Have the early coordination failures models achieved Keynes's programme?

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Abstract

The aim of this paper is to assess how three seminal coordination failure models (Diamond ([1982] 1991), Howitt (1985) and Roberts (1987)) have fared against 'Keynes's programme'. The first part of the paper characterises Keynes's programme as consisting of the following four objectives: (a) demonstrating the existence of involuntary unemployment, (b) demonstrating that wage rigidity can be exonerated as its cause, (c) giving a general equilibrium interdependency explanation of the phenomenon within a perfect competition framework, and (d) demonstrating that demand stimulation is the proper remedy to suppress involuntary unemployment. In a second part, I claim that no correct assessment of Keynes's programme can be made without drawing a distinction between involuntary unemployment and underemployment. These prerequisites being settled, in part three I undertake the study of the three models to conclude that none of them succeed in achieving Keynes' programme in its entirety. In the last part of the paper, I raise the issue as to whether Keynesian economists should continue to fight for the involuntary unemployment concept.

Résumé

L'objectif de cet article est d'évaluer la mesure dans laquelle trois modèles pionniers de la théorie des échecs de coordination (Diamond ([1982] 1991), Howitt (1985) et Roberts (1987)) ont réussi à réaliser le projet poursuivi par Keynes dans la *Théorie générale*. Celui-ci est décrit dans une première partie de l'article comme consistant en quatre objectifs: (a) démontrer l'existence du chômage involontaire; (b) exonérer la possibilité qu'il soit causé par un salaire trop élevé; en donner une explication d'équilibre général dans un contexte de concurrence parfaite; (d) démontrer que le remède à appliquer est une stimulation de la demande agrégée. Dans une second partie, je souligne la nécessité de séparer les cas de chômage involontaire et de sous-emploi. La troisième partie de l'article est consacrée à l'examen des modèles. La conclusion qui y tirée est que, pour des raisons différentes, aucun des trois modèles ne réussit à pleinement réaliser le programme de Keynes. Enfin, dans le dernière partie, je m'interroge sur la question de savoir si les économistes keynésiens doivent continuer à se battre pour défendre le concept de chômage involontaire.

1. Introduction

Coordination failures models are often branded as 'Keynesian'. This should come as no surprise because nobody would deny that by trying to bring out cases of malfunctioning of the market system these models' creators were treading in Keynes's footsteps. My aim in this paper is to delve deeper into the issue of the Keynesian character of the coordination failures literature. [1] More precisely, I want to assess the contribution of a few of its early models against the background of what I shall call 'Keynes's programme', the result of my attempt to identify more precisely the aim that Keynes was pursuing when writing his *General Theory* (1936). The following three models will be examined: Diamond ([1982] 1991), Howitt (1985) and Roberts (1987).[2]

2. Keynes's programme: a reconstruction

Hosts of books and articles have been written purporting to delineate the theoretical objective that Keynes set himself when writing the *General Theory*. Unfortunately, none of the proposed interpretations has gained unanimous acceptance, a point to which I shall have the opportunity to return in my conclusion. Nonetheless a standpoint must be taken. Mine is as follows.

First of all, Keynes pursued the objective of demonstrating the theoretical existence of involuntary unemployment. The latter, he recognised, was a phenomenon whose real-world existence was compelling yet for which economic theory could find no place. Bridging this gulf was the task he set himself.

Keynes' interest in involuntary unemployment followed from the presumption that it expressed some system failure, a malfunctioning of the decentralised economy.[3] Its existence had to temper, if not upset, the optimistic interpretation of this system put forward by many economists since Adam Smith. In particular, Keynes wanted to link it with a deficiency in aggregate demand for the output as a whole, itself associated with some leakage from the productive towards the financial sector.

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[1] This paper borrows from chapter 2, 5, 18 and 20 of De Vroey (2004).

[2] Cooper and John (1988) is probably the best-known paper on coordination failures. It shows how an apparently disparate stream of literature can be unified by pointing out its two common traits, the existence of spillovers and strategic complementary. However, it will not be discussed here, because it gives no central role to the notion of involuntary unemployment. Other interesting early coordination failure articles are Bryant (1983), Drazen (1987), Heller (1986) and Weitzman (1982).

[3] In Leijonhufvud's terms 'Keynes was concerned with a *systemic* problem that could be defined neither in terms of individual decision situations nor in terms of interactions between buyers and sellers in a single market' (Leijonhufvud, 1983: 195-196). Or, as Coddington put it: 'Involuntary unemployment arises because of a malfunctioning of the economic *system*: it is not that individuals lack the willingness or ability to work but rather that the economy is failing to provide them with the opportunity to do so' (Coddington 1983: 27). See also Kregel (1987: 135).

The claim that involuntary unemployment follows from some system failure affects the type of analysis to be undertaken. The common explanation in Keynes's time was that unemployment was the result of wage levels being too high. Such an explanation is part of a Marshallian analysis in which one market, here the labour market, is considered in isolation from the rest of the economy. Keynes wished to escape this framework in a twofold way. On the one hand, he wanted to discharge too high a wage from any responsibility for the existence of involuntary unemployment. On the other, the explanation for involuntary unemployment had to be located outside the labour market. As Meltzer put it: 'the problem is manifested in the labour market, but it does not arise in the labour market' (1988:197). What Keynes was actually striving for was to move the analysis of unemployment from a partial to a general equilibrium framework (although this terminology did not exist at this time). Yet, such a willingness to adopt an interdependency perspective should not be interpreted as an adhesion to the Walrasian general equilibrium approach. In Keynes's time, Walras's views were hardly known in Cambridge and, for better or worse, Keynes did not think that Walras's theory could be of any help to his own project.

On the other hand, Keynes did not want to join the imperfect competition line of argument which was emerging at the time in Cambridge. He wanted to put his argument in terms of perfect competition – possibly because he associated imperfect competition with collusion, unions, etc, whereas he wanted to bring to the fore some deeper systemic feature.

As far as policy was concerned. Keynes believed that a remedy existed for the flaw in the economic system that he had striven to display, and that it was not lowering wages. To him the government certainly had an active role to play, yet this insight received no precise content in the *General Theory*. For all Keynes's evasiveness on this matter, the interpretation, which quickly became popular, that the appropriate remedy was state-induced demand stimulation, seems appropriate. The rationale for this view is that demand activation follows from the diagnosis that Keynes posited, namely that involuntary unemployment resulted from aggregate demand deficiency. The latter implies demand activation as its remedy!

The above analysis can be summarised by stating that Keynes's research programme consisted of four items:

1) demonstrating the existence of involuntary unemployment;

2) demonstrating that wage rigidity can be exonerated as its cause;

3) giving a general equilibrium or interdependency explanation of the phenomenon within a perfect competition framework;

4) demonstrating that that demand stimulation is the proper remedy to solve the problem of involuntary unemployment.

Finally, I surmise that in Keynes's eyes this theoretical enterprise had to be achieved whilst sticking as closely as possible to the premises of standard theory. For sure, the latter had to be modified in order to integrate involuntary unemployment, yet this had to occur with minimum changes in premises, in short, in a 'methodologically correct way'.

In view of the various ambiguities that are present in the *General Theory*, I cannot claim that my reconstruction of Keynes's aim is the only conceivable one. Nonetheless, I hope that it constitutes a plausible account. It would require no further explanation were it not for the first item, that of demonstrating the existence of involuntary unemployment, which requires a special investigation.

3. Defining involuntary unemployment and differentiating it from underemployment

According to standard microeconomic theory, the fact that an economic agent is not participating in the labour market is not incongruous. It must simply be the case that the prevailing wage is lower than or equal to his or her reservation wage (i.e. the highest value of the real wage such that the demand for leisure is equal to the total time endowment of the agent concerned). Call this the 'reservation wage principle'. The existence of involuntary unemployment can then be seen as a violation of this principle. It occurs if agents are not trading despite the fact that the market wage exceeds their reservation wage. According to the first order condition of their decision problem — the equalisation of the marginal rate of substitution between consumption and leisure with the real wage rate — they should be participating yet they are not. Nonetheless trading, instead of an adjustment in the wage rate, is occurring. Put differently, at the real wage/employment mix characterising effective trading, some suppliers are 'off their supply curve' and rationed. Market non-clearing and the breaching of the reservation wage principle are thus two faces of the same coin.

This definition can be traced back to Chapter 2 of the *General Theory*, where it is pinpointed by Keynes as a violation of the second classical postulate. Reflecting further on it, I shall now argue that it amounts to describing somebody who is involuntarily unemployed as being in a state of individual disequilibrium. To this end, following authors such as Hayek ([1937] 1948) and Patinkin (1965: 11-12, 387-392), the standard notion of optimising behaviour needs to be qualified by driving a wedge between the optimal plan and optimising behaviour. The optimal plan refers to agents' solutions to the choice problem they are facing. It is formed before the opening of trading. As stated by Patinkin:

> We can consider the individual – with his given indifference map and initial endowment – to be a 'utility-computer' into whom we 'feed' a sequence of market prices and from whom we obtain a corresponding sequence of 'solutions' in the form of specified optimum positions. (Patinkin 1965: 7)

Agents' optimal plans become expressed in their individual supply or demand (or excess demand) schedules. In contrast, optimising behaviour refers to what is observed after trading has started. Thus, optimising behaviour implies that the optimal plan has come through. My point is that optimal choice and optimising behaviour need to be logically separated – finding a solution to a choice problem and implementing it are not one and the same thing.

Individual equilibrium exists whenever the action of a given agent during a given trade round turns out to be the execution of his or her individual optimising plan as decided at the beginning of the trade round. Individual disequilibrium refers to a case where this is untrue. Individual disequilibrium thus means the inability of some agents to transform their optimal plan into optimising behaviour.

What is usually understood by equilibrium is actually an interactive equilibrium, i.e. a state where optimal plans have been made compatible. Thus, interactive equilibrium implies generalised individual equilibrium. In Hayek's terms:

> Equilibrium in this connection exists if the actions of all members of society over a period are all executions of their respective individual plans on which each decided at the beginning of the period (Hayek [1937] 1948: 37)

Symmetrically, the notion of interactive disequilibrium refers to a state of incompatibility across individual plans. Its counter-part at the individual level is that at least some agents are in a state of individual disequilibrium.

In this light, it turns out that involuntary unemployment is a case of individual disequilibrium. It ought to be understood as 'forced leisure', opposed to 'chosen leisure'. The unemployed, the argument runs, are deprived of the capacity normally attached to every economic agent to participate in the interactive process through which market outcomes are generated. Excluded from the opportunity to work, they are cast aside by the market system through no fault of their own. Therefore, the 'involuntary' modifier seems perfectly appropriate.

The breaching the reservation wage principle definition has the merit of bringing out the fact that unemployment is a phenomenon of disparity, marked by a split between the employed and the unemployed. It exists when total employment is unevenly distributed across agents, as it affects a proportion of the active population — the unemployed — while leaving the employed agents unaffected.

Unfortunately, constructing models able to demonstrate involuntary unemployment as defined above has proved to be a most daunting task, except of course if the assumption of an exogenous wage floor is made. In my recent book , *Involuntary Unemployment. The Elusive Quest for a Theory* (De Vroey 2004), I argue that, claims to the contrary notwithstanding, neither Keynes nor IS-LM authors were able to give a solid justification of involuntary unemployment in the breaching of the reservation wage sense and, *a fortiori,* as a case of

individual disequilibrium. True, models yielding involuntary unemployment in the breaching sense emerged in the 1970s and 1980s — I am thinking of implicit contract and efficiency wage models. However, they forewent the individual disequilibrium aim by giving involuntary unemployment the milder meaning of a state where the unemployed are frustrated and jealous of the employed, a state which coexists with optimal behaviour (and thus with individual equilibrium).[4]

My claim that no models demonstrating the breaching of the reservation wage principle surfaced before the mid-1970s prompts the further question of why it was believed for so long that involuntary unemployment had been demonstrated. This is due, I now want to claim, to a semantic confusion between two concepts, involuntary unemployment and underemployment.

The problem is that the notion of involuntary unemployment has been understood as meaning something other than the breaching of the reservation wage principle meaning (which is its appropriate definition in my eyes). In particular, it has been used to designate states of underemployment where no such a breaching occurs.[5] These are cases where the employment level endogenously reached by the economy is deemed to be inferior in welfare or efficiency terms with respect to some higher level, attainable only through exogenous action. That is, amongst the conceivable employment levels, that which endogenously prevails is not that which allows the most utility to agents. To every agent, it is optimal in the sense that it results from constrained optimising decision-making. Thus, the reservation wage principle is satisfied, and supply of and demand for labour match. Nonetheless, a higher utility would be reached if a greater employment level could be arrived at. The wedge between the optimal and the effective level of employment is then called involuntary unemployment. Here, the involuntary modifier makes sense only in a loose way as referring to some inability to achieve a welfare-dominating higher level of employment.

Involuntary unemployment in the underemployment sense captures an idea that must certainly have been attractive to Keynes and is still so to Keynesian economists: that underemployment ought to be related to a systemic flaw associated with the decentralised nature of the decision-making process in capitalist economies, rather than to wage rigidity or too high wages, However, it suffers from two drawbacks. First, two types of underemployment, 'dominated underemployment', on the one hand, and 'efficient underemployment', on the other, should be distinguished. The former pertains to cases where the existing level of employment is both non-maximal and sub-optimal — it is welfare-dominated by one or several higher level. The latter designates cases where the existing level of employment is non-maximal yet optimal — reaching a higher level of employment would not increase agents' utility. Clearly, only states

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[4] As stated by Azariadis, 'the employed workers… are to be envied by their laid-off colleagues – a situation that many economists would call 'involuntary unemployment' (1987: 734).

[5] The author who initiated this understanding of involuntary unemployment is probably Haavelmo (1950).

of dominated underemployment can be of interest to economists wanting to denounce some market failure. However, it has turned out that models which claim to have demonstrated underemployment in the dominated sense, have actually succeeded only in demonstrating it in the efficient sense. The most striking examples of this are models based on the inverse L-shaped supply of labour curve.

The second drawback of the underemployment line of research it that it is low-key. Models demonstrating involuntary unemployment in this sense fail to come to grips with the unequal distribution of total employment across agents, deemed to be a central feature of unemployment. In these models, every agent wanting to participate in the labour market does so in an optimising way — no individual disequilibrium is present. It is just that their participation could be increased through exogenous actions. So what is called involuntary unemployment has nothing to do with joblessness — i.e. people who are totally out of work — although the initial motivation for the research was to give a theoretical account of this phenomenon. In short, we have an alleged theory of involuntary unemployment from which unemployment, strictly understood, is absent. Therefore the underemployment definition of involuntary unemployment is wanting.

To conclude, two main definitions of involuntary unemployment are available: a narrow one where involuntary unemployment designates a breach of the reservation wage principle and a broader one where it refers to underemployment. A relativistic stance could be taken according to which both definitions would be considered acceptable. However, this is not the stance I wish to take. I rather think that the first definition is the most apposite, and that this is the definition that Keynes had in mind. To compound the matter, there are two sub-types of involuntary unemployment in the breaching of the reservation wage sense: the former bears the individual disequilibrium connotation, the second does not. Here again, it must be presumed that Keynes had in mind the first variant. If this viewpoint is accepted, models demonstrating involuntary unemployment in any sense other than individual disequilibrium cannot be considered as having fulfilled the first item of Keynes's programme.

At the time he wrote the *General Theory*, it was hardly perceived that the involuntary unemployment concept, so understood, was on a collision course with what we now call 'microfoundations'. Moreover, in the wake of the Great Depression it would have been out of place to question the view that the unemployed were in this condition involuntarily. Nowadays, however things have changed drastically, the burden of the proof having shifted onto those who want to use the involuntary unemployment concept rather than onto its opponents.

4. A critical examination of the early coordination failures models

4.1. Diamond's search equilibrium model

Diamond's model pertains to a perfectly competitive barter economy:

> It is common in theoretical economics to use a tropical island metaphor to describe the working of a model. The island described here has many individuals, not one. When employed, they stroll along the beach examining palm trees. Some trees have coconuts. All bunches have the same number of nuts but differ in the height above the ground. Having spotted a bunch, the individual decides whether to climb the tree. There is a taboo against eating nuts one has picked oneself. Having climbed a tree, the worker goes searching for a trade – nuts for nuts – which will result in consumption (Diamond [1982] 1991: 42).[6]

The economy comprises only self-employed agents. They fall into two classes. Either they are searching for a productive activity, i.e. for a tree that is worth climbing, or they are looking for a trading partner after having found a suitable tree. Agents of the former type are called the 'unemployed', those of the second the 'employed' ([1982] 1991: 33). Every tree bears the same number of coconuts yet trees vary in terms of the effort needed to reach and pick the nuts. The arrival of production possibilities is stochastic. The effort must be below some threshold pertaining to the individual's willingness to act on production opportunities (the cut-off cost c^*). Once agents are endowed with coconuts, they must find somebody else, also in possession of coconuts, with whom to make a swap.[7] This is the second searching process. When it is over, trade takes place on a one-for-one basis, and the good is consumed.

Diamond's central assumption is that the arrival rate of trading partners is an increasing function of the level of activity, i.e. the number of agents holding coconuts to trade. Thus, trade technology exhibits increasing returns to scale: an increase in the level of activity makes trading easier.

The time derivative of the employment rate satisfies:

$$\dot{e} = a(1-e)\, G(c^*) - eb(e)$$

where e is the level of activity, a the arrival rate of production possibilities, $(1-e)$ the unemployment rate, G the distribution of costs and b the arrival rate of trading partners. The first element of the right-hand expression is the rate of inflow in tradable goods, the second the rate of outflow, i.e. the decrease in the stock of inventories.

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[6] In my eyes, the third sentence of Diamond's quotation should read 'when unemployed' in view of what he writes on p. 33, 'Individuals have 0 or y units for sale. The former are looking for production opportunities and are referred to as unemployed'.

[7] On top of the assumption that agents cannot consume the products of their own investment of labour, it is also assumed that they cannot undertake further production before having exchanged the coconuts they hold.

As illustrated in Figure 1, the steady-state employment rate, $\dot{e} = 0$, is an upward sloping function of b, 'since a greater willingness to invest goes with a greater number of traders if the flows into and out of inventories are to match' (Diamond 1984: 11). It starts from a positive lower bound of possible production costs, $\underline{c}$, and is bounded above by the employment level reached if all possible production opportunities are accepted.

Next, Diamond considers the determination of c^*, the cut-off cost, the individual willingness to act on production opportunities.. Individuals, who are assumed to know a and b, choose c^* to maximise their expected lifetime utility. The underlying assumption is that the optimal cut-off cost (c^*) is equal to the capital gain from a change in position from holding a good in inventory to not holding. c^* is a positive concave function of e, starting from the origin.

Figure 1 Underemployment in Diamond's search model
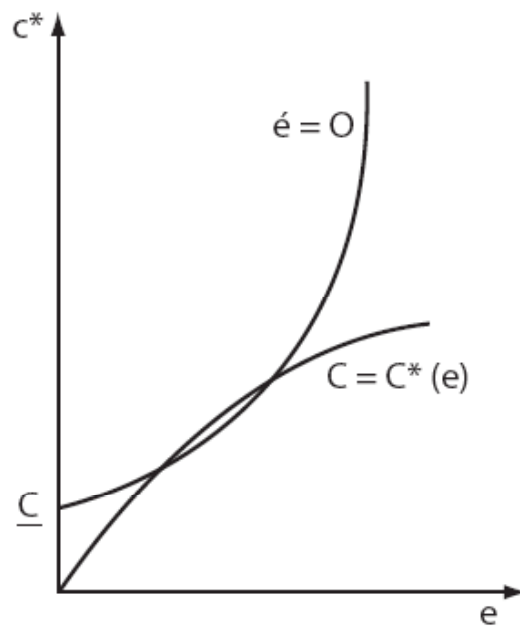
As Figure 1 shows, Diamond's model features multiple Pareto-rankable equilibria. After a shock, the economy can get stuck in a 'wrong' steady state equilibrium, even if the shock has passed. The way is thus paved for exogenous interventions.

> With multiple equilibria there is an important potential role for government. The government can attempt to influence beliefs by suggesting that there is nothing to fear but fear itself. More important, the government can take fiscal action to increase

aggregate demand and so launch the economy on the optimistic path. In this way we can model pump-priming while being completely consistent with individual maximisation and rational expectations (Diamond, 1984: 26).

Assessing Diamond's model, the first remark to be made is that he uses the terms 'employed' and 'unemployed' terms in a particular way. To him, somebody is unemployed whenever he or she is searching for a production opportunity, but employed when searching for a trading opportunity. According to the standard, and in my opinion better, definition, an agent is unemployed if he or she is unsuccessfully attempting to participate in the labour market. Although there is of course something in common between the self-employed person who happens to be without clients and the jobless person, I believe that they should be considered as engaging in distinct types of activities. Thus, a prerequisite for the existence of unemployment is that the economy under study comprises a labour market. Since this is not the case in Diamonds' model, strictly speaking, it has no place for the category of unemployment, and *a fortiori* for that of involuntary unemployment. His model must thus be characterised as pertaining to dominated underemployment.

Hence, the first point of Keynes' programme is not achieved. However, Diamond's model fares better on the other points. It exhibits a system failure to combat for which demand activation is the proper policy. Finally, rigidity is discharged from any responsibility for the underemployment phenomenon.

4.2. Howitt's transaction costs model

Howitt has been keener than other authors to draw a connection between modern models and Keynes's own conceptions. One of his strong beliefs about the Keynesian programme is that fixed prices have no place in it. Keynesian economists, he argues, ought to be criticised for their failure to follow this principle.

> Keynes was a great success in many respects. But in his main objective, that of freeing the theoretical explanation of unemployment from depending upon sticky wages and prices, he was a failure. The Keynesian revolution soon settled on the conclusion that Keynes's system made sense, and resulted in unemployment, only under the assumption of a sticky money wage rate (Howitt 1990: 7).[8]

Since Keynes himself proved unable to dispense with wage rigidity, any theoretical development that might succeed in this enterprise will be highly appreciated. According to

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[8] In the same vein, Howitt notes that 'from Modigliani to Taylor the modern Keynesian position has been the classical one that Keynes was attacking: that sticky wages are to blame' (1990: 75). However, his review of Bewley's 1999 book (Howitt 2001), gives the impression that he may have changed his mind.

Howitt, getting rid of the standard claim 'that people are unemployed because they are asking too much' is the main contribution of coordination failures models.

Howitt's model (1985) has a twofold lineage — first, the disequilibrium tradition and, second, Diamond's model. From the former, Howitt retains the presence of quantity signals, while abandoning its fixprice feature. From Diamond, he borrows the trade externality idea.

The auctioneer is present in Howitt's model, yet he exerts only his price announcing function without arranging trade. Agents have to find traders in a costly way (i.e. they must use resources in order to execute transactions). Firms have to use up a fraction of production to this end, households a fraction of their time. The thrust of Howitt's model is that the unit cost of selling decreases with the quantity traded. Hence the 'thin-market externality': the thinner the market, the higher the transaction cost, and *vice-versa.*[9] The existence of these costs changes agents' decision-making processes, as they need to be alert to quantity signals. Hence, the demand for labour is a function not only of the real wage, but also of the quantity of labour traded, the same being true for labour supply.

To Howitt, labour trading costs is a sort of unproductive labour, to use classical economists' parlance. This unproductive labour is 'unemployment'.

> I shall interpret unemployment as labour services used up in the selling of labour services. … The rate of unemployment is the fraction of all labour services used in selling labour (Howitt 1985: 93).

The eventual effect of such transaction costs is that the equilibrium will not generally be unique as Figure 2 below, reproduced from Howitt (1985: 95), illustrates.

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[9] The unitary sale effort per firm (σ) is a function of total output ($\overline{y}$), while the unitary sale effort per worker (τ) is a function of total labour traded ($\overline{n}$) with $\sigma'(\overline{y}) < 0$ and $\tau'(\overline{n}) < 0$.

Figure 2 Underemployment in Howitt's model
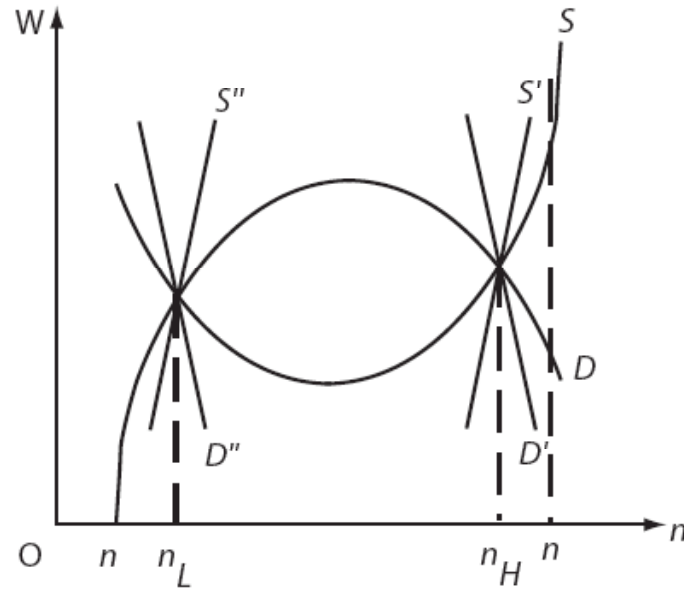
The welfare implication of multiple equilibria is that households' utility will be greater whenever employment is greater. This result, Howitt claims, must be interpreted as a case of involuntary unemployment, the latter being equal to the fraction of labour services used up in the selling of labour services.

In discussing Diamond's model, I have argued that it cannot be considered to have unemployment as its proper object because it comprises no labour market. The same observation must be made about Howitt's model although the labour market is present in it. What Howitt calls unemployment does not fit what I consider its proper definition. In his model, there is market clearing, everybody who wants to work is working, and the loss in employment is evenly distributed across agents. Thus, its real object of analysis is dominated underemployment. Since unemployment is absent, the 'involuntary' modifier is disqualified as well.

Like Diamond, Howitt is on firmer ground as concerns the other elements of Keynes's programme. First, his result belongs to the system failure type: any demand boost will result in decreasing the unit transaction cost, hence improving agents' welfare. Moreover, no objection can be levelled to Howitt's claim that price rigidity plays no role in his model.

4.3. Roberts' coordination failures model

Authors such as Clower, Leijonhufvud and Benassy had realised that the trade organisation assumption (i.e. the auctioneer hypothesis) constituted the decisive obstacle against the introduction of market rationing in Walrasian or neo-Walrasian theory. The difficulty, however, was to find a tractable way of disposing with the auctioneer. Roberts' (1987) model marks an important step in this direction.

According to Roberts, his model formally captures Clower's idea of self-confirming conjectures. He also claims to be heir to authors such as Barro-Grossman, Drèze and Benassy in emphasising perceived quantity constraints as well as the idea that demand constrains employment. Yet the fixed-price assumption is disposed with.

The following quotations brings home the gist of Roberts' model:

> Equilibrium with full employment exists, with all agents transacting their Walrasian quantities. Simultaneously there are also equilibria at the these same prices and wages in which markets fail to clear. In particular, some price-taking and wage-taking workers are rationed in their labour market transactions and are unable to sell as much of their labour as they desire at the given wage. This involuntary unemployment arises despite the model's incorporating markets for all commodities.… and in equilibrium no such agent finds it worthwhile, for example, to reduce wages in the face of involuntary unemployment. (Roberts 1987: 856)

Roberts' claim is stronger than Howitt's since he is unambiguously striving to demonstrate involuntary unemployment in its reservation wage definition where 'workers facing given prices and wages are off their supply curves in equilibrium' (Roberts 1987: 858). The possibility of such a result stems from the radically non-Walrasian trade technology adopted: 'the key is in the modelling of the processes determining prices and individual transactions' (1987: 856). Roberts assumes a separation and specialisation in production and consumption. There are two types of producers (*A* and *B*), two types of worker-consumers (*J* and *K*), two types of labour (*r* and *s*) and two flows of goods (*x* and *y*). In total the economy comprises five commodities, money (*m*), which is non-produced, being the fifth. The model is based on a generalised absence of a 'Ford effect'. No worker can supply inputs to a producer from whom he or she might buy outputs. Symmetrically, workers buy output only from the type of producer to whom they supply no labour. As shown in Figure 3, the *J*s can supply input only to *A*s while they can purchase output only from *B*s.

Figure.3. The trade structure in Roberts' model
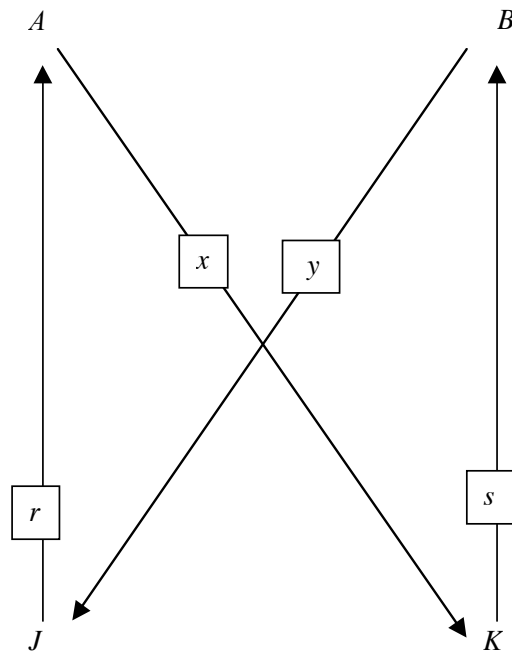
All agents are endowed with money. Only producers have the technical knowledge to produce goods. Labour is the only factor of production. Returns to scale are constant. The input–output coefficient is set at unity. Production is made to order. No inventories are present. Prices and wages are flexible, in that all producers may set the price and wage they control at any level they wish.

The formation of equilibrium prices and quantities occurs in three stages. In stage 1, firms announce prices. In stage 2, workers react by making trade proposals, pertaining to both labour and the produced good, to the different firms. In stage 3, firms make their quantity decisions by selecting quantities of labour and quantities of the produced good to be sold from the workers' offers to trade.

The economy and institutions together define a game in extensive form. Examining its sub-game perfect equilibria, Roberts shows that a continuity of equilibria is possible. Walrasian equilibrium is one of them. Another possible equilibrium is when agents do not trade at all. Keynesian equilibria can also exist, where some of the consumers trade their Walrasian quantities at the Walrasian price and wage while a subset of consumers consume their initial endowments, supplying no labour and demanding no output.

Such a result follows from the non-cooperative character of the game coupled with its institutional arrangement, on the one hand, and with the presence of the non-produced good, on the other. Involuntary unemployment will result from households of one type developing self-fulfilling pessimistic conjectures about the quantity choices made by households of the other type.

Such pessimistic conjectures arise, for example, when a K-consumer, whose optimising plan is to sell labour and purchase output, conjectures that the corresponding J-agent has decided to consume his or her endowment and make a zero labour and output offer. Agent J makes the same conjecture about agent K. As a result, neither of them will supply labour and demand output, contrary to their optimising plan. In this case, the state of involuntary unemployment of some agents results from their conjectures as to other agents making the voluntary unemployment choice (i.e. the decision to use the total time endowment for leisure). Another example is when a K-household, whose optimising plan is to trade s and x, conjectures that the corresponding agent J will choose to supply r while expressing no demand for y. If agent K further conjectures that Firm B, to whom he or she was intending to sell labour, will end up refusing the offer for lack of demand for y while in contrast firm A, from which he or she was intending to buy x, will accept the trade offer. Realising that this situation might result in negative money holdings, agent K will refrain from trading (Roberts 1987: 868).

Roberts' model must be hailed for having demonstrated involuntary unemployment in the reservation wage sense. Does it also feature individual disequilibrium? Roberts' own answer seems to be negative. He wants his agents to exhibit optimality and rationality, two features which he considers equivalent to their being in equilibrium. It then seems unwarranted to refer to individual disequilibrium. However, Roberts' definitional stance rests on equating optimality, rationality and equilibrium. As a result, individual equilibrium is axiomatic. My viewpoint is different. As stated above, I believe that a distinction must be drawn between individual planning and effective or observable behaviour — it is not because an agent has rationally conceived an optimal plan that the latter will necessary be realised. Roberts' model shows exactly this. My definition of individual disequilibrium refers precisely to the case where an agent is unable to make his or her optimal plan come through. Thus, individual disequilibrium excludes neither rationality nor optimising planning. If my distinction and definition are accepted, Roberts' rational agents can be considered as being in a state of individual disequilibrium since they are stuck in forced leisure through no fault of their own.

Finally, let me turn to the other features of the Keynesian programme. The framework adopted by Roberts is general equilibrium. Involuntary unemployment co-exists with the Walrasian wage, so that wage rigidity cannot be declared guilty of causing involuntary unemployment. Unfortunately Roberts' paper misses the full realisation of Keynes' programme, for it fails to properly tackle the policy dimension.

4.4. Comparing the three models

Table 1 summarises the results of my investigation into how the three models fare with respect to the Keynesian programme.

Table 1. The realisation of Keynes's programme

	Diamond	*Howitt*	*Roberts*
Involuntary unemployment in the individual disequilibrium sense	no	no	yes
System failure	yes	yes	yes
Price and wage flexibility	yes	yes	yes
Demand activation as the proper remedial policy	yes	yes	no

Two main conclusions stand out. First, all three models come close to achieving Keynes' programme, yet none of them fully succeeds in this endeavour. The shortcomings of Diamond's and Howitt's model are to bear on underemployment rather than involuntary unemployment. They are unable to grasp the uneven distribution of employment across agents that characterises unemployment. The individual disequilibrium connotation is also absent. Howitt's insistence on involuntary unemployment is more a source of conceptual confusion than of assistance. As to Roberts, he succeeds in demonstrating involuntary unemployment in its individual disequilibrium meaning. His model confirms my intuition that a main stumbling block to theorising involuntary unemployment lies in the trade technology on which canonical economic theory rests. Yet he fails on the score of justifying demand activation.

My second, conclusion bears on the comparison between the three models. Up to now I seem to have privileged the aim of demonstrating involuntary unemployment. As a result, Roberts' model seems to be superior to Diamond's and Howitt's. Does this mean that Keynesian economists should follow Roberts' lead rather than Diamond's or Howitt's? This is not necessarily true. Definitely, Roberts' model marks a victory on the front of demonstrating involuntary unemployment. But then, it turns out to be a one-shot victory — yes involuntary unemployment has been demonstrated, but so what? On the one hand, Roberts just provides an example of involuntary unemployment. No research programme ensues, On the other hand, the victory comes too late, at a time when the agenda of macroeconomics has already shifted

away from the battle over involuntary unemployment, as a result of the 'new' classical revolution.

5. A broader perspective

My conclusion as to the incapacity of coordination failures models to fully take up Keynes's programme also holds for other so-called New Keynesian models such as efficiency wage or, imperfect competition models. It is always the same picture. At best, these models succeed in achieving all but one of the four items on Keynes' programme. None achieves the full success score.

How should this continuing failure be interpreted? My opinion is that, seven decades after the publication of the *General Theory*, the most plausible explanation is that Keynes' programme is non-feasible; at least one of its elements is always too much.

Had Keynesian authors cast their standpoint in reference to Keynes's programme as I have defined it, they could have stated that their departure from this agenda stemmed from a realisation of its impossibility, and from the need to replace it by a more tractable programme. If this viewpoint is accepted, my analysis resolves two standard enigmas in the history of Keynesian economics. The first is why Keynesian theories have emerged which depart from Keynes's own way of putting issue. This happened, it can now be asserted, because Keynes's programme was not feasible. The second conundrum is why, if Keynes's programme had to be amended, has it not been replaced by a single alternative programme, to which all Keynesian economists could rally? Why, in other words, are there competing Keynesian theories? Here again, the answer is simple. Once it is admitted that some departure from Keynes's programme is necessary, several alternatives present themselves, according to the item of the original programme that one decides to shelve. It is then no surprise that different Keynesian theories co-exist. They have all a lineage in Keynes's programme and there is no reason to argue that one particular departure is superior to the others.

Beyond doubt, the main difficulty standing in the way of the realisation of Keynes's programme is its first item, demonstrating involuntary unemployment in the individual disequilibrium sense. This raises the last question that I wish to tackle in this paper — should Keynesian economists continue to strive to demonstrate involuntary unemployment in its strong meaning?

The main motivation behind Keynesian economists' attempt to introduce involuntary unemployment in economic theory is their belief that it is an important fact of life. For example, Shapiro and Stiglitz (1985: 1217) write 'To us, involuntary unemployment is a real and important phenomenon with grave social consequences that needs to be explained and understood'. This belief is shared by most Keynesian economists. They are convinced that,

out there in the real world, something exists which deserves to be called involuntary unemployment, and bears the connotations mentioned above, especially that people are unemployed through no fault of their own.[10] Hence their desire to introduce this concept into the theoretical discourse.

What explains the difficulty of constructing a theory of involuntary unemployment? Is it, as argued by Lucas, that the 'thing'' to be explained doesn't exist, or is it due to some deeply embedded premise of economic theory? My own view tilts towards the latter. Economic theory is concerned with parables. The premises upon which it is based have the advantage of allowing tractable rigorous theorising, yet the price of this is that important facts of life are excluded from the theoretical universe. Non-chosen outcomes is one of them. The underlying reason lies in the trade technology and perfect information assumptions upon which both the Walrasian (and neo-Walrasian) and the Marshallian (and neo-Marshallian) theories of value are based. Put differently, as soon as the centralised market hypothesis is adopted, the democratic character of the market becomes a compelling conclusion: no non-optimal solution can be imposed upon any agent or, in other words, interactive equilibrium implies individual equilibrium. The exclusion of non-chosen outcomes ensues.

In a brilliant and oft-quoted passage of the *General Theory,* Keynes wrote:

> Obviously, however, if the classical theory is only applicable to the case of full employment, it is fallacious to apply it to the problems of involuntary unemployment — if there is such a thing (and who would deny it?). The classical theorists resemble Euclidean geometers in a non-Euclidean world who, discovering that in experience straight lines apparently parallel often meet, rebuke the line for not keeping straight — as the only remedy for the unfortunate collisions which are occurring. Yet, in truth, there is no remedy except to throw over the axiom of parallels and to work out a non-Euclidean geometry (Keynes 1936: 16).

Let us accept that Keynes is right in his diagnosis. This still does not take us very far. The fact that one may pray for the occurrence of a non-Euclidean geometry hardly suffices to bring it about. And if it proves so difficult to construct, what should be done in the meantime? With the exception of Clower and Leijonhufvud on the one hand, and post-Keynesians, on the other, Keynesian economists can be seen as geometricians who have opted for continuing to use traditional Euclidean geometry for want of a serviceable alternative.

Here Euclidian geometry is tantamount to economic theory without involuntary unemployment. However, the elimination of this concept would only affect the theoretical sphere. Drawing conclusions from this sphere about the real world would be a mistake. That

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10 As once stated by Solow, 'I believe that what looks like involuntary unemployment is involuntary unemployment' (1980: 3).

is, one should not deny the existence of real world involuntary unemployment merely on the grounds that there is no place for the concept of involuntary unemployment in the theoretical discourse. As a counterpart, the fact that solid arguments can be put forward as to its real-world existence is not a sufficient condition to give it theoretical legitimacy. Admittedly, this position makes sense only if it is accepted – as I believe it should be – that a sharp divide must be drawn between the real world and the fictitious theoretical universe. Unfortunately, the principle of such a separation is scarcely admitted either by Keynesians or by the new classicists. The latter have not hesitated to transpose the theoretical non-existence of involuntary unemployment onto the real world. The flaw of Keynesians is that they have over-stated their case: while their model only demonstrates either involuntary unemployment in the narrow frustration meaning or underemployment, they behave as if they had succeeded in giving an explanation of involuntary unemployment in its common-sense meaning.

Foregoing the involuntary unemployment claim may look like a high price to pay, since the existence of mass unemployment, interpreted as having an important involuntary component, was the real-world phenomenon that triggered the whole Keynesian enterprise. Yet would its abandonment really be so dramatic? Several arguments suggest that it might not be so.

First, as stated above, this theoretical abandonment should have no impact on assessments made about reality, in so far as the principle of a separation between the two levels of discourse is accepted.

Second, the reasons for its dismissal should be taken into account, i.e. the rationality assumption and the centralised trade technology assumption. Both of these are defensible on the grounds of tractability and the lack of better alternatives. Still, there is nothing to boast about in their adoption. Their only justification is expediency. If involuntary unemployment is deemed to be theoretically unacceptable only on such grounds, there is no reason to make a fuss over its dismissal.

Third, the issue at stake is whether the demonstration of involuntary unemployment should have priority over the other points on Keynes's programme once it is admitted that they are on a collision course. To Keynes, the concept of involuntary unemployment was instrumental in the realisation of a larger cause, namely the denunciation of a system failure and the vindication of state intervention in the economy. If this concept has been an object of controversy, it is mainly because it was a metaphor for the wider judgement to be made on the efficiency of a competitive market system, and of the opportunities for state intervention in it. Wanting to defend the involuntary unemployment concept then amounts to taking a sceptical stance on the virtues of laissez-faire, and to defending the view that outside interference in the market can be beneficial. Similarly, opposition to involuntary unemployment would then stem from support for full laissez-faire. This is the real issue in the dispute. But this debate does not necessarily need the involuntary unemployment concept. Therefore, in the present state of

economic theory one should not stick too firmly to the view that involuntary unemployment is the *sine qua non* of Keynesian theory.

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