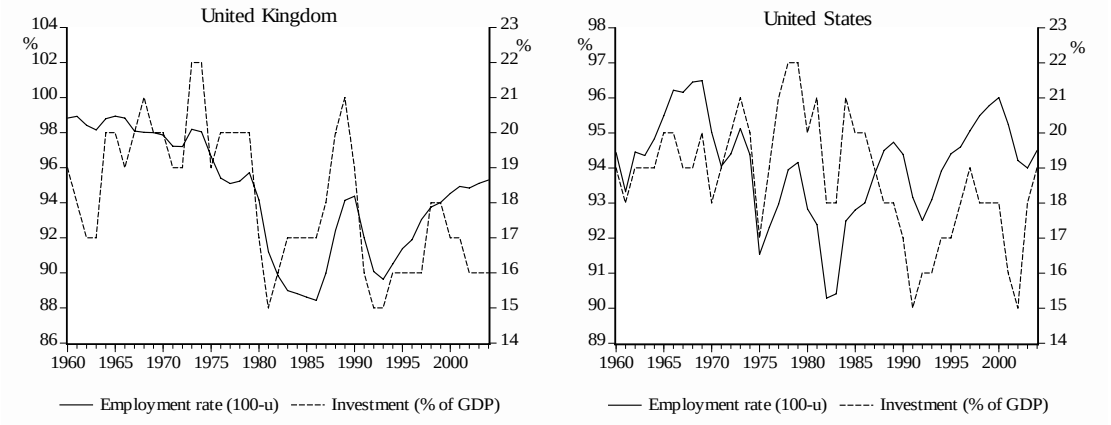

Figure 3. The first two principal components.

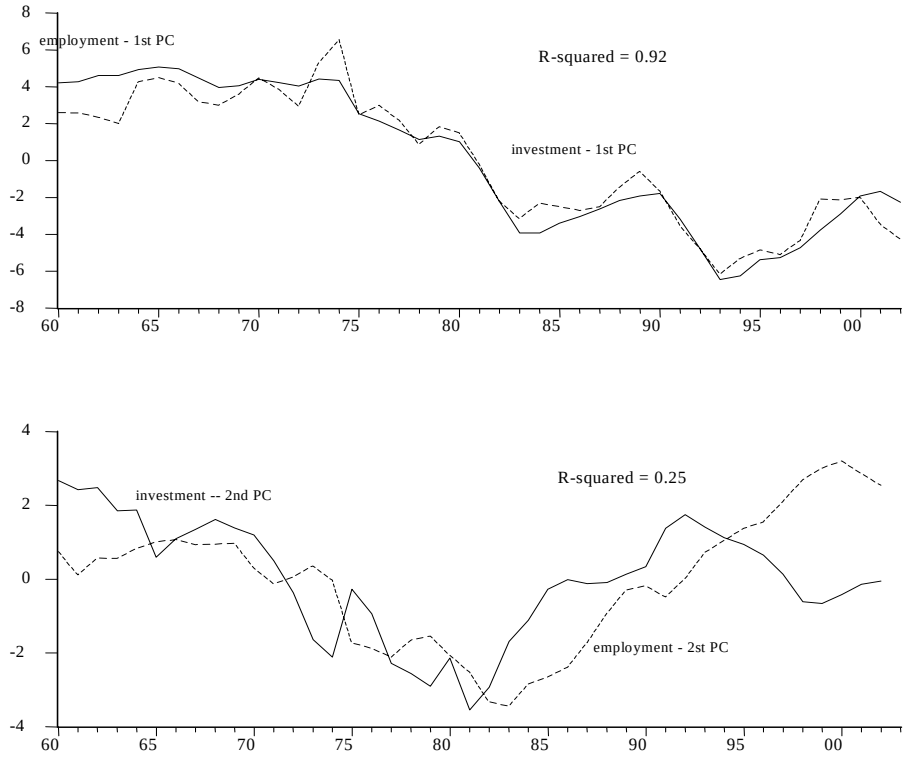

Figure 4. The first PCs and the world discount factor