

Real Business Cycle Models of the Great Depression : a Critical Survey

L. Pensieroso

Discussion Paper 2005-5

Département des Sciences Économiques
de l'Université catholique de Louvain



UCL

Real Business Cycle Models of the Great Depression: a Critical Survey

Luca Pensieroso*

Department of Economics, Université Catholique de Louvain

February 5, 2005

Abstract

Recent years have witnessed a revival of interest in the Great Depression of the 1930s. Among the differing new interpretations, that of the real business cycle (RBC) is particularly significant. It represents an outstanding methodological innovation in trying to cast the Great Depression within an “equilibrium” framework. This paper critically reviews the RBC interpretation of the Great Depression, clarifying its theoretical and methodological foundations, and paving the way for future assessments of its validity.

Keywords: Great Depression, Real Business Cycle Theory

JEL Classification: B22, N12

1 Introduction

The Great Depression of the 30s was undoubtedly the most important economic crisis ever witnessed by the XX century. Its extension and duration

*I wish to thank Michel De Vroey for his prodding supervision, and David de la Croix for criticisms and suggestions. Gabriele Cardullo, Mario Denni, Emanuele Massetti, Giulio Nicoletti and Alessandro Sommacal made useful comments on an early version of this work. Mirella Albano greatly improved my English. The usual disclaimers apply. Financial support from the Belgian French-speaking Community’s “Action de Recherches Concertée” programme, ARC Project “New Macroeconomic Perspectives on Development” (Grant ARC 03/08-302) is gratefully acknowledged. Correspondence address: ESPO, Place Montesquieu 3, 1348, Louvain-la-Neuve, Belgique. E-mail: pensieroso@ires.ucl.ac.be

convinced several contemporary observers that it might well be signalling the approaching collapse of the capitalistic production system.

The Great Depression plays an outstanding role in the history of ideas. Keynes's *General Theory*, in effect, dates back to 1936 and the Great Depression unquestionably paved the way to Keynes' work. The Keynesian approach to the economic theory concentrates on the concept of market failure as opposed to the standard *laissez faire* theory. Consequently, the experience of the Great Depression seemed to confirm, in the eyes of most contemporary observers, the correctness of the Keynesian intuition, that, in the short run at least, a capitalistic economy does not gravitate towards a full employment position.

The Keynesian approach to economics remained the mainstream theory until the end of the 1960s, when it was first challenged by Friedman and the monetarists, and subsequently replaced by new classical macroeconomics. The main message put forward by this new trend in the economic literature, with particular regard to the history of economic thought, is that there is no need for any "Keynesian" deviation from neoclassical theory in order to provide a thorough explanation of the business cycle, as no market failure concept is required for this purpose. A properly defined neoclassical model could provide a plausible explanation of the phenomenon. Nevertheless, even when the Keynesian model lost its predominance and was replaced by new classical macroeconomics, the Great Depression still appeared to be an example of market failure, whose causes were mainly attributed to the complex social and institutional situation after the World War I (Eichengreen (1992); Kindleberger (1973)), and whose end could almost certainly be ascribed to the intervention of public authorities (Romer (1992); Vernon (1994)). New classical macroeconomists themselves considered the Great Depression a phenomenon somehow beyond the reach of equilibrium theory. In particular, Lucas, whose distinctive contribution to economic theory consists of having stated that all cycles were alike and could be studied as equilibrium phenomena (Lucas 1977), wrote:

"the Great Depression [...] remains a formidable barrier to a completely unbending application of the view that business cycles are all alike." (Lucas (1980), pg. 273.)

"If the Depression continues, in some respects, to defy explanation by existing economic analysis (as I believe it does), perhaps it is gradually succumbing under the Law of Large Numbers." (Lucas (1980), pg.284)

However, at the end of the 1990s attempts to overcome this limitation saw the light of day: a new interpretation of the Great Depression, which

tried to explain it within a real business cycle (RBC) framework, began to gain ground. Such an interpretation really constitutes a first step in overcoming the once accepted limit to equilibrium theory. Instead of viewing the Great Depression as a phenomenon lying beyond the grasp of the equilibrium discipline, authors working in this direction believe that the new classical methodology and theory might be able to tackle it. To all intents and purposes, this amounts to viewing the Great Depression as a “normal” business cycle, in that, although exceptional in its dimension, it can be analysed within the new classical macroeconomics equilibrium framework.

In this paper I shall present a critical review of this RBC interpretation of the Great Depression. The aim is to single out its theoretical and methodological foundations, so paving the way for assessing its validity. The paper will be organised as follows. In Section 2, I shall explain some methodological premises about the application of RBC theory to the Great Depression. In Sections 3 and 4, a review of RBC existing papers about the US and the International Great Depressions will be presented. In these review sections, a narrative description of the models will be given with little or no recourse to technicalities, although some details of the economic rationale behind them will be explored. Section 5 summarises the argument, and provides guidelines for future research.

2 The RBC Theory and the Great Depression: Assumptions and Methodology

2.1 Assumptions

The distinctive feature of RBC theory is its attempt to explain cyclical fluctuations of income and employment under two fundamental hypotheses, the “equilibrium hypothesis” and the “exogenous shock hypothesis”.

The “equilibrium hypothesis” is the postulate that an economic cycle can be studied as an equilibrium phenomenon, or, in other words, that it can be studied in a framework comprising market clearing and agents’ optimising behaviour (Lucas 1977). Under this assumption, business cycles are the aggregate result of the optimum response of individuals to changes in the economic environment (Hartley et al. (1997)). In Mankiw’s (1989) words

“[...] real business cycle theory describes economic fluctuations as a changing Walrasian equilibrium.”

I shall label as “exogenous shock hypothesis” the assumption that the source

of the economic cycle is exogenous to the growth process¹. In a RBC perspective, in fact, the economic cycle is conceived as a stochastic oscillation around a trend which is determined by savings, demography and technology, as in the Solow model (Solow (1956))². This hypothesis characterises the conception of the economic cycle within the RBC framework as due to an exogenous shock to the fundamentals of an economic system, as opposed to theories in which fluctuations are endogenous, or to animal-spirit-driven theories, in which fluctuations result from the indeterminacy of the long-run growth path³.

This conception of economic cycles has important implications for the definition of depressions. Researchers in the RBC tradition define a depression as a period in which the rate of growth of the economy is suddenly and significantly below that which it would have been if the exogenous random shock that hit the economy had never occurred. As to the notion of a Great Depression, Kehoe and Prescott (2002) consider, as a “working definition”, that a recession is a Great Depression if output falls cumulatively by more than 20% with respect to its trend level, dropping by more than 15% in the first decade of the depression. These numbers serve to give a quantitative definition of the borderline between a business cycle, and a business cycle which has become a depression. Of course they imply a good dose of arbitrariness, and although they may be reasonable, no theoretical meaning should be attributed to them⁴.

¹At a first sight this labelling might seem to contrast with Plosser’s (1989) contention that

[...] “The fluctuations that are present in the model [...] are the result of the same factors that generate economic growth. The real business cycle model, therefore, provides an integrated approach to the theory of growth and fluctuations.”

But more in-depth consideration shows that the contrast is only apparent. The alleged integration between growth theory and business cycle theory, which we will not discuss here, does not mean that business cycles occur in a manner dependent on the process of growth. On the contrary, in RBC models productivity fluctuations occur exogenously at random. Therefore the “exogenous shock hypothesis” label seems appropriate.

²For surveys on the RBC literature see, *inter alia*, Hartley et al. (1997), Mankiw (1989), Plosser (1989), Ryan (2002) and Stadler (1994).

³Technically, in a standard RBC model the long-run growth path is a saddle-path with a unique equilibrium, where convergence is guaranteed by the suitability of the production and utility functions. To have fluctuations, therefore, one needs a series of temporary shocks to these functions. When animal spirits are considered, there is indeterminacy in the equilibrium, and therefore convergence is not guaranteed anymore.

⁴Moreover these definitions produce some puzzling results. Kehoe and Prescott (2002) argue that Switzerland has been experiencing a Great Depression since 1973, on the ground that de-trended output per person of working age fell by more than 30% between 1973

This definition amounts to considering that a Great Depression is a normal business cycle of greater magnitude, i.e. one in which the economic aggregates behave as in any other business cycle, but with greater variance in their oscillation.

2.2 The Dating of the Depression

It might be thought that the dating of the depression is an issue on which consensus exists, yet this is not the case. As a matter of fact RBC theorists have changed the way of thinking on this issue. Traditionally economists tended to consider the Great Depression as starting with the stock market crash of the 1929, and ending with the election of Roosevelt in the 1933 (Eichengreen (1992), Friedman and Schwartz (1963), Robbins (1934), Temin (1989))⁵. However in an RBC interpretation the Great Depression is defined as covering the entire decade of the 1930s. This results from the definition of a Great Depression given above: US de-trended output dropped more than 35% in four years, while in 1939 it was nearly 27% below its 1929 de-trended level (Cole and Ohanian (1999)). As Prescott (1999) points out, this change in the timing of the event shifts the nature of the central question to be addressed from

“Why was there such a big decline in output and employment between 1929 and 1933?”

to

“Why did the economy remain so depressed for the entire decade?”

In other words, according to RBC theoreticians, a new issue should be added to the “traditional” question of what caused the Great Depression, namely what explains the slowness of the recovery phase. As a result, for them the main aim of an economic explanation of the Great Depression becomes the identification of the obstacles, be they economic or socio-political, impeding the recovery.

and 2000, with a decline of more than 18% between 1973 and 1983. Anyone can witness, however, that life in Switzerland in the last 30 years has had very little in common with life in the USA during the 1930s!

⁵Here I refer to the dating of the event called the “Great Depression”, not to the dating of its alleged causes. In effect, many of the authors quoted in the text consider the causes of the Great Depression to be rooted in events which occurred well before 1929. Eichengreen (1992) and Friedman and Schwartz (1963) are an example. An exception to this general tendency to date the Great Depression between 1929 and 1933 is Galbraith (1995), who criticises this view from a Post-Keynesian point of view, asserting that the Great Depression never ended, but was swept away by the outbreak of the second world war.

2.3 Methodology

As to methodology, RBC theorists tread in Lucas' footsteps by arguing that the central purpose of a theory of the economic cycle is not to explain the origin of a particular business cycle, but rather to make the artificial, modelled economy reproduce the actual behaviour of a real-world economy (Lucas (1980)). The logic of this methodological premise must be traced back to the fundamental hypotheses we have singled out. Indeed, if any economic cycle starts with an exogenous shock, studying the specific characteristic of this shock serves little purpose for the task of elaborating a general theory of the business cycle. It is much more important to understand the regularities that will ensue after the shock occurs.

RBC theoreticians build models in the Solow-Ramsey tradition, modified to allow for stochastic shocks that hit the economy at random. Any stochastic shock of this nature is called an "impulse mechanism" of the business cycle. The typical impulse mechanism considered in standard RBC models is a technological shock, represented as an autoregressive stochastic shock on the total factor productivity (TFP). TFP is a parameter of the production function, which embodies a broad concept of efficiency in combining inputs to obtain output. The point deserves closer examination, because RBC authors make extensive use of it. Consider a Cobb-Douglas production function

$$Y_t = AK_t^\alpha L_t^{1-\alpha},$$

where $A = \text{TFP}$. With a simple "growth accounting" exercise (Solow (1957)) we can distinguish between growth of output originated by the growth of inputs, and the growth of output which can be attributed to variations in the TFP. Taking log-derivatives with respect to time we obtain

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \alpha \frac{\dot{K}}{K} + (1 - \alpha) \frac{\dot{L}}{L}.$$

The first term on the right hand side is the well-known Solow residual. In a standard RBC model, the impulse mechanism of the business cycle is a random shock on A of the kind

$$A_t = \rho A_{t-1} + \varepsilon_t,$$

where $0 < \rho < 1$ and ε_t 's are white-noise disturbances.

Having defined the impulse mechanism of the business cycle, RBC theoreticians compute the equilibrium reaction to the impulse mechanism. That is, they study the qualitative and quantitative response of the model economy to the random shock, on the basis of the set of relationships postulated by

the model which allows them to identify a “propagation mechanism” for the shock. This simulation technique requires the model to be calibrated, that is, a numerical value assigned to each parameter on the basis of econometric estimates, or, if reliable econometric data are absent, on the basis of economic plausibility. If the perturbed model economy “reproduces” aggregate fluctuations reasonably well, it can be considered as a plausible theory of the cycle. That is, the ability of an artificial model to reproduce a set of stylised facts after being hit by an exogenous random shock is the methodological litmus test by which the robustness of the theory is judged.

2.4 National Dimension of the Phenomenon

The RBC interpretation of the Great Depression differs from previous interpretations when considering the role played by the international political and economic environment during the 1930s. While earlier leading authors (Bernanke (1995), Eichengreen (1992) and Kindleberger (1973)) had stressed the international dimension of the Great Depression, and gone so far as to say that a full understanding of that phenomenon could not be reached without considering the international dimension, RBC researchers reversed this position by concentrating their analysis on isolated country studies. Several reasons may explain this change of perspective.

- The first work on the Great Depression from a RBC perspective is the paper by Cole and Ohanian (1999), which is strictly concerned with the Great Depression in the USA. Data proves that the Great Depression hit harder in the USA than in other industrialised countries; output fell relatively more, and the state of depression of the economy lasted longer than in any other country. This evidence persuaded the authors to assume that the shock that affected the US economy must have been far bigger than the shocks which affected other economies and, in addition, that the slowness of the US recovery was probably due to some idiosyncratic shock, since other countries recovered earlier. Moreover, the USA is notoriously an almost closed economy as far as international trade is concerned. Consequently, a national dimension appears to them sufficient to analyse the US Great Depression⁶.
- From a methodological point of view, the mathematical formalisation that is typical of RBC research forces the economist to leave out many

⁶This is the position held by Romer (1993) too. Although working from a different basis, she argues that the Great Depression in the United States was due to a mixture of bad monetary policy and aggregate demand shocks, both with idiosyncratic characteristics specific to the American case.

aspects of reality in order to concentrate on the aspects that are considered essential. Given that RBC models explain recessions by means of a shift in the labour-demand schedule (Mankiw (1989)), exogenous shocks to TFP (i.e. exogenous variations in the Solow residual) could easily do the job, while keeping the model sufficiently compact. The international dimension becomes therefore negligible.

3 The RBC Interpretation of the U.S. Great Depression

The RBC interpretation of the US Great Depression stems from the work of two leading authors, Harold Cole and Lee Ohanian. The initial results were somewhat frustrating, insofar as neither the standard RBC story of technological shocks, nor other standard real and monetary factors could properly account for both the magnitude and the long duration of the Great Depression. Therefore, they soon focused their attention on the protracted character of the depression, a theme that eventually proved more congenial to the RBC methodology and theory. The distorting elements of some New Deal policies helped in explaining why the economy remained depressed for so long. This position has been authoritatively espoused, not to say inspired⁷, by Prescott, who, in a short comment article in 1999, gave a clever picture of the basic elements of the RBC interpretation of the Great Depression.

3.1 The Early Stage: Cole's and Ohanian's Works, Prescott's Comment

3.1.1 The Onset of the Great Depression

Cole and Ohanian's early work is mainly negative, consisting in showing that earlier explanations of the Great Depression are unsatisfactory when

⁷See Prescott (1998), pg. 21.

“The Great Depression in the United States is an example of a large deviation from the neoclassical growth theory that is not accounted for by variations in TFP. In 1939 hours worked per adult were still 23% below what it was in 1929, the year prior to the start of the Great Depression. During this ten year period output per hour increased by about 10%, which is only a little below the historical average. The question is why employment didn't return to its 1929 level. The only candidate for an answer is policy that changed the nature of the game being played by the economic actors.”

recast within the RBC framework. In their 1999 paper, the authors start by describing the behaviour of the main de-trended macroeconomic aggregates during the decade 1929-1939; subsequently, they try to single out, among the many different explanations in the literature purporting to explain business cycles, the models which best fit these data. Cole and Ohanian (1999) find that stochastic shocks to the growth rate of the TFP could explain roughly 40% of the 1929-1932 drop in output. They obtain this result by taking a suitable specification of the model, and feeding in the measured level of TFP as a measure of technological shock.

An interesting point, highlighted later by Ohanian (2002), is that the drop in measured TFP during the Great Depression, although not sufficient to reproduce in the model the magnitude of the decline in output, is still relatively high when compared with the drops in measured TFP that normally accompany recessions in the post-World War II period. This feature means that the behaviour of the TFP during the 1930s was peculiar, in that some of the specific reasons had still to be discovered (see Ohanian (2002) for further discussion).

Alternative “real” explanations, such as shocks to international trade, public expenditure and distorting taxes, are presumed to have had a lesser impact, if any, on the crisis. Their argument as to these alternative factors is as follows.

International trade. The 1930s were characterised by the collapse of world trade induced by the general raising of tariffs and quota restrictions. Some authors (e.g. Crucini and Kahn (1996)) argue that this trade disruption may have produced an appreciable effect on the US economy, particularly if the elasticity of substitution between domestically produced inputs and imported inputs was very low. Against this argument Cole and Ohanian (1999) note that the United States was at that time a relatively closed economy, with trade comprising a relatively low share, roughly balanced between imports and exports. Moreover, the presence of tariffs suggests that, even if an important part of US imports were intermediate goods, they probably had a high elasticity of substitution with domestic intermediate goods; consequently, international trade disruptions probably had no appreciable or enduring negative effects on the US Great Depression.

Public expenditure and distorting taxes. Cole and Ohanian (1999) report data showing that de-trended public expenditure in the USA declined significantly only in 1933. It remained above the trend level during almost the entire decade. So a negative crowding out effect of public expenditure has to be dismissed. As far as taxes are concerned,

the authors assert that tax rates on factors' income changed slightly in 1929-1933, but considerably more later on. Given the distorting nature of income tax, it can be imagined that a tax increase may have had some negative impact on the economy. Using data on the average marginal tax rates on factors' income, Cole and Ohanian (1999) run two further simulations: the first with the 1929 average tax level, the second with the 1939 average tax level. In the second simulation the steady-state level of labour input is 4% lower than in the first. The authors conclude that negative fiscal policy shocks did not produce appreciable effects on the 1929-1933 crisis, but they can explain some 20% of the weak 1934-1939 recovery.

“Monetary” shocks, financial disruptions and nominal rigidities are also considered to have had little impact on the Great Depression.

The argument on this point is developed in detail by the same authors in another paper (Cole and Ohanian (2000)), where a more in-depth view of the role of deflation induced by monetary shocks in determining the 1929-1933 downturn within an RBC framework is provided. Cole and Ohanian (2000) review the main mechanisms identified by economists to explain the observed pattern of the real effects of monetary policy during the 1930s, namely:

- Lucas and Rapping's (1969) unexpected deflation model, by which an unexpected monetary restriction would lead to a lower labour supply, insofar as workers, having adaptive expectations, always expect that the deflation of prices and monetary wages will no longer exist in the next period, and they therefore respond to unexpected deflation by lowering their labour supply;
- the debt deflation model of Irving Fisher (1933), by which deflation, by making the burden of real debts heavier, would cause firms' bankruptcies, and a collapse in demand;
- the sticky wage hypothesis, by which, in the presence of nominal wage rigidities, a general decrease in prices would induce an increase in real wages, thus causing a decrease in the labour demand;
- theories centred on the role of banking disruptions induced by deflation, that would have caused the efficiency of financial intermediation to decrease and a consequent decrease in lending and output (Bernanke (1983)).

By comparing deflation in 1929-1933 to that in 1920-1921, the authors firstly exclude Lucas and Rapping's (1969) and Fisher's (1933) hypotheses.

To the first they object that deflation was more likely to be expected in the 1930s than in the 1920s, because the nominal interest rate was lower during the 1930s. This weakens Lucas and Rapping's (1969) model propagation mechanism, which is based on unexpected deflation. As to Fisher's (1933) debt-deflation model, they note that, although the level of private debt as a proportion of output was higher in 1929 than in 1920, output dropped more sharply during the 1930s than during the 1920s, even if deflation was less severe⁸.

The strategy of comparing deflation in 1929-1933 and 1920-1921 is not decisive as far as the sticky wage hypothesis and the financial disruption hypothesis are concerned. De-trended hourly real earnings in manufacturing increased more in 1929-1933 than in the 1920-1921 recession, while bank failures were certainly more widespread and significant during the Great Depression. These considerations induced the authors to test these two hypotheses by means of simulations with modified versions of the benchmark RBC model.

To test the sticky wage hypothesis, Cole and Ohanian (2000) built a two-macro-sector general equilibrium model, in which a final good Y is produced by means of two different types of intermediate goods Y_m and Y_n . Each intermediate good is produced by means of capital and labour H_j , where $j = m, n$. There are two sectors producing intermediate goods: one, n , is a competitive sector, with wages set at the market clearing level; the other, m , is a non-competitive sector, in that wages are fixed above this market clearing level. Both sectors use the same constant returns to scale Cobb-Douglas technology, i.e.

$$Y_j = (AH_j)^{1-\theta} K_j^\theta.$$

The final goods sector uses a Constant Elasticity of Substitution (CES) technology, i.e.

$$Y = (\alpha Y_m^\phi + (1 - \alpha) Y_n^\phi)^{\frac{1}{\phi}}.$$

Both capital and labour are immobile.

The preferences of the representative household are specified through a logarithmic utility function. The representative household can allocate its working time between the two sectors, and it is assumed to perceive that wage fixity in the non-competitive sector is a non-recurring phenomenon - i.e. the model assumes that each wage shock occurring in any of the Depression

⁸Prices went down by 19.4% in 1920-22 and by 11.5% in 1929-31, whereas de-trended real income dropped respectively by 3.8% in the 1920-22 and by 22.4% in the 1929-31. See Cole and Ohanian (2000), pg. 6, Table 3.

years is completely unexpected⁹.

The model is calibrated using, as far as possible, standard values from RBC literature for the parameters. A calibration for the model-specific parameters is also provided. These parameters are ϕ (the parameter of the CES production function, which governs the elasticity of substitution between Y_m and Y_n) and α (the fraction of the economy distorted by high wages). The values of these parameters are chosen by considering the manufacturing sector as the empirical counterpart of the non-competitive sector in the model.

The authors run two simulations, one with a benchmark model without nominal wage rigidities, and another with the model as described above. They then compare the results of their simulations with the data, and conclude:

“These results suggest that the high wage was not the primary cause of the Great Depression.[...] This wage accounts for about a 3 per cent decline in output at the trough of the Great Depression, compared to an actual 38 per cent decline. Increasing the size of the distorted sector to 50 per cent, or reducing the substitution elasticity to 0,1 did not significantly change the result.”
(Cole and Ohanian (2000) pg. 20).

The economic rationale of this result is as follows. In this two-sector model, wage rigidity has both a direct and an indirect effect on employment. In the distorted sector firms employ labour up to the point where the marginal product of labour equates to the real wage. Because, by definition, the real wage in this sector is above the market clearing level, production in the distorted sector will be below its potential level. It follows that part of the labour force potentially employable in the distorted sector will remain unemployed. Such a direct effect is clearly negative. To understand the indirect effect, it is worth considering that output in the distorted sector is an input in the production of the final good. Cole and Ohanian (2000) assume that technology is such that Y_m and Y_n are imperfect complements in the production of the final good, rather than substitutes. That is to say they consider $\phi < 0$. This means that as Y_m diminishes, its relative scarcity will increase, and so will do its relative demand. Firms cannot substitute Y_n for Y_m beyond a certain level. Thus $\frac{p_m}{p_n}$, the relative price of the distorted sector, must increase. According to the authors, this means that, given a monetary wage \bar{w}_m , the real wage $\frac{\bar{w}_m}{p_m}$ should decrease. In other words, the real wage would decrease in spite of the nominal rigidity, thus determining an upward

⁹This is a technical assumption needed in order to be able to compute the equilibrium in the simulation recursively.

shift in the value of marginal product of labour (i.e. the marginal product of labour multiplied by the price of output schedule). Thus the indirect effect would tend to counteract the direct one.

Cole-Ohanian (2000) also exclude the possibility that wages might be significantly underestimated, and instead argue that the contrary is likely to be true. They refer to Margo (1993) and assert that wages were probably well below the trend line also in the manufacturing sector, because of the compositional bias in favour of high-skilled workers that affected the U.S. economy in the 30s¹⁰.

As to the analysis of banking shocks, Cole and Ohanian (2000) first defined banking shocks as bank closures affecting the information capital. Afterwards they built a model in which information capital was used by banks as input together with deposits, to obtain a “banking output”. This banking output appears, in the end, as an input for the production of the final good. Both these productive process are assumed to be constant returns to scale. This model was built so that, in each sector, the ratio of inputs to outputs is equal for all inputs. Consequently, the loss of information capital relative to output due to bank closures is equal to the fraction of deposits on output loss due to bank closures. As, on the basis of the US data reported by Cole and Ohanian (1999), this was pretty low during the Great Depression, the authors conclude that, because the loss of information capital was also low during the Great Depression, it only affected the economy slightly.

3.1.2 The Long Duration of the Great Depression

While, as we have seen, the results of Cole and Ohanian’s analysis of the onset of the Great Depression were basically negative, its long duration provided them with more encouraging results. Had the Great Depression been a normal business cycle, it should have ended much earlier than it actually did. Once the effects of the TFP negative shock were exhausted, the economy should have recovered its steady-state growth path. In Cole and Ohanian’s (1999) simulations, output should have recovered its trend level by 1936, if the measured shocks to TFP in the 1930s had been the sole “impulse mechanism” for the economic cycle. The TFP was back to its trend level in that year. However de-trended data show that in 1939 output was still a good 25% below its trend level. The observation that the recovery failed to happen in the mid-1930s led Cole and Ohanian (1999) to argue that the Great Depression was not only the result of a temporary shock that caused a fluctuation around the trend-growth path, but that it was probably the outcome

¹⁰This point is actually controversial. For instance, Bordo et al. (2000) argue that data at the industrial level suggest that there was no significant skill composition bias.

of a mixture of a temporary shock with some other permanent shocks that caused the growth path itself to shift downward. At the end of their paper, Cole and Ohanian (1999) suggest that a likely culprit could be the New Deal policies introduced after 1933.

While this line of research about the link between New Deal policies and the Great Depression is only alluded to in Cole and Ohanian's 1999 paper, it is the central object of their subsequent research (Cole and Ohanian (2004) and, in an earlier and more detailed working paper version, Cole and Ohanian ((2001)). Their basic claim is that New Deal competition and labour market policies are to blame for the duration of the Great Depression. In particular, they consider two important reforms: the National Industrial Recovery Act (NIRA)¹¹ and the National Labour Relations Act (NLRA)¹². These measures had a relatively high coverage in the economy: employment in the sectors covered by the NIRA was about 52% of total employment, while this figure reached 77% in the private non-farm sector (Cole and Ohanian (2001), pg. 67, Table 2). Cole and Ohanian (2004) built a model to show that the rise in prices and wages actually curbed the recovery in production, rather than boosting it (as Roosevelt's economic advisers had thought it would)¹³. The

¹¹The NIRA was enacted in 1933 and declared unconstitutional by the Supreme Court in 1935. The act aimed at providing all the sectors covered by "codes of fair competition", to obtain an end to substantial price deflation, and an increase in workers' income that could allow for greater consumption expenditure. The NIRA also suspended anti-trust law, and encouraged cooperation between firms, and collusion in price setting; it heavily discouraged price competition, subordinating price cuts to administrative approval. The codes, though different for each sector, had to be negotiated under the guidance of the National Recovery Administration, and required the approval of the President. Cole and Ohanian (2001) stress that Roosevelt's political inclinations, as well as the deep conviction of his advisers that an increase in prices and nominal wages would be the best way to counteract the depression, led him to guarantee his approval to those codes that included collective bargaining over wages and minimum wages for low-skilled workers.

¹²The NLRA was enacted in 1935, and its constitutionality was upheld by the Supreme Court in 1937. It gave workers the right to organise themselves into trade unions independent of their masters; it prohibited discrimination based upon union affiliation, as well as the coercive enrolment in companies' unions. The Act also established a National Labour Relations Board (NLRB), which had the authority to guarantee the legal enforcement of wage agreements.

¹³It is very interesting to note that the view that the NIRA policy probably had a negative impact is not the prerogative of RBC theory. J.M. Keynes, in an open letter to Roosevelt published in *The New York Times* in 1933, expressed his disagreement with this policy as a means of producing a recovery. He argued that the fact that an increase in prices and monetary wages generally characterises the recovery periods does not mean that it causes the recovery to happen. So, in Keynes's view, the US administration had confused causes with effects. In Keynes's opinion the NIRA was probably an obstacle to recovery, because it increased the costs of production, whereas the appropriate measure

model is explicitly oversimplified insofar as it assumes NIRA and NLRA to be the same thing, and does not consider the effects of other New Deal policies. This is done in order to have only one model, which could more easily be used to predict output in the whole 1934-1939 period.

The benchmark specification of the model is a multi-sector version of a standard real business cycle model, in which a final good in period t , Y_t , is produced using a variety of intermediate goods. These intermediate goods are produced by different industries, $i \in [0, 1]$, each belonging to a sector $s \in [1, S]$. The set of industries in sector s is given by $[\varphi_{s-1}, \varphi]$, where $\varphi_s \in [0, 1]$ and $\varphi_{s-1} < \varphi_s$, $\varphi_0 = 0$, and $\varphi_S = 1$. All the production technologies exhibit constant returns to scale. In algebraic form, denoting the output of the industry i as $y(i)$, the labour augmenting technology in the industry as z , the sectoral output as $Y_{s,t}$, and assuming perfectly mobile labour across industries and sectors, and sector-specific capital, Cole-Ohanian (2004) write:

$$y(i)_t = (z_t n(i)_t)^\gamma (k(i)_t)^{(1-\gamma)};$$

$$Y_{s,t} = \left[\int_{\varphi_{s-1}}^{\varphi_s} (y(i)_t)^\theta di \right]^{\frac{1}{\theta}};$$

$$Y_t = \left[\sum_{s=1}^S (\varphi_s - \varphi_{s-1}) Y_{s,t}^\phi \right]^{\frac{1}{\phi}}.$$

They then specify a logarithmic utility function

$$\sum_{t=1}^{\infty} \beta^{t-1} [\ln(c_t) + \phi \ln(1 - n_t)],$$

in which n_t is the number of members of a household working in the market - i.e. labour is assumed to be indivisible.

To model New Deal policies in this setup, Cole and Ohanian modify the model in three ways.

First, they assume that, in the economy, a fraction χ of the sectors producing intermediate goods forms a cartel. In these sectors there is, therefore, a rent to be shared between workers and firms arising from the monopolistic extra profits.

for ending the recession was a policy of large government expenditure, financed by long-term public debt, together with a monetary policy which fixed low nominal interest rates. Keynes's diagnosis was that people were not spending money, and that this was causing the cumulative deflation that resulted in depression. To restart a virtuous circle of development, people had to be induced to spend. If this were not possible, a good surrogate for the missing private expenditure would be government expenditure. In the end, the increase in the aggregate demand would generate an increase in the general level of prices.

Second, Cole and Ohanian assume that, as a consequence, wages in these cartelised sectors are bargained over between workers and firms; the relative bargaining power of the two parties is embodied in a parameter ω that gives the probability of a firm gaining monopolistic extra profits without accepting workers' wage demands. The cartelised sector behaves as in an "insider-outsider" model, where all insider workers are paid the same wage.

Third, it is assumed that there are frictions on the labour market, in order to allow for flows of workers between the competitive and the cartelised sectors. This is modelled by saying that a fraction π of workers in the cartelised sector in period t will keep their jobs in period $t + 1$, while a fraction $1 - \pi$ will lose them due to retirement, illness, etc. Considering that jobs in the cartelised sectors are better paid, workers' preferences will certainly be to move to these sectors rather than to similar jobs in the competitive sectors. Consequently, a search process for these jobs will start. Cole and Ohanian assume that a person searching for a job in a cartelised sector in period t will find it in period $t + 1$ with probability v_t .

These three modifications are intended to emphasise the characteristics of the New Deal policies the authors consider essential, i.e. the connection between the acceptance of collective bargaining, allowing *de facto* for the greater bargaining power of unions and workers, and allowing a price control policy by cartelised firms. They also reproduce the "equal pay for equal work" principle, a cornerstone of union policy in the 1930s. Cole and Ohanian (2004) calibrate and simulate their model, feeding in the sequence of observed TFP as measures of the technological shock, and then compare the results of the cartel modification with the competitive benchmark, both in relative terms and in terms of reproducing the actual data.

The main result they obtain when comparing the two steady-state solutions is that cartelisation policy causes a greater drop in output, the greater the bargaining power of workers, i.e. the lower is the calibrated value for the parameter ω , and, *ceteris paribus*, the higher is χ , the share of the economy involved in such a policy. However the effects of varying ω are much larger than those induced by variation in χ ; as Cole and Ohanian observe:

"The key depressing element of the policy is not monopoly *per se*, but rather the link between wage bargaining and monopoly."
(Cole and Ohanian (2004), pg. 805).

As far as comparison with the actual data is concerned, while the competitive model does not at all reproduce the observed trend of the economic aggregates during the recovery, the cartel model (obviously starting from the same initial value for the capital stock, and feeding in the same sequence of TFP) makes predictions which are considerably closer to the facts. On the basis of the

figures obtained, Cole and Ohanian (2004) argue that the cartel model is able to explain a good 60% of the slow recovery. The rationale for this result is that the negative effects of higher wages and lower production propagate from the cartelised sectors to the competitive ones, insofar as the reduced output in the cartelised sectors tends to lower wages and employment in the competitive sectors where, moreover, people search for a more rewarding job in the cartelised sectors. So, they conclude,

“[...] New Deal labor and industrial policies did not lift the economy out of the Great Depression [...] Instead, the joint policies of increasing labor’s bargaining power, and linking collusion with paying high wages, prevented a normal recovery by creating rents and an inefficient insider-outsider friction that raised wages significantly and restricted employment.” (Cole and Ohanian (2004), pg. 813).

3.1.3 Prescott’s Assessment

In a short comment article on Cole and Ohanian (1999), Prescott (1999) sketches a general and clear outline of the RBC interpretation of the US Great Depression, which is worth considering. It can be briefly summarised as follows. First, some of the exogenous factors described in terms of an exogenous shock to TFP would necessarily have caused a strong recession at the end of 1929. Second, misconceived economic policies, attempting to improve the disastrous economic performance of that time, impeded the normal adjustment of market forces. These policies introduced strong distorting elements into the US economy: by increasing *de jure* the real wage rate, they lowered the normal employment level and the growth path. In Prescott’s (1999) words:

“in the Great Depression, employment was not low because investment was low. Employment and investment were low because labour market institutions and industrial policies changed in a way that lowered normal employment.” (Prescott (1999), pg. 27).

The methodological perspective that lies behind this paper deserves to be discussed, because it is representative of the whole early RBC interpretation of the Great Depression. Prescott (1999) seems to draw a line between the realm of history, which includes the historical identification of shocks, and the realm of economics, which studies the propagation mechanism of the business cycle. If I am correct, in this methodological approach the origin of a shock

(i.e. the concrete historical determination of the impulse mechanism of the business cycle) is outside the scope of economics, being somehow banished into the limbo of anecdotal report. This procedure might make sense, from a theoretical point of view, when the development of a general theory of the business cycle is considered. In that case, the theory can conceivably be more interested in the regularities of the business cycle (that is, in how a business cycle arises from an exogenous shock) than in studying the peculiarities of each particular shock. However things should be different when a specific analysis, such as the Great Depression, is considered. All the more that in this case the exogenous shock required to reproduce the data is abnormally large, and this abnormal dimension deserves more detailed historical analysis.

Subsequent RBC analyses have indeed involved more causal perspectives.

3.2 Subsequent Developments

3.2.1 The Debate about Sticky Wages

Cole and Ohanian's (2000) conclusions that sticky wages were irrelevant in accounting for the onset of the US Great Depression have been questioned by other RBC authors. Christiano et al. (2004) point out that

“there just does not seem to be a tight negative relationship between the real wage on the one hand, and output and employment on the other”.

Other authors have put forward counter-arguments. Bordo et al. (2001) and Gertler (2001) argue that what Cole and Ohanian (2000) call the “the general equilibrium” indirect effect of wage rigidity, in a two-sector model, is actually a biased result. According to them, Cole and Ohanian's (2000) result follows from the unjustified assumption of perfect wage flexibility in the non-manufacturing sector. As Gertler (2001) points out, this model excludes nominal wage rigidity by definition, and thus excludes the decrease in the aggregate demand for labour that is necessary if the sticky wage hypothesis is to produce real effects. Moreover, Bordo et al. (2001) emphasise that there is no justification for this choice, either theoretical or empirical, because it is based on a questionable extension to the whole non-manufacturing sector of the wage flexibility observed in the farming sector. According to Bordo et al. (2001), imposing a non-competitive wage in the non-manufacturing sector - even lower, if so we wish, than the non-competitive wage in the manufacturing sector - completely reverses Cole and Ohanian (2000) results.

Empirical evidence on cross-sectional international data presented by Eichengreen and Sachs (1985) suggests that currency-devaluating countries

experienced relatively lower real wages and higher industrial production, a finding consistent with the sticky wage hypothesis¹⁴.

Finally, on the positive side, Bordo et al. (2000) show that the sticky wage hypothesis could provide a fitting explanation of the onset of the Great Depression, within a RBC framework. In this paper, the authors build a simple one-sector real business cycle model with fixed wages à la Taylor (1980) and monetary shocks. Running a simulation on this model, they find that the model can “explain” approximately 70% of the 1929-1932 drop in output, a result in sharp contrast with Cole and Ohanian (2000). However, they do admit that their results clearly show that on its own the sticky wage hypothesis accounts neither for the recovery phase of the US Great Depression, characterised by a strong monetary expansion (Romer (1992)), nor for the final year of the recession, 1932-1933. Bordo et al. admit that some financial disruption of the kind envisaged by Bernanke (1983) might have been responsible for the crisis in the final year, whereas they suggest a more detailed explanation, built on Cole and Ohanian’s (1999) early suggestion about the possible distorting role of New Deal policies to explain the recovery phase. In particular, they focus on the National Industrial Recovery Act (NIRA), a step that was taken a year later by Cole and Ohanian. Bordo et al. (2000) then modify the process of wage formation in their model by splitting it into two processes: a Taylor setting, for the period 1929:3-1933:2¹⁵; and a level of wages fixed to their 1933:2 level later on. This modified model shows that

“As long as real wages were legislatively mandated at levels well above the marginal product of labour that would prevail at full employment, monetary expansion alone could not lead to recovery.”

The lack of unanimity among RBC authors about the role played by wage stickiness in the onset of the Great Depression is worth stressing. To all intents and purposes, this lack of unanimity suggests that the theoretical quantitative approach of RBC can lead to equivocal conclusions.

3.2.2 Christiano et al. (2004)

A further development in the application of RBC methodology to the Great Depression is the recent work by Christiano et al. (2004). This paper is

¹⁴Expansionary monetary policy generates price inflation; provided that nominal wages are rigid, real wages will go down. This will determine an increase in labour demand and hence in output.

¹⁵Quarterly data are used here.

actually an attempt to build a “realistic” dynamic stochastic general equilibrium model that can be used for contemporary policy questions. The US Great Depression appears in the paper as the toughest possible test for the model. In this respect Christiano et al.’s basic conclusion is that while the Great Depression was certainly the result of many joint shocks, it is mainly attributable to two factors: a “preference for liquidity shock” (which induced a shift away from demand deposit towards money, thus in large part causing the onset of the depression); and the increased market power of workers during the New Deal (which explains why, during the recovery phase, employment was still so low, thereby shedding some light on why the recovery phase itself was so slow).

These results are obtained by means of a very complex RBC style model. Its basic structure is as follows. It is assumed that a final good Y_t is produced by a perfectly competitive representative firm, by means of a number of intermediate goods $Y_{j,t}$. These intermediate goods are produced by monopolists who set their prices $P_{j,t}$ subject to a Calvo (1983) style friction. The intermediate good firms need labour $l_{j,t}$ and capital $K_{j,t}$ for their productive activity. They buy working hours from households, paying a wage rate W_t . They rent capital from entrepreneurs, paying a rental price of capital Pr_t^k for capital services. Moreover, each intermediate good firm must finance in advance a fraction ψ_k and ψ_l of capital and labour services. They do it by asking for loans from banks, and paying back a net interest rate of R_t . Entrepreneurs buy capital x from capital producers, paying for it at the price $Q_{\bar{K}',t}$. In order to pay these amounts they use their net worth N_t and they borrow $B_t = Q_{\bar{K}',t} - N_t$ from banks, paying a gross interest rate Z_t . At the end of the period, they sell back the undepreciated capital to capital producers, at the same price $Q_{\bar{K}',t}$.

Entrepreneurs can be bankrupted during each period with a probability $1 - \gamma_t$, which is also the fraction of the new entrepreneurs entering the market. Capital producers produce units of new capital good x' by means of previously installed capital x and investment goods I_t . They buy investment goods from the final good sector, paying them P_t . Banks use capital and labour to “produce” their services and hoard reserves. They buy working time l_t^b from household, and rent capital K_t^b from entrepreneurs, paying respectively W_t and Pr_t^k . They hold demand deposits from firms and households, D_t^f and D_t^h , paying them an interest rate of $R_{a,t}$. They also hold time deposits from households, T_t , which pay a non-state-contingent expected rate of return R_{t+1}^e .

Finally, households consume an amount C_t of the final good, paying P_t per unit; they hold high powered money M^b ; they pay lump-sum transfers to entrepreneurs, in order to guarantee free entry in entrepreneurship; and

receive lump-sum transfers corresponding to the net worth of entrepreneurs exiting the economy.

Households are modelled as maximizing the utility function

$$E_t \sum_{l=0}^{\infty} \beta^{l-t} \left\{ \ln(C_{t+l} - bC_{t+l-1}) - \zeta_{t+l} \frac{\psi_L}{2} h_{j,t+l}^2 - v_t \frac{\left[\left(\frac{P_{t+l} C_{t+l}}{M_{t+l}} \right)^{\theta_{t+1}} \left(\frac{P_{t+l} C_{t+l}}{D_{t+l}^h} \right)^{1-\theta_{t+1}} \right]^{1-\sigma_q}}{1-\sigma_q} \right\},$$

where $-bC_{t+l-1}$ represents habit persistence; ζ_{t+l} is a parameter denoting a shock to the preference for leisure; v_t stands for the liquidity preference shock. Households are assumed to be able to exert some monopoly power over labour, so that they set wages within a Calvo contract setting. There is also a non-modeled Government, which buys G_t unit of the final good, at the price of P_t per unit.

Christiano et al. (2004) then introduce eight exogenous shocks and study their joint and idiosyncratic impact on the model, comparing outcomes with data for the US Great Depression. These shocks affect: the monopoly power of intermediate good firms ($\lambda_{f,t}$); the monopoly power of wage earners (ζ_t); households' preference for currency versus demand for deposits (θ_t); the preference for liquidity (v_t); productivity shocks for intermediate goods (ε_t); the survival probability of the entrepreneur (γ_t); the relative value of excess reserve in banking sector (ξ_t); willingness of entrepreneurs to take risks (σ_t). These shocks are drawn from stochastic processes, and estimated with a maximum likelihood procedure.

Christiano et al. assume that these shocks influence the rate of growth of money, because of the monetary authority reaction function. After having estimated all the parameters and calibrated the model, they ran a simulation, fitting in the estimated values for the shocks. They found that their model could properly reproduce key features of the data. As anticipated in the beginning of this section, they also found that two shocks were crucial in explaining the Great Depression in the United States: preference for liquidity and workers' market power.

While workers' market power resembles the traditional high wages story, which we have dealt with above, the preference for liquidity deserves some further explanation. An exogenous shock to the preference for liquidity leads to a decrease in the ratio between demand deposits and money demand, $\frac{D_t^h}{M_t}$, in consumption and in time deposits. The aggregate M1 falls, causing the interest rates to increase. The higher interest rates, causing an increase in the debt burden and a decrease in the rental price of capital¹⁶, lead to a higher

¹⁶Because consumption demand decreases.

probability of bankruptcy for entrepreneurs. As a consequence, entrepreneurs drop their demand for capital goods, and therefore capital producers lower the level of production of capital goods. Their prices, therefore, go down. The fall in the price of capital worsens the drop in investments, because it causes the net worth of entrepreneurs to diminish.

At the end of the paper, Christiano et al. (2004) carried out a counterfactual example in which monetary authority actively reacts against the shocks, allowing the growth rate in the monetary base to overcompensate for the reduction due to the eight shocks. This leads them to argue that, had an appreciably more expansive monetary policy taken place in the 1930s, the size and duration of the Great Depression would have been much less.

This study by Christiano et al. (2004) is methodologically analogous to the previous studies reviewed. The analysis is, however, somewhat more complex, because of the attempt to take into account at least some of the complexity of reality. Its conclusions are clear as well as its policy implications: the Great Depression was in origin a “market failure” due to an escape towards liquidity, worsened later on by the distorting intervention of the State. Then a “State failure” was added to the ongoing crisis. Had there been an active monetary policy, the depression would have been milder.

3.2.3 Weder (2001)

The last paper to be considered in this section is Weder’s (2001). In this paper, a dynamic stochastic general equilibrium model of the RBC type is modified in order to allow exogenous shocks to the aggregate demand for consumption to be the only impulse mechanism of the business cycle. The aim of this paper is to quantitatively evaluate the impact of the consumption shock on the Great Depression by simulating the model. As for the methodological concern, the model is in the RBC tradition. Nevertheless, it has a clearly Keynesian flavour, all the more so in that Weder defines his model as a RBC formalisation of Temin’s (1976) ideas on the Great Depression as a phenomenon mainly due to a contraction of the autonomous components of aggregate demand for consumption.

In Weder’s model, households are thought of as maximizing the following utility function

$$\max_{c_t, l_t, x_t} E \sum_{t=0}^{\infty} \beta^t (1+n)^t [(1-\eta) \ln(c_t - \Delta_t) + \eta \ln(1-l_t)],$$

where Δ_t is a random variable affecting the subsistence level of consumption, and l_t stands for labour. The model also includes variable capital utilization

u_t , “organizational synergies” A_t and increasing returns to scale, expressed by means of a parameter γ :

$$y_t = A_t^\gamma (u_t k_t)^\alpha l_t^{(1-\alpha)};$$

$$A_t = (\bar{u}_t \bar{k}_t)^\alpha \bar{l}_t^{(1-\alpha)}.$$

Weder (2001) identifies the preference shifter econometrically as follows. He first derives a Euler equation from the first order conditions for the household’s utility maximisation problem. He then linearises the Euler equation, taking a Taylor approximation of it. Finally uses ordinary least squares to regress the formula he obtained on the data, and takes the residual from the regression as the preference shifter. The dynamic process of this preference shifter is then found econometrically to be second order autoregressive, of the kind

$$\hat{\Delta}_t = \zeta_1 + \zeta_2 t + \zeta_3 \hat{\Delta}_{t-1} + \zeta_4 \hat{\Delta}_{t-2} + d_t.$$

Weder uses this AR(2) to compute a shock series $\{d_t\}_{1930}^{1939}$ from the data. Then, he calibrates his model, largely on the basis of Cole-Ohanian (1999) analysis, and runs a simulation. It turns out that the model with increasing returns matches the trend in US output very well, “explaining” around 82% of the collapse, the slow recovery and the second 1937 recession.

Weder (2001) is also interested in comparing his model with both the competitive and the cartel model in Cole and Ohanian (2001). He first points out that his model can mimic the onset of the Great Depression as well as the slowness of the recovery (reproducing about 80% of the data), whereas Cole and Ohanian’s (2001) competitive model can explain only about 40% of the onset of the depression, and very little of the recovery phase. Moreover Cole and Ohanian’s (2001) cartel model can only explain a 50-60% of the recovery phase. Besides, Weder argues that his model can reproduce the 1937 recession, which other models cannot.

To investigate further which model “explains” data in a statistically more appropriate way, Weder (2001) runs a regression of actual US output on the “predicted” output of three models: his own model, Cole and Ohanian’s (2001) competitive model and Cole and Ohanian’s (2001) cartel model. He finds that the “predictions” of his model are statistically more significant than those of the other two models. Indeed, when output from his model is added to the regression, the other two lose any explanatory power, in the sense that the null hypothesis (that they do not explain US output at all) cannot be rejected. When only the recovery period is considered, his model and Cole and Ohanian’s cartel model) are equally statistically significant in “explaining” the data.

This apparent equivalence in data mimicking ability between two conceptually different hypotheses (shocks on productivity and institutional modifications - i.e. supply shocks - in Cole and Ohanian (1999) and (2001), and shocks on the aggregate demand in Weder (2001)) raises doubts about the usefulness of RBC methodology as applied to the interpretation of an historical event such as the Great Depression. As a matter of fact, RBC theory does not provide a criterion to choose between contrasting explanations that have the same data mimicking ability. In the case under examination, therefore, the results are finally ambiguous, despite the valuable quantitative effort.

3.3 A General Picture

When assessing the RBC model, Romer (2001) makes a distinction between real business cycle models, and real-business-cycle-style models. The former refer to

“[...] the proposition that macroeconomic fluctuations are well described by a model where aggregate technology shocks and other real disturbances impinge on a Walrasian economy [...].”

The latter are defined as models working in the RBC methodological tradition, but employing a wide range of non-Walrasian ingredients¹⁷. The idea behind this distinction is that

“[...] What distinguishes the real-business-cycle research program is its approach to modelling.”

Using a slight reinterpretation of this definition, I will distinguish between a RBC-proper interpretation of the Great Depression and a RBC-style interpretation of the Great Depression.

The RBC-proper interpretation (including Cole and Ohanian (1999), (2000), (2001), (2004) and Prescott (1999)), sticks strictly to the standard RBC methodology, insofar as no causal explanation is involved. In this interpretation, the explanation of the plunge of the early thirties (that is, the historical identification of the shock that caused the Great Depression) is somehow considered methodologically less interesting than the explanation of the long duration of the depression (that is, why the Great Depression did not behave in the same way as business cycles observed in the post-war period). This attitude comes from considering the Great Depression as a

¹⁷This definition amounts to saying that Romer (2001) defines RBC-style models as basically those belonging to the stream of literature nowadays known as new neoclassical synthesis (Goodfriend and King (1997)).

normal business cycle, one in which aggregate economic variables behave as in any other business cycle, but for the magnitude of the oscillations. As a consequence of this methodological perspective, the causes of the productive collapse of the USA economy in the 1930s are mostly traced back to some exogenous supply shock, embodied for simplicity in a parameter of the production function (i.e. TFP). As for the protracted character of the depression, the RBC-proper interpretation charges New Deal policies with having been responsible for it. These policies allowed for substantial distortions in the economy, thus impeding the otherwise inevitable recovery.

The RBC-style interpretation, in which I include all the other papers reviewed above, follows methodologically in the wake of the RBC tradition, while trying to deviate from the benchmark RBC model, by looking for explanations of the onset of the Great Depression. In other words, this current in the literature is interested in a causal perspective, the onset of the Great Depression being explained by means of a variety of explicit variables (monetary shocks and sticky wages in Bordo et al. (2000); preference for liquidity in Christiano et al. (2004); exogenous demand shocks in Weder (2001)). As to the long duration of the Great Depression, all these authors accept the implications of the “normality view”: either the Great Depression would have been a normal business cycle of higher magnitude, had distorting State interventions been absent (Bordo et al. (2000), Christiano et al. (2004)); or the Great Depression was a normal business cycle of higher magnitude that lasted a long time because the shock producing the cycle was extremely long lasting (Weder (2001)).

The general picture that emerges from this survey stands in sharp contrast to the views held by previous economic historians. Eichengreen and Temin (2000) are authoritative representatives of these views. They stress the role of Gold Standard policies and mentality in causing the onset of the Great Depression and its widespread diffusion around the world. The historical analysis tends to consider the Great Depression as a specific outcome of many historically specific causes; it does not share the “normality” perspective at all.

Two aspects of this RBC literature on the Great Depression seem particularly worthy of comment: the methodological and the normative aspects. Methodologically, it emerges from the survey of the literature (above) that the early RBC authors could be interpreted as erecting a border line between the realms of history and economics. Economics was basically concerned with the elaboration of models trying to reproduce a given set of data by the endogenous model’s response to an unidentified exogenous shock. On the contrary, history had the role of giving both content and meaning to the exogenous shock. As already discussed, this methodological perspective, while

being perhaps appropriate when building a general theory of the business cycle, leaves many problems unresolved when dealing with the specific case of the interpretation of an historical event such as the Great Depression. All the more so in that, in the case under consideration, the exogenous TFP shock explaining the onset of the Great Depression is not satisfactory: while it explains only 40% of the contraction phase (Cole and Ohanian (1999)), TFP's drop is abnormally large when compared with TFP's behaviour in the post-war era (Ohanian(2002)). This methodological aspect is somehow smoothed over in later RBC-style interpretations.

A striking aspect of the application of RBC methodology to the Great Depression is that sometimes such a methodology leads to an ambiguous results, as happens, for example, when dealing with the sticky wages story (Bordo et al. (2000) vs. Cole and Ohanian (2000)) or in the case of the quantitative equivalence between demand-shock-driven and supply-shock-driven explanations of the Great Depression (Weder (2001) vs. Cole and Ohanian (2004)). This point deserves some attention because the quantitative dimension of RBC theory has always been thought of, by its proponents, as one of the major strengths of RBC methodology, as it allows for the comparative evaluation of different theories on a quantitative basis. This has been a big step forward in economic theory. It was thought that the theoretician analyses each hypothesis by means of a benchmark model, and then chooses the one that best fits the data, after having simulated the model. The ambiguous results reported here for the Great Depression, instead, suggest that RBC methodology does not always provide suitable criteria for choosing among competing theories.

As far as the normative aspect is concerned, there is widespread agreement among RBC authors on the negative impact of New Deal policies, which are seen as causing the exceedingly long duration of the Great Depression. This position reflects the general *pro-laissez faire* inclination of the RBC literature since its inception. Provided, indeed, that business cycles are changing-in-time Walrasian equilibria, any counter-cyclical policy is doomed to distort the optimal allocation of resources, as an immediate result of the First Welfare Theorem.

4 RBC Theory and Great Depressions Worldwide

The RBC interpretation of the Great Depression outside the USA is made of two elements. The first is a critique of what RBC theorists call the “consen-

view”¹⁸, stressing the role of deflation and nominal wage stickiness in the diffusion of the depression from the USA to the rest of the world. The basic idea of the “consensus view” is that adherence to the gold exchange standard system induced restrictive monetary and fiscal policies in the presence of serious deficits in the balance of trade, or in order to avoid them. These policies are normally deflationary, and deflation causes unemployment, unless nominal wages decrease. The second element is a case-study analysis of a number of countries, applying an identical methodology and theoretical set-up to each country. These studies, it is claimed, demonstrate that idiosyncratic shocks to TFP and country specific economic policies provide a fairly good explanation for the Great Depression in each country, without any reference to an international dimension.

4.1 The Critique of the “Consensus View”

The arguments presented by Cole et al. (2003) for rejecting the “consensus view” are empirical and mainly based on the sign of the correlation between log deviations from the trend-lines of real wages and output, and between log deviations from the trend-lines of prices and output. According to these authors, if the “consensus view” were right, there should be a positive correlation between the rates of growth of prices and real output, and a negative correlation between rates of growth of real wages and real output. In other words, pinning things down to a traditional labour demand/labour supply graph, we should observe a north-west movement along the labour demand schedule, with increasing real wages and decreasing employment.

Studying a cross section data on 17 OECD countries, Cole et al. (2003) note that when regressions are performed on the cross-sectional average data for 1929-1932, the correlation between the log deviations of prices and real output turns out to be -0.08, while the correlation between the log deviations of real wages and real output is 0.26. This observation leads them to conclude that the cause of the international Great Depression should not be sought in a movement along the labour demand curve, but rather in a movement of the labour demand curve. They then model this hypothesis. They consider a RBC model with money à la Lucas. In their model, the economy can be hit by two shocks: a monetary shock, causing a movement along the labour demand curve, and a productivity (TFP) shock which shifts the labour demand curve. Cole et al. calibrate the parameters of the model so that the two shocks taken together reproduce as exactly as possible the data set.

¹⁸The term “consensus view” is used by Cole et al. (2003) to refer to papers by Bernanke (1995), Bernanke and Carey (1996) and Eichengreen and Sachs (1985).

Then they try to figure out, for different orthogonalisations¹⁹ between the two shocks, how much of the movement of the total quantities during the Great Depression could be explained by each factor. They found that a country-specific TFP shock orthogonal to deflation could explain $\frac{2}{3}$ of output variation in each country, while monetary shocks explained the remaining $\frac{1}{3}$. Moreover, their artificial series of TFP shocks matches the few available data for economy-wide productivity during the 1930s²⁰. On the other hand, the same simulation carried out with only the monetary shock, that is without TFP shocks, produces a high negative correlation between real wages and real output (in log deviation terms), which is at variance with the cross-sectional evidence.

On the basis of this analysis, Cole et al. (2003) conclude that an RBC account of the international Great Depression should be based on a shock that works like a productivity shock, that is orthogonal to deflation, and that looks like a productivity shock in the data. They suggest that natural candidates for such a shock are the financial disruptions stressed by Bernanke (1983), the decrease in “information capital” hypothesised by Ohanian (2002), and policy interventions that obstruct the normal working of the market forces, as in Cole and Ohanian (2001).

The empirical evidence presented by Cole et al. (2003) can be questioned on several grounds. The 1929-1932 data shows that a positive log deviation from the trend of real wages is accompanied by a negative log deviation from the trend of output in 13 countries out of the 17 considered. This means that, in the vast majority of the observations, the relationship between real wages and output is negative. True, the interpolation of the plotted data gives an upward sloping line, with a positive correlation equal to 0.26. But, firstly, 0.26 is not a particularly high value. The observations are highly dispersed in the plot, so that the R^2 is necessarily very low. Secondly, considering that the countries under consideration were substantially different in this periods, the fact that an international increase in the rate of growth of wages is accompanied by a diminishing rate of decrease in output does not necessarily mean that, as long as real wages increase in each country, we should expect real output to increase in that country. Many other factors which have not been controlled for could influence the results - for example,

¹⁹Two random variables x and y are said to be orthogonal if their cross moment $E(x, y)$ is zero. In the case under examination, the favoured procedure is one that orthogonalises the TFP shock on deflation. This means that the authors regress TFP on deflation, and then subtract from the actual value of TFP the value obtained by the regression. In this way the residual TFP will be not correlated with deflation, as the effect of deflation on TFP has already been taken into account by means of the regression.

²⁰These data refers to the USA, Canada, the UK and Australia.

internal political factors (such as the role of unions and of socialist parties), international political factors (such as war reparations and war debts) and exchange problems in connection with problems in the balance of trade.

4.2 Case Studies

The case studies analysis is all contained in a special issue of the *Review of Economic Dynamics*. I have chosen to focus on four cases, Canada, Germany, France and United Kingdom, being them methodologically representative and more interesting as to the Great Depression of the thirties at the same time²¹.

4.2.1 Canada

Amaral and MacGee (2002) carried out a comparative analysis of the Great Depression in Canada and the USA, using a RBC model that is formally equivalent to that used by Cole and Ohanian (1999). Their principal result is that an exogenous shock to TFP could reproduce about 50% of the Canadian depression, and also performs well in accounting for the slow recovery. Moreover, building on arguments by Cole and Ohanian (2000), they exclude the possibility that monetary factors could have played a major role in causing the Canadian Great Depression. Finally, they test the importance of terms-of-trade shocks in explaining the depression. During the 1930s, Canada's was a small economy where trade constituted a high proportion of GDP, and trade shocks were certainly appreciable at that time.

The test was done by running a simulation on a two-country RBC set-up, under the limiting assumption that inputs are non-tradable goods. The results show that terms-of-trade shocks are unable to account for the Great Depression in Canada.

The comparison between Canada and the USA is interesting, although puzzling. It shows, in effect, that, although some similarities in the general economic trend between the two countries existed, the USA experienced a recovery starting in 1933, while Canada did not. Such a US recovery was characterised by a strong TFP recovery. TFP, in effect, was back to its trend level by 1937 in the USA, while it remained below the trend level throughout the 1930s in Canada. Interestingly, the time of recovery coincided with the

²¹For the sake of completeness, the other papers on the issues concern Italy's mild depression of the 30s, Japan's crisis in the 90s and analyses on South-American countries' depressions in the last decades. I omitted Italy, because the Italian depression was less significant than the others and moreover a bit peculiar (Perri-Quadrini (2002)). I instead focused on Canada, to compare it with the United States.

implementation of New Deal policies in the United States, while Canada had no such policy. On the other hand, while all the aggregate variables suggest that, starting from 1933, the USA was on the path to recovery while Canada was not, nevertheless, quite surprisingly, the total hours worked increased more rapidly in Canada than in the USA in the same time span. Moreover the trend of measured capital input for the United States was above the Canadian one.

Amaral and MacGee (2002) try to solve these puzzles by making reference to Cole and Ohanian (2001); they argue that New Deal policies in the USA affected labour employment negatively, and therefore, in the USA, measured TFP (which is a residual) tended to be, *ceteris paribus*, higher. This explanation seems rather odd. The point is that the GNP of the United States recovered faster than the GNP of Canada. The differing TFP behaviour can easily be explained by the differing GNP behaviour, provided that TFP is normally pro-cyclical. Saying that TFP was higher because employment was lower could instead conceal some logical pitfalls. Amaral and MacGee (2002) argue that the USA recovered earlier than Canada, because TFP in the USA recovered earlier than in Canada. Such a faster recovery, it is argued, did not create higher employment in the USA than in Canada, because New Deal policies independently affected the labour market in the USA. So, contrary to what is expected, Canadian employment recovered earlier than US employment. But then Amaral and MacGee (2002) point out that the higher trend of TFP in the USA could depend upon the lower trend in employment! One might conclude from this odd argument that New Deal policies were the instrument that dragged the USA economy out of the depression because, paradoxically, by allowing for higher unemployment, they have allowed for higher TFP, which, in the RBC framework, is the driving force of the economy. This conclusion clearly indicates that this TFP story does not withstand close examination.

4.2.2 Germany

While the USA was the epicentre of the Great Depression, Germany was certainly the European country that experienced the worst depression in the early 1930s. In their paper analysing the Great Depression in Germany from a RBC perspective, Fisher and Hornstein (2002) firstly observe that detrended US and German data are quite similar in terms of rates of variation, so that, in their opinion, the two phenomena are comparable²². Interestingly,

²²The authors stress that there are nevertheless some differences between the depression in the two countries worth mentioning. The peak of the German cycle was in 1928, while that of the US cycle was in 1929. Moreover Germany had been “depressed” during the

Germany recovered to its 1928 trend level in 1937, while the USA was still depressed at that date. The paper claims that one or more real shocks could account for the behaviour of the German economy, without any need to refer to monetary shocks or international constraints. Fisher and Hornstein (2002) consider three real shocks that seem to them to be in accordance with the data: real wages, TFP, and fiscal policy. Until 1933 Government policies and union strength caused real wages to increase. In their model, such an increase in real wages could explain the drop in hours worked per working-age person. On the other hand, as real wages began to decrease after 1933, the high-wages hypothesis could not account for the slowness of the recovery. The “predictive” capacity of the model is improved when fiscal policies (restrictive up to 1932, and very expansive after the seizure of power by Hitler, and the subsequent high public expenditure on the military) and exogenous variations in TFP are added to the model. On the other hand, the model incorporating all three shocks overestimates the magnitude of the fluctuations. In their conclusions the authors suggest that endogenising TFP by means of the concept of capacity utilisation could improve the results of the simulations.

The logic of these results is the usual explanation of a standard RBC model with government expenditure and distorting taxation. An exogenous TFP negative shock, together with a deflationary fiscal policy in the early 1930s, contribute to explaining the onset of deflation. The labour demand curve shifts downwards. Nominal wages rigidities and unions explain the increase in real wages, and therefore the transformation of deflation into a recession. There is a move along the new labour demand curve. With the change in the government, and the accession of Hitler to power, fiscal policy becomes expansive, while prices and nominal wages are controlled, mainly through the abolition of unions. High government expenditure causes a strong crowding-out effect, with public consumption subtracting resources from the private sector. This induces an appreciable “wealth effect”, because people, feeling poorer, are now willing to work more, which explains the recovery in production. The labour supply curve shifts rightwards.

4.2.3 France

If the German Great Depression can be cast in a RBC framework, as argued by Fisher and Hornstein (2002), the French case analysed by Beaudry and Portier (2002) has proved to be a much harder task. According to what Beaudry and Portier (2002) define as “the conventional wisdom”, the Great

whole of the 1920s, while this was certainly not the case for the USA.

Depression in France was a relatively minor episode, mainly due to monetary factors. France was relatively isolated from the Great Depression until roughly 1932, thanks to an undervalued French franc. When the UK and USA left the gold standard and devalued their currencies, in 1931 and 1933 respectively, French production for export started to decrease and precipitated France into a recession that was significant, although less dramatic than in other countries. At the trough of the recession the French unemployment rate was about 5%. Deflationary policies put into effect by Prime Minister Laval in 1935 worsened things. The recovery was finally due to the devaluation of the franc in 1936, when the Popular Front of leftist parties won the elections.

Against this view, Beaudry and Portier (2002) note that if we look at de-trended data, the picture that emerges is quite different, and much more comparable with that depicted by Cole and Ohanian (1999) for the United States. In terms of de-trended data, the depression in France began in 1930, and there was no recovery at all: assuming $1929 = 100$, de-trended output in 1939 was 67.5. Moreover there was no acceleration of the depression after 1933. Finally, international trade was a small proportion of output, and for reasonable values of the elasticities of substitution for intermediate goods, an international trade shock can only account for a small part of the drop in output in the model.

Having established the similarity between the French and the US Great Depressions, Beaudry and Portier (2002) check whether the main explanation proposed by Cole and Ohanian (1999) and Cole and Ohanian (2001) for the US Great Depression (namely an exogenous drop in TFP, followed by distorting economic policies) also works for France in a comparable RBC model. They find that the shock to TFP is not sufficient to explain the magnitude of the de-trended output drop, and that it is even misleading, as far as the long duration of the depression is concerned. These results are in line with Cole and Ohanian's (1999) findings for the USA. Unlike Cole and Ohanian (1999), however, Beaudry and Portier (2002) do not consider this as a good result, and reject the TFP hypothesis.

Unsatisfied with the traditional RBC model, Beaudry and Portier (2002) then examine whether a business cycle model derived from a neo-Schumpeterian endogenous growth model might do the job better. They simply introduce the embodiment hypothesis (that is a hypothesis stating that technological improvement affects only new capital goods, i.e. investments, rather than the whole capital stock) into the RBC set up, and suppose that the impulse mechanism of the business cycle is a shock to the input side. Simulations run under these hypotheses show a much better fit to the data. The rationale for their result is intuitive. If technological progress is embodied in new

investment goods, the drop in the investment output ratio will also have an indirect effect on the rate of technological progress achieved (that is on the technological progress that is applied to the production of goods and services). In this way, a recession caused by a reduction in the use of inputs will tend to self-replicate.

In order to explain the source of these variations in investments and employment, Beaudry and Portier (2002) argue in favour of some institutional change that lowered the steady-state level of total hours worked and of the capital output ratio. In this respect, following Cole and Ohanian (2001), they suggest that a likely culprit for the protraction of the depression after 1936 is the formation of a leftist government in 1936 that reduced (by law) the number of hours worked for a given wage - i.e. increased the rate of real wages. So, according to Beaudry and Portier (2002), the French depression was a normal adjustment process to a lower steady-state growth path induced by institutional modifications.

4.2.4 United Kingdom

The last case study I consider in this section is the analysis of the Great Depression in the United Kingdom from a RBC perspective by Cole and Ohanian (2002). In this paper, the authors first undertake a growth-accounting exercise, leading them to exclude the suggestion that a TFP shock could properly account for the 20-year long depression in the United Kingdom. De-trended data show, indeed, that both TFP and capital input increased between 1920 and 1938, while labour input decreased markedly, compared to the pre-World War I average. Secondly, they argue that Keynes's (1931) position on the relationship between exchange rate policy, exports and recession²³ was inconsistent with the available data. They argue that the restrictive exchange-rate policy (i.e. the adoption of the gold standard system with the British pound pegged to its pre-War level) dates to 1925, while, by their definitions, the recession began far earlier, in 1919. Moreover, in modern RBC-style models, monetary shocks do not have a propagation mechanism strong enough to account for such a long-lasting depression.

Having excluded the monetary origin of the British depression, the authors propose an alternative explanation, based on a series of circumstances affecting the labour supply. On the one hand, the diminishing competitiveness of the British economy in producing some traditional export goods led

²³Keynes's (1931) basic idea is that gold standard constraints forced British policy makers to adopt a strongly deflationary policy, in order to achieve equilibrium in the balance of trade. This was necessary because the high value of the pound caused difficulties in the export sector.

to changes in the structure of production, and to a necessary relocation of the highly concentrated British industrial firms. On the other hand, the contemporaneous adoption of a post-war policy of housing subsidies deterred households from moving to follow job vacancies, by increasing the opportunity cost of moving. As a third factor, Cole and Ohanian (2002) consider the existence of a “generous” unemployment benefit scheme. Sticking to this view, the Great Depression in the United Kingdom can therefore be attributed to contingencies and policies causing a leftward shift in the labour supply schedule.

4.3 A General Picture

The case-study analyses reviewed above were the first attempt to submit the Great Depression in different countries to the same methodological inquiry. On the one hand, such an attempt might prove useful in providing new insights, so improving our comprehension of the period under examination. On the other hand, by taking such a wide perspective, RBC theorists departed dramatically from previous work on the subject. Eichengreen (1992) and other leading historians of the period stress the international dimension of the Great Depression. By contrast, RBC authors produce a collection of idiosyncratic analyses within the same methodological framework.

On the basis of the review presented here, the arguments adduced to support this new approach, as opposed to the accepted historical wisdom, do not seem robust. While the empirical argument advanced by Cole et al. (2003) is lacking definitive evidence, the insights that lead for example Romer (1993) and Cole and Ohanian (1999) to analyse the USA Great Depression in a national perspective (i.e. the observation that the USA was an almost closed economy which experienced a bigger and longer depression than other countries) do not apply to other countries such as France or Germany.

Nevertheless, these case-study analyses lead to some qualifications of our early assessment of the US Great Depression. The two fundamental aspects we picked out in Section 3 when dealing with the USA, the methodological and the normative aspect, are recognisable here as well. Yet some differences are worth highlighting. Methodologically, there is a clear predominance of non-historical modelling over historical explanation, yet the demarcation line between history and economics is not always as clear as in the USA case. While the analyses of Canada and Germany resort to TFP technology, the others do not. As far as the normative aspect is concerned, it is even more accentuated in this stream of the literature than it is in the analysis of the United States. In Kehoe and Prescott’s (2002) words, the broad message of the RBC interpretation of the international Great Depression is that

“[...] government policies that affect TFP and hours per working-age person are the *crucial determinants* of the great depressions of the 20th century” (added emphasis).

This interpretation really follows in the wake of the seminal work by Cole and Ohanian (1999) focused on the United States. Yet, there is a fundamental ambiguity concerning the role of economic policy during the 1930s. In particular, it is not clear whether these authors think that economic policy worsened a pre-existing negative business cycle (as in the RBC interpretation of the US Great Depression) or whether economic policy caused the crisis to occur (as in the passage quoted above from Kehoe and Prescott (2002)). In this respect, it seems that their normative inclination toward *laissez faire* has somehow overcome the rigour of the argument.

5 Conclusions

In this paper, I have presented a critical review of the RBC interpretation of the Great Depression. Particular attention has been paid to the methodological novelty RBC models of the Great Depression have brought about. As a matter of fact, before the RBC interpretation saw the light of day, the Great Depression was considered an insuperable obstacle to the generalised and unbending application of the neoclassical equilibrium theory. RBC models on the Great Depression have totally reversed this position, by casting it in an equilibrium framework.

In view of this methodological focus, in this paper I have firstly singled out the methodological premises underlying the RBC approach to the Great Depression. The RBC interpretation of the Great Depression builds upon two fundamental hypotheses, which I have defined as the “equilibrium hypothesis” and the “exogenous shock hypothesis”. These assumptions amount to conceiving business cycles as a sequence of changing Walrasian equilibria induced by random shocks. In this set-up, the definition of a recession period refers to a negative difference between the actual rate of growth of the economy and its trend value. A depression is defined as a big recession, i.e. one in which output is suddenly and significantly lower than its trend value (Kehoe and Prescott (2002)).

In the light of these definitions, the previous unanimity on the dating of the Great Depression has been questioned by RBC authors. According to them the Great Depression covers the entire decade of the 1930s (Prescott (1999)), rather than only the strong contraction phase (1929-1932) as traditionally defined (Eichengreen (1992); Robbins (1934); Temin (1989)). This change of perspective shifts the nature of the central question to be addressed

from the onset of the Great Depression to its long duration. In addressing such a question, RBC authors stick to Lucas's equilibrium method, paying great attention to the quantitative dimension of their economic inquiry. Their typical method of analysis is to build a model economy, to calibrate the parameters corresponding to the individual objective functions, and to try to replicate the qualitative behaviour and the descriptive statistics of a given set of data, after having introduced a suitable exogenous shock.

The initial concern with the USA case, and the demand for simplicity, led RBC authors to be concerned with a national perspective, paying only slight attention to the previously much discussed international dimension of the Great Depression. This allowed me to distinguish, in the review section, the analysis of the USA Great Depression from the analyses of other countries' Great Depressions, the two blocks of analyses being independent of each other.

The general conclusion RBC authors have reached in analysing the Great Depression is that it was a normal business cycle whose persistence was due to the distorting intervention of the State, in a vain attempt to improve the general economic performance. So, while New Deal policies and the like are traditionally seen as the starting point of the recovery phase, in the RBC interpretation the position is completely reversed. Such economic policies are, in fact, blamed for having been, not simply ineffective, but actually harmful and responsible for the absence of recovery. A strong *pro-laissez faire* normative concern characterises the argument here. In particular, such a normative concern is extremely relevant to the analyses concerning the international Great Depression, where, for example, Kehoe and Prescott (2002) go so far as to conclude that economic policies were its cause.

As to methodology, the RBC analysis of the Great Depression could often be interpreted as drawing a clear border line between the realms of history and economics, the latter being concerned with building models for data mimicking, the former with giving an historical content to the black-box categories used in economics. This methodological feature is particularly obvious in some leading analyses of the US Great Depression (see Cole and Ohanian (1999) and Prescott (1999)). In effect, the review presented in Section 3 of this paper shows that the RBC interpretation of the US Great Depression should be split into two main tendencies: a RBC proper interpretation, resulting from really analysing the USA Great Depression "through the lens of neoclassical theory" (Cole and Ohanian (1999)), and a RBC-style interpretation, methodologically following in the wake of the RBC tradition, but more involved in a causal analysis. The distinction between history and economics is much clearer in the first stream of the literature than in the second. As to the international Great Depression, although there is a clear methodological

preference for modelling over history, the border line is less definite than in the USA case. Indeed, the papers reviewed in Section 4 show that, according to these authors, the origin of the Great Depression in each country should be sought in some country-specific shock, the international dimension being totally dismissed (Cole et al. (2003); Kehoe and Prescott (2002)). This led in general to more attention being paid to historical factors.

This paper aimed to put the literature in perspective, and did not enter into an assessment of its methods and conclusions. Yet some general suggestions for future research do emerge from this review. A first point worth a more detailed analysis is the strident contrast between RBC authors and leading historians as to the role played by international factors during the Great Depression. As discussed above, the RBC interpretation of the Great Depression ignores the international dimension. Even when concerned with the international environment, this literature still adopts a national perspective. On the contrary, all the historians who have studied the period stress both the role of international monetary constraints and the role of some tension-widening socio-political situations, the latter broadly related to the Russian communist revolution and the consequent emergence of strong leftist parties (Eichengreen (1992); Hobsbawm (1996)). An in-depth comparison of the RBC interpretation of the international Great Depression and the work of leading economic historians could help our understanding of the underlying reasons for such a big divergence of perspective, and whether it is justified or not.

A second intriguing direction for further research concerns the normative aspect of the RBC interpretation of the Great Depression. The accusation that New Deal policies delayed the recovery phase reveals a strong inclination towards *laissez faire*. This raises the question of whether this interpretation of the Great Depression is really a novelty, or whether it is, so to say, a case of old wine in new bottles. To this purpose, a comparison could be drawn between the first *laissez faire* views of the Great Depression and the RBC interpretation. Such a comparison could shed some light on important theoretical and methodological questions. In particular, it could clarify whether the RBC analysis can be considered as an attempt to cloak an old idea in new theoretical tools, or whether the methodological innovation is so important as to make the RBC interpretation of the Great Depression a new standard. A comparison between these two broad schemes of interpretation (neoclassical and new classical) and some heterodox interpretation of the Great Depression could also be enlightening, insofar as the understanding of how the two theories differ from the heterodox paradigms might allow the similarities and differences between them to be better defined.

Finally, there is the question of whether the “normality assumption”

makes sense for the analysis of a period like the Great Depression. Under the equilibrium hypothesis, the normality assumption implies that, during an economic cycle, a deflation process is the re-equilibrating market reaction to a shock. In other words, under the equilibrium hypothesis, the normality assumption implies that deflation should have led the economy back towards the stationary equilibrium. The observation that this back-to-trend movement did not seem to happen until the early 1940s leads us to conclude that a further negative external intervention must have been at work in worsening things. Hence, the accusation of the New Deal policies. The point is that the logical premise of this reasoning, i.e. the normality assumption, seems to be at variance with the general perception of a phenomenon like the Great Depression. It postulates, indeed, that markets work well, while most contemporary observers viewed the deflation as a clear sign of market failure (Garratay (1986)). A definitive assessment of the RBC interpretation of the Great Depression should therefore start by investigating what a normal business cycle is, and whether, historically, the Great Depression can be subsumed under this category. This analysis would lead, I guess, to a reconsideration of the entire methodological foundations of RBC theory.

References

- Amaral P. S. - MacGee J. C. (2002), "The Great Depression in Canada and the United States: A Neoclassical Perspective", in *Review of Economic Dynamics*, vol. 5, pg. 45-72.
- Beaudry P. - Portier F. (2002), "The French Depression in the 1930s", in *Review of Economic Dynamics*, vol. 5, pg. 73-99.
- Bernanke B. S. (1983), "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression", in *American Economic Review*, vol. 73, pg. 257-276.
- Bernanke B. S. (1995), "The Macroeconomics of the Great Depression: A Comparative Approach", in *Journal of Money, Credit and Banking*, vol. 27, pg. 1-28.
- Bernanke B. S. - Carey K. (1996), "Nominal Wage Stickiness and Aggregate Supply in the Great Depression", in *Quarterly Journal of Economics*, vol. 111, pg. 853-883.
- Bordo M. D. - Erceg C. - Evans C. L. (2000), "Money, Sticky Wages, and the Great Depression", in *American Economic Review*, vol. 90, pg.

1447-1463.

- Bordo M. D. - Erceg C. - Evans C. L. (2001), "Comments on Cole-Ohanian", in Bernanke B. S. - Rogoff K. (2001) (eds.), *NBER Macroeconomics Annual 2000*, National Bureau of Economic Research, MIT Press, Cambridge, MA.
- Calvo G. (1983), "Staggered Prices in a Utility-Maximizing Framework", in *Journal of Monetary Economics*, vol. 12, pg. 383-398.
- Christiano L. - Motto R. - Rostagno M. (2004) "The Great Depression and the Friedman-Schwartz Hypothesis", *Working Paper 10255*, National Bureau of Economic Research.
- Cole H. L. - Ohanian L. E. (1999), "The Great Depression in the United States from a Neoclassical Perspective", in *Federal Reserve Bank of Minneapolis Quarterly Review*, vol. 23, pg. 2-24.
- Cole H. L. - Ohanian L. E. (2000), "Re-Examining the Contributions of Money and Banking Shocks to the U.S. Great Depression", *Research Department Staff Report 270*, Federal Reserve Bank of Minneapolis.
- Cole H. L. - Ohanian L. E. (2001), "New Deal Policies and the Persistence of the Great Depression: a General Equilibrium Analysis", *Working Paper 597*, Federal Reserve Bank of Minneapolis.
- Cole H. L. - Ohanian L. E. (2002), "The Great UK Depression: A Puzzle and a Possible Resolution", in *Review of Economic Dynamics*, vol. 5, pg. 19-44.
- Cole H. L. - Ohanian L. E. - Leung R. (2003), "Deflation, Real Wages and the International Great Depression: A Productivity Puzzle", (mimeo, downloadable from the website of Prof. Harold Cole at <http://www.bol.ucla.edu/>).
- Cole H. L. - Ohanian L. E. (2004), "New Deal Policies and the Persistence of the Great Depression: a General Equilibrium Analysis", in *Journal of Political Economy*, vol. 112, pg. 779-816.
- Crucini M. J. - Kahn J. (1996), "Tariffs and Aggregate Economic Activity: Lessons from the Great Depression", in *Journal of Monetary Economics*, vol. 38, pg. 427-467.
- Eichengreen B. (1992), *Golden Fetters. The Gold Standard and the Great Depression, 1919-1939*, Oxford University Press, Oxford.

- Eichengreen B. - Sachs J. (1985), "Exchange Rates and Economic Recovery in the 1930s", in *Journal of Economic History*, vol. 45, pg. 925-946.
- Eichengreen B. - Temin P. (2000), "The Gold Standard and the Great Depression", in *Contemporary European History*, vol. 9, pg. 183-207.
- Fisher I. (1933), "The Debt-Deflation Theory of Great Depressions", in *Econometrica*, vol. 1, pg. 337-357.
- Fisher J. D. M. - Hornstein A. (2002), "The Role of Real Wages, Productivity, and Fiscal Policy in Germany's Great Depression 1928-37", *Review of Economic Dynamics*, vol. 5, pg. 100-127.
- Friedman M. - Schwartz A. J. (1963), *A Monetary History of the United States, 1867-1960*, Princeton University Press (for NBER), Princeton.
- Galbraith J. K. (1995), *Money: Whence It Came, Where It Went*, Houghton Mifflin Co.
- Garratay J. A. (1986), *The Great Depression. An Inquiry into the Causes, Course and Consequences of the Worldwide Depression of the Nineteen-Thirties as Seen by Contemporaries and in the Light of History*, Harcourt Brace Jovanovich, London.
- Gertler M. (2001), "Comments on Cole-Ohanian", in Bernanke B. S. - Rogoff K. (2001) (eds.), *NBER Macroeconomics Annual 2000*, National Bureau of Economic Research, MIT Press, Cambridge, MA.
- Goodfriend M. - King R. (1997), "The New Neoclassical Synthesis and the Role of Monetary Policy" in Bernanke B. - Rotemberg J. (1998) (eds.) *NBER Macroeconomics Annual 1997*, MIT Press, Cambridge MA.
- Hartley J. E. - Hoover K. D. - Salyer K. D. (1997), "The Limits of Business Cycle Research: Assessing the Real Business Cycle Model", in *Oxford Review of Economic Policy*, vol. 13, pg. 34-54.
- Hobsbawm E. J. E. (1996), *Age of Extremes : the Short Twentieth Century 1914-1991*, Abacus, London.
- Kehoe T. J. - Prescott E. C. (2002), "Great Depressions of the 20th Century", in *Review of Economic Dynamics*, vol. 5, pg. 1-18.
- Keynes J. M. (1931), *Essays in Persuasion*, Macmillan, London.

- Keynes J. M. (1933), "The New Deal", in *The New York Times*, (reprinted in *Collected Writings of Keynes*, London 1981-1982, vol. XXI, pg. 289-297).
- Keynes J. M. (1936), *The General Theory of Employment, Interest, and Money*, Macmillan, London.
- Kindleberger C. P. (1973), *The World in Depression*, University of California Press, Berkley.
- Lucas R. E. Jr. (1977), "Understanding Business Cycles", in Lucas R. E. Jr. (1981), *Studies in Business-Cycle Theory*, MIT Press, Cambridge, MA, 1983.
- Lucas R. E. Jr. (1980), "Methods and Problems in Business Cycle Theory", in Lucas R. E. Jr. (1981), *Studies in Business-Cycle Theory*, MIT Press, Cambridge, MA, 1983.
- Lucas R. E. Jr. - Rapping L. A. (1969), "Real Wages, Employment, and Inflation", in *Journal of Political Economy*, vol. 77, pg. 721-754.
- Mankiw N. G. (1989), "Real Business Cycles: A New Keynesian Perspective", in *Journal of Economic Perspectives*, vol. 3, pg. 79-90.
- Margo R. A. (1993), "Employment and Unemployment in the 1930s", in *Journal of Economic Perspectives*, vol. 7, pg. 41-59.
- Ohanian L. E. (2002), "Why Did Productivity Fall So Much During the Great Depression?", in *Federal Reserve Bank of Minneapolis Quarterly Review*, vol. 26, pg. 12-17.
- Perri F. - Quadrini V. (2002), "The Great Depression in Italy: Trade Restrictions and Real Wage Rigidities", in *Review of Economic Dynamics*, vol. 5, pg. 128-151.
- Plosser C. I. (1989), "Understanding Real Business Cycles", in *Journal of Economic Perspectives*, vol. 3, pg. 51-77.
- Prescott E. C. (1998), "Business Cycle Research: Methods and Problems", *Working Paper 590*, Federal Reserve Bank of Minneapolis.
- Prescott E. C. (1999), "Some Observations on the Great Depression", in *Federal Reserve Bank of Minneapolis Quarterly Review*, vol. 23, pg. 25-31.

- Robbins L. (1934), *The Great Depression*, Macmillan, London.
- Romer C. (1992), “What Ended the Great Depression?”, in *Journal of Economic History*, vol. 52, pg. 757-784.
- Romer C. (1993), “The Nation in Depression”, in *Journal of Economic Perspectives*, vol. 7, pg. 19-39.
- Romer D. (2001), *Advanced Macroeconomics*, McGraw-Hill, New York.
- Ryan C. (2002), “Business Cycles: Real Business Cycle Approach”, in Snowden B. - Vane H. R. (2002) (eds.), *An Encyclopedia of Macroeconomics*, Elgar, Cheltenham UK.
- Solow R. M. (1956), “A Contribution to the Theory of Economic Growth”, in *Quarterly Journal of Economics*, vol. 70, pg. 65-94.
- Solow R. M. (1957), “Technical Change and the Aggregate Production Function”, in *Review of Economics and Statistics*, vol. 39, pg. 312-320.
- Stadler G. W. (1994) “Real Business Cycle”, in *Journal of Economic Literature*, vol. 32, pg. 1750-1783.
- Taylor J. B. (1980), “Aggregate Dynamics and Staggered Contracts”, in *Journal of Political Economy*, vol. 88, pg. 1-23.
- Temin P. (1976), *Did Monetary Forces Cause the Great Depression?*, Norton, New York.
- Temin P. (1989), *Lessons from the Great Depression*, MIT Press, Cambridge, MA.
- Vernon J. R. (1994), “World War II, Fiscal Policies and the End of the Great Depression”, in *Journal of Economic History*, vol. 54, pg. 850-868.
- Weder M. (2001), “The Great Demand Depression”, *Discussion Paper 3067*, Centre for Economic Policy Research.

Département des Sciences Économiques
de l'Université catholique de Louvain
Institut de Recherches Économiques et Sociales

Place Montesquieu, 3
1348 Louvain-la-Neuve, Belgique