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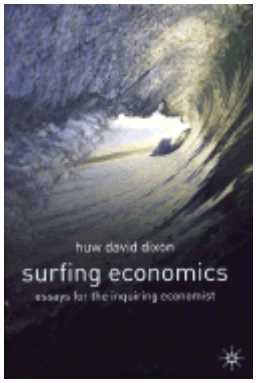
New Keynesian Economics, Nominal Rigidities and Involuntary Unemployment.



Surfing Economics, chapter 5 pages 109-122.

Chapter 5
New Keynesian Economics, Nominal Rigidities and Involuntary Unemployment*.

5.1: Introduction.

In this paper, I seek to examine what the contribution of new Keynesian Macroeconomics has been in the last 15 years and to consider the methodological lessons to be learned. I also want to outline what I believe to be the driving forces behind the innovations made. I would like to stress at the outset that this paper is very much an expression of my own personal opinions and perspective rather than an attempt at scholarly objectivity. The new Keynesian umbrella has sheltered many different themes: financial market imperfections, coordination failures, endogenous growth, menu costs/staggered contracts, fiscal multipliers inter alia[1]. In this paper I wish to focus on two themes: nominal rigidities and involuntary unemployment. These have of course been part of the Keynesian approach since Keynes' *General Theory* and remain a major theme in *new* Keynesian economics.

I will argue that there is strong empirical evidence for the importance of nominal rigidities, making them an important ingredient in any serious macroeconomic theory. However, nominal rigidities can only be properly understood in a theoretical framework with price or wage making agents. It is almost impossible to begin to understand nominal rigidities in the Walrasian framework where all agents are price takers. It is precisely this shift that new Keynesian models made: they

abandoned the notion of perfect competition and were then able to provide microfoundations for nominal rigidity. Much the same can be said for involuntary unemployment. There is now a growing body of evidence that reflects what has been obvious to the casual observer for some time: those who become unemployed are unhappy about the change in status. This is almost impossible to model in Walrasian labour market. Indeed, in some Walrasian models the individuals who become unemployed suffer less than those who remain in employment. Again, the introduction of imperfect competition (e.g. efficiency wages, unions) is needed to make this explicable.

The outline of the paper is as follows. Section 5.2 briefly outlines the new Keynesian "idea"; section 5.3 looks at the treatment of nominal rigidities in pre-new-Keynesian models; section 4 explores nominal rigidities in the new Keynesian perspective; section 5.4 considers the explanation of involuntary unemployment in Walrasian models and models with imperfect competition; section 5.6 looks at the new consensus in macroeconomics; section 5.7 concludes and draws out the methodological lessons of the paper explicitly.

5.2: The New Keynesian idea

I have written elsewhere in some detail about the origins and precursors of new Keynesian macroeconomics (Dixon and Rankin (1995a) and *The role of imperfect competition in new Keynesian economics*). However, for the purposes of this chapter, I will take the discussion in the introduction to Mankiw and Romer's collection "*New Keynesian Economics*" (Mankiw and Romer (1991), pp.2-3). Here the authors argue that New Keynesians *do* believe that:

- Nominal variables can affect real variables (the Classical Dichotomy is violated)
- Market Imperfections are crucial for understanding the economy.

Indeed, putting together these two points Mankiw and Romer state that "…the interaction of nominal and real imperfections is a distinguishing feature of new Keynesian economics" (*op.cit*.).

What was the driving force that led economists to adopt this viewpoint? I shall argue as follows. First, the empirical evidence pointed to the importance of nominal rigidities. Second, the theoretical motivation that the only way to explain nominal rigidities was to adopt a framework with price/wage-making agents. Indeed the theoretical motivation was even stronger, since the introduction of imperfect competition did not just solve the problem of explaining nominal rigidities, but also the explanation of involuntary unemployment[2] (see for example Blanchard and Kiyotaki (1987), Dixon (1988)). Furthermore, it gives rise to very different welfare effects than the Walrasian model - for example, welfare increases in a boom and decreases in a recession. Thus the introduction of imperfect competition simultaneously solved several problems at once: why wages and prices were at non-Walrasian levels; the possibility of involuntary unemployment; welfare is increasing in output and employment and so on. Again, the whole story is beyond this chapter, so I will instead focus on the two themes of nominal rigidities and involuntary unemployment.

5. 3: Nominal Rigidities before the new Keynesians.

Let us pursue this core idea and see how it relates previous economic paradigms[3]. Firstly, we have the *neoclassical synthesis* model, most notably associated with the

names of John Hicks and Don Patinkin. From the perspective of the neo-classical synthesis the economy would in the long run be in Walrasian equilibrium. In the short-run, however, nominal (or real) rigidities could result in deviations from the equilibrium. The short-run equilibrium could thus be analysed by an IS/LM approach or the Aggregate-supply/demand model for example. Alternatively, in an inflationary environment the Philips curve could be used to model price and wage adjustment. Nevertheless, the long run was a competitive equilibrium (the long run aggregate supply curve or Philips curve is vertical). Nominal rigidities are crucial here since they allow for the impact of nominal and real demand shocks to have real effects on the economy.

Here is however an incoherence at the heart of the Neo-classical synthesis. This is summed up by *Arrow's paradox* (Arrow 1959)[4]. For a perfectly competitive equilibrium, you need to have all agents acting as price-takers. However, if everyone acts as a price-taker, how can prices change? This paradox is profound and not easy to resolve if you want to keep perfect competition. If all agents are price-takers, the issue of nominal rigidity becomes almost impossible to investigate except in an ad hoc manner: if no one sets the price it becomes difficult to ask why they do not adjust the price immediately[5]! Of course, at the time (i.e. the 1950's and 60's) this did not seem such a big issue: the model of price-adjustment used in general equilibrium was Walras's Tatonnement process. A fictional agent is invented, the auctioneer who adjusts prices in response to excess demands. However, you do not solve the issue of price-adjustment in a price-taking world by inventing a new category of supernatural economic agent[6].

Friedman's account of the Natural Rate changed things[7]. He developed the surprise theory of the short-run Philips curve. In essence, deviations form the long-

run equilibrium (the *Natural Rate*) were explained by *expectational* errors, not nominal rigidities. The central insight here was that supply decisions are based on expected (or perceived) prices or the current general price level. If demand caused the current level of prices to rise beyond what had been expected, this could stimulate supply. Workers might (mis)perceive concomitant nominal wage rises as real wage increases and supply more labour. This sort of idea was formalised by Lucas in his "archipelago"[8] theory of the Natural rate (Lucas 1979). When allied to the notion of rational expectations, this idea gave rise to the notion of policy neutrality Sargent and Wallis (1976) and the notion that only unanticipated changes in the money supply have a real effect (Barro 1977). This approach became central to much macroeconomic theorising in the decade starting around 1975. In particular, the "Lucas surprise supply curve" embodied this view. Until Lucas's "surprise supply function" became standard, people used to look at the Phillips curve as a relationship with inflation[9] on the LHS and output or employment on the RHS. The Lucas surprise supple curve inverted this relationship: inflation became the causative RHS variable, whilst output and employment the dependant variables. Governments made output and employment to fluctuate by causing unanticipated inflation.

Whilst in the Friedman-Lucas story the notion of price-flexibility and market clearing is logically consistent with deviations from equilibrium, the consensus developed that perhaps this was not a very plausible story. The Lucas archipelago model rests on the notion that whilst individuals know a lot about their own market ("island"), they are not well informed about the aggregate variables (the "archipelago"). This means that they can misperceive a local nominal price/wage rise as a real increase, when in fact it may be a real decrease. However, the sort of aggregate variables that this story requires be unknown are the aggregate price level

and the money supply. But these are the two variables for which we have frequent, regular and accurate statistics regularly published and broadcast on the media.

Of course, much the same "surprise supply" story can be told in terms of *contracts* made ex ante, before events unfold. Wages (and/or) prices are set ex ante, and nominal demand shocks can affect output via a standard aggregate supply curve based on fixed wages. But then the theory reduces to a model of nominal rigidities, with the same problems as the neoclassical synthesis.

There were two reactions in the 1980s to this problem of nominal rigidity in competitive models. One was the development of the new Keynesian school, which dropped the Walrasian assumption of price-taking behaviour and put imperfect competition at the centre of macroeconomic modelling. The other approach was to drop the nominal side altogether and model economic fluctuations as occurring due to real factors (technology shocks) in a dynamic general equilibrium model: the RBC approach[10], such as Prescott (1986).

5.4: Nominal Rigidities in new Keynesian models.

Imperfect competition is central to the new Keynesian approach to nominal rigidity. The theory of menu costs as an explanation of nominal price rigidity in a macroeconomic context was developed more or less simultaneously by Parkin (1986), Akerloff -Yellen (1985a,b) and Mankiw (1985) although the idea had been around for sometime. I will not discuss the empirical evidence for the importance of menu costs here (I examine these in a companion paper Dixon (1999)): in this chapter I will provide a theoretical focus.

The approach states that there is some non-convex cost of price adjustment, a "menu cost". This can be thought of either as some explicit cost of price adjustment (as is implicit in the name) or rather as resulting from some sort of bounded rationality which means that you do not change your current action unless it yields an improvement of more than ε (the technical term for this is ε-optimisation). Either way, it introduces some degree of nominal inertia at the individual level (price/wage setter). The assumption of imperfect competition is important because it says that the nominal inertia will arise even when the menu costs are small[11]. Under imperfect competition the monopolistic price is optimal for the firm: hence any small deviations form it yield no first-order loss in profit. Thus only small menu costs can lead to price rigidity. The same sort of argument can be applied to the labour market: assuming the initial contract was in some sense optimal[12], even small re-negotiation costs can lead to nominal wage rigidity (in fact, people often accept that re-negotiation costs might well be large, since they have to be agreed). Clearly, an efficiency wage model will have the same property even though the wage is set unilaterally by the firm.

Imperfect competition plays a dual role here: not only does it permit us to consider the price-making decision in labour and product markets explicitly, it also provides the argument for small menu-costs. In a Walrasian model neither of these roles is possible, since the act of price-setting is not modelled as the outcome of a maximising decision by an economic agent(s).

I would emphasise here that theories for labour markets based on contracts do not represent an *alternative* to menu-cost theory, but are properly seen as an inherent part of it. Whilst some authors (e.g. Greg Mankiw) have tended to down play the labour market and emphasise the product market, others such as George Akerlof and Janet Yellen have not. Indeed, most European new Keynesian[13] authors tend to focus

more on unionised labour markets reflecting the relatively greater importance of unions in Europe. Furthermore, theories of overlapping contracts and related causes of nominal wage rigidity must be based implicitly on some re-negotiation costs. The "menu-cost" elements in the labour market are different in many ways to those in the output market, but the same general principles apply. I think it is not an exaggeration to say that so far as nominal wage and price rigidity goes, menu-costs are the only show in town[14]. The label "menu-costs" was perhaps not judiciously chosen: it implies something trivial and restricted to restaurants. However, the fact that so many prices and wages are fixed in nominal terms over significant periods of time suggests that the "menu-costs" are large enough to cause significant nominal rigidities in practice (for a discussion of the evidence see Dixon (1999)).

4.5: Involuntary Unemployment.

The Walrasian equilibrium has some very special welfare features. The First Fundamental Theorem of Welfare economics states that a Walrasian equilibrium is Pareto optimal in the absence of certain well defined market failures. In a representative agent economy this means that the equilibrium maximises the welfare of the representative agent. One big implication of this is that if we consider small deviations from equilibrium (caused for example by nominal rigidities or expectational errors), then not only is there is no first order welfare effect, but the effect that is present is symmetric[15]. Booms are as bad as busts (recall Friedman's parable of workers being fooled into working too hard when there is unanticipated inflation).

Imperfectly competitive economies, however, are very different. Even if the behavioural features of an imperfectly competitive economy are similar to a Walrasian economy, the welfare properties will almost certainly be different. In particular, in an imperfectly competitive equilibrium there will tend to be too little output and employment. It is thus likely that welfare will be increasing in output and employment . This seems to mesh in with the common-sense view that "unemployment matters". Indeed, writing as a new Keynesian Romer (1993) states that "after all, accepting the belief that the labour market was continuously in Walrasian equilibrium would require denying that unemployment was an important phenomenon".

Many economists have however doubted the importance of the concept of involuntary unemployment as a useful concept. For example, Lucas (1978) stated that "…Involuntary unemployment is not a fact or a phenomenon to which it is the task of theorists to explain. It is, on the contrary, a theoretical construct which Keynes introduced (in order to explain) large scale fluctuations in measured, total unemployment.[16]" This viewpoint is (as I interpret it) that the concept of involuntary unemployment is of little use in explaining output and unemployment fluctuations and is immeasurable. However, even if this were the case, the *welfare* properties implied would be different. It is on this issue that I focus is what (if any) welfare effect is there when unemployment increases and how is it distributed across households?

There is no doubt that most people become unhappy when they become unemployed through redundancy. The empirical evidence for this is overwhelming (see Oswald (1997a, 1997b)). This implies that we should have theories of employment

determination which are consistent with this fact. One could of course argue with the facts: economists have largely ignored direct evidence on human happiness for the last half-century, on the basis that happiness could not be measured. However, the case for doing so is becoming less and less tenable (see for example Frank (1997), Ng (1997)).

Walrasian theories of unemployment are not consistent with this fact. In order to understand the full extent of their inadequacy here, let us consider what happens in a labour market when there is an adverse technology shock, so that the demand curve[17] for labour shifts to the left in wage-employment space. For explanatory convenience we will adopt a purely partial equilibrium approach. In a competitive market, a fall in demand will lead to lower equilibrium (real) wages and employment: in Figure 5.1 we move from Point A to point B.

The key question on which I wish to focus is the following: *who is better off, the person who remains employed or the person who becomes unemployed*? In other words, how is the reduction in welfare shared out in a competitive market?

Let us look at two different models of how the competitive market might work, both of which are commonly used in Walrasian macromodels.

4.5.1: The Representative household.

In this case, there is just one representative household in the economy. Implicitly, there are many identical households, all of whom supply the same labour. All households would have the same change in utility as a result of the adverse

productivity. One could think of this as being the case where all households work: the movement down the labour supply curve represents simply the reduction in working hours by the households. There is no room here for a distinction between unemployment and employment.

4.5.2: Heterogeneous households, indivisible labour (HHIL).

In this model[18], all households have a single unit of labour to supply and a reservation wage. If the market wage is at or above the reservation wage, they are willing to supply all of their labour: if it is below the reservation wage, they would rather supply no labour and consume the leisure. The market supply curve is simply the cumulative density function for the reservation wages of households. As we move down the market supply curve, two things are happening:

(a) The real wage of those employed (for whom the real wage strictly exceeds their reservation wage) declines. This has a first order effect on the utility of the employed, making them worse off.
(b) However, those who become unemployed are almost indifferent. This is because at the margin, the real wage and the reservation wage are (almost) equal. The gain in leisure (almost) exactly offsets the loss of wage income.

We thus have the conclusion that the reduction in welfare in the HHIL model is concentrated in the employed. The households who become unemployed have the smallest reduction (zero at the margin). This model clearly fails to pass the litmus test that the welfare loss should be concentrated on those becoming unemployed.

What sort of models do we need to fit the fact that those who become unemployed suffer the largest welfare reduction? I would argue that what we need is a model with

equilibrium involuntary unemployment. There are different ways of modelling this. However, let us consider a model with a fixed real wage as a good starting point.

4.5.3: Rigid real-wages.

In Figure 5.2, we see that the real wage is at W, which exceeds the competitive real wage Θ_A (the disutility of labour). The initial equilibrium is at A, with the level of involuntary unemployment being given by the distance A-C. After the adverse technology shock , the new equilibrium is at B, with the corresponding decline in employment from L_A to L_B. If we have a representative agent model this will result in a decline in hours for all households, with no individual being unemployed. The reduction in consumer surplus (taken to be the measure of household welfare[19]) is large and represented by the shaded area

$$\Delta CS = (L_A - L_B)(W - \Theta_A) + \frac{1}{2}(L_A - L_B)(\Theta_A - \Theta_B)$$

The change in welfare ΔCS decomposes into two elements. First there is the "square" representing the loss in surplus due to the fact that the initial real wage is above the initial disutility of labour Θ_A; second there is the "triangle" representing the fact that the new employment level represents a deviation form the new competitive equilibrium at D. The triangle represents a second order welfare loss; the square a first order loss[20].

If we started from a competitive equilibrium then $W = \Theta_A$, so that there is no (first order) loss in welfare, only the second order loss. This is represented in Fig 3, where the shaded area is

$$\Delta CS = \frac{1}{2}(L_A - L_B)(\Theta_A - \Theta_B)$$

This follows because the initial employment level would be the welfare maximizing given the wage: hence any reduction in employment from the initial position will not give rise to a first order reduction in welfare (the Envelope Theorem again) but only the second order "triangle" loss.. Hence in this case it is not the real wage rigidity itself but the presence of involuntary unemployment in the initial equilibrium which is crucial in generating a first order welfare effect of changes in employment in response to the adverse technology shock.

Now consider the same model, but with the employment change being one where people either work all they want, or not at all. In this case, as we go from A to B, those who remain employed suffer no reduction at all in their utility: *all of the reduction in welfare is concentrated on those who become unemployed*. In this model, the difference between an initial position with IU and market clearing is not so stark: even if the initial real wage were at the Walrasian level, there would be a concentration of the first-order welfare loss on those becoming unemployed. However, there is a problem here: how can a competitive market be reconciled with a situation where some households become involuntarily unemployed (as those who are made unemployed become, since they would be willing to work at a slightly lower real wage than the one prevailing). More on this later.

4.5.4: The Monopoly Union

The assumption of an exogenous real wage is of course not very satisfactory. Let us consider standard monopoly union model. In this case, let us suppose that the union marks up the real wage so that it is a fixed markup over the marginal disutility of labour. For example, we can express the real wage as

$$w = \frac{e}{e-1} q$$

Where ε is the elasticity of labour demand. Then, in effect, the "supply curve" of the unionised labour market lies above the standard competitive labour supply, as depicted in Figure 4. The dotted upward sloping line represents the marginal disutility of labour (which can be thought of as an increasing function of employment L). The solid upward sloping line gives the markup on this. The reduction in demand leads to a shift from A to B: as in the competitive case the real wage and employment fall. The lost consumer surplus is given by the sum of three terms, representing the different parts of the shaded area in Fig 4.

$$\Delta CS = L_B(W_A - W_B) + (L_A - L_B)(W_A - \Theta_A) + \frac{1}{2}(\Theta_A - \Theta_B)(L_A - L_B)$$

In the case where people are either unemployed or employed, the loss in welfare to the employed is represented by the first term: the ones remaining in work are paid less. The second two terms represent the welfare loss to those becoming unemployed. They lose the entire surplus representing the gap between the marginal disutility of labour Θ and the wage. Those becoming unemployed would suffer a far larger reduction in welfare than those who remain in employment.

4.5.5 Walrasian models do not fit the facts.

The assumption that labour markets clear all of the time is not consistent with the fact that when total labour supply varies, the reduction in welfare is concentrated on those who lose their jobs. The oft-used model with reservation wages implies the exact opposite. It is almost impossible to reconcile in principle the idea of Walrasian

market clearing with the notion that two otherwise identical households suffer different fates (one employed, the other unemployed). In the reservation wage model, the allocation of employment is efficient (it goes to those with the lowest disutility of work), which implies that those who become unemployed are those which get the least out of working. The marginal worker gets almost no surplus and so is indifferent between working and not working. Hence he looses little when he becomes unemployed.

One can of course introduce an *ad hoc* almost Walrasian model with long-run equilibrium but which allows for short-term rigidities or other non-instantaneous market clearing. I have discussed this before: it is not in my opinion a coherent viewpoint to take (Arrow's paradox).

Lastly, if we return to Lucas' earlier statement, recall that the comparative statics of at least one of the non-Walrasian models we have considered (monopoly union) does look very much like the Walrasian (we simply use a different "supply curve, the marked-up disutility of labour in Figure 4.). However, the welfare effects are different in type and magnitude. The First Theorem of Welfare no longer holds sway.

4.6: New macroeconomics, New consensus.

As Neil Rankin and I argued in Dixon and Rankin (1995, p.9), in the 90's the distinctions between different "schools" have tended to reduce and a new consensus has arisen. In this section I want to talk a little about the nature of this consensus.

Firstly, the notion that nominal rigidities seems to be emerging as a major part of the new consensus in macroeconomics. I will look at this in some detail. This in a sense marks a victory for new Keynesian economics, since this is the only sort of theory that can explain nominal rigidities.

Secondly, most economists have accepted the notion that we need to have dynamic models. Few macro-economists write models that are completely static nowadays. Although the first models in dynamic macroeconomics tended to be Walrasian, the dynamic method in itself is not generic to the Walrasian equilibrium. For example, the RBC method can be applied to "new Keynesian" models (see for example Hairault and Portier (1993), Danthine and Donaldson (1990, 1993), Rotemberg and Woodford (1995, 1996)). The Ramsey model can be adopted to include unionised wage-setting (Aaronsen, Sjogren and Lofgren (1998)).

Perfectly competitive models are in general easy to solve - after all, they are just "supply equals demand" dressed up in different ways. It is thus easier to develop new methods and ways of modelling when you have this simple equilibrium concept. For example, one of the special properties of "supply equals demand" is that with a representative household the solution maximises welfare (this is implied buy the First Fundamental Theorem of Welfare). Hence you do not even need to analyse the market process, but simply go first to a social planning problem to solve the model. Imperfect competition is generally more complicated to analyse; things are more intricate and require more thought. We should therefore expect people using perfectly competitive models to develop tools of analysis first[21]. We can then use these methods and address the real issues using models with imperfect competition.

Let us look at the first feature I highlighted in the new consensus – nominal rigidities. There is now a rapidly growing literature which puts an overlapping

contract framework into a dynamic general equilibrium model – see for example (Guido Ascari (1997,1998), Ascari and Rankin (1997)). In these models employment is determined by labour demand - there is involuntary unemployment. This enables the authors to explore the effects of policy in some detail: in particular Ascari and Rankin (1998) shows the mechanics of how disinflation (both anticipated and unanticipated) causes a slump. There have writers who have been associated with the standard RBC approach who have been moving towards the integration of nominal variables into the dynamic general equilibrium model (e.g. Cooley and Hansen (1995), Chari et al (1996). In fact, the literature integrating nominal rigidities into dynamic general equilibrium is growing so rapidly that it is not really appropriate to attempt to summarise it here[22].

However, there is a more general move towards integrating nominal rigidities apparent in the monetary policy literature. There has been a move towards modelling central banks as using the interest rate to try to control inflation. The usual way this is modelled is using a "Phillips curve" relationship which puts the rate of inflation as a (lagged) function of output (see for example Ball (1997), Bean (1998), Svensson 1997)). This marks an interesting change in perspective. The original policy credibility literature was based on the surprise supply function in which a surprise in inflation caused a change in output. The whole argument for central bank independence was that by delegating monetary policy to conservative central bankers the temptation to have a bout of inflation to reap the reward of some extra output and employment could be avoided. This model is perfectly compatible with the notion that prices and wages are perfectly flexible, with output variations caused by expectational errors (as in the Friedman/Lucas story). When authors are now modelling actual policy rules, they reverse the relationship and have changes in output

(caused by interest rate policy directly or via the exchange rate) causing changes in inflation. This marks an interesting historical cycle.

4.7: Conclusion - The Lessons for Methodology.

In this chapter I have given a personal view of the contribution of new Keynesian economics to macroeconomics in terms of providing a sound background for both nominal rigidities in prices and wages and for the theory of involuntary unemployment. A crucial feature of this contribution is the notion of imperfectly competitive markets with price-making agents. There were two main motivations for the theory. First the empirical evidence pointing to the importance of nominal rigidities. Secondly the fact that the introduction of imperfect competition enabled us to provide a sound theoretical framework for answering several issues at once.

Until new Keynesian macroeconomics, there was in macroeconomics one ruling theoretical framework, Walrasian equilibrium and more generally price-taking behaviour[23]. However, the Walrasian paradigm cannot in principle begin to explain two crucial macroeconomic features: nominal price or wage rigidity and involuntary unemployment. It should be noted that these facts had been known for a long time.

One response was to ignore these problems, introducing nominal rigidity as some *ad hoc* add on, not itself explained by the theoretical framework (i.e. as the result of some maximising decision by economic agents). Involuntary equilibrium could then be generated as a transitory by-product of non-market clearing prices. Another response was denial. This was essentially the route taken by RBC theory: nominal phenomena were completely ignored and involuntary unemployment seen as an irrelevant theoretical construct.

New Keynesian macroeconomics, however, managed to initiate a change in paradigm that is still going on. If we take nominal rigidities and involuntary unemployment seriously then we have to abandon the Walrasian framework. The key here is to set price-making agents at the heart of our macroeconomic framework: only once we have done this can we begin the task of explaining nominal rigidities and take unemployment seriously. He importance of this theoretical innovation is how it enables us to begin the process of understanding the mechanics of wage and price determination and the corresponding quantities in a manner consistent with standard economic theory.

* I would like to thank Roger Backhouse, Kevin Hoover , Andrea Salanti and Richard Lipsey for useful discussions. Shortcomings are solely my responsibility.

[1] For surveys of this literature see Dixon and Rankin (1994) and Silvestre (1993).

[2] I have always used the concept of "involuntary unemployment" in a purely technical sense that at the prevailing wage the household would like to supply more labour. When unions set wages, people sometimes prefer to use the term "union-voluntary". I do not think that it is worth arguing over terminology. However, with efficiency wages the firm sets wages so that there is clear and unambiguous "involuntary" unemployment.

[3] This is intended as a sketch which reflects my own interpretation of events. For a more scholarly and comprehensive treatment, see Hoover (1984, 1988). Although he deals primarily with monetarist and new Classical writings, he sets them in the context.

[4] Arrow's comments were not directed at macroeconomic models. However, his reasoning applies as much to the neo-classical synthesis as it does to the Arrow-Debreu general equilibrium framework.

[5] Arrow argues that somehow in disequilibrium agents somehow gained market power that they lost when the equilibrium was re-established. This idea has never been successfully formalised to my knowledge.

[6] Of course, Walras himself based the notion of the auctioneer on the functioning of market makers in the Paris Bourse. It is one thing to think of financial or commodity markets and another to apply this to the labour market.

[7] I have discussed the Natural Rate concept in a historical and theoretical context at some length in Dixon (1995b).

[8] An archipelago is a large collection of small islands. The "island" is taken to be the individual market; the archipelago to represent the aggregate economy. The assumption is that that the individual is well informed about his own market/island, but not about the aggregate economy.

[9] This comment applies to both the "short-run" curve with given expectations, or the "long-run" version. "Inflation" should be meant to include "deviations of actual inflation form expected".

[10] In fact the RBC movement was more than that. There was also a shift in focus towards a *quantitative* explanation of the business cycle, towards business cycle empirics (of a novel nature).

[11] In Soviet Russia the price of bread was kept constant over decades, since Lenin had promised "peace and bread". The costs of price adjustment for bread producers were severe and terminal indeed!

[12] For example, if the contract maximises some Nash-product of the employees and firm's payoffs.

[13] For example, Andersen et al (1996), Benassy (1995), Santoni (1996), Aloi and Santoni (1997) amongst many others.

[14] Well, almost. The only alternative I can think of is a model with multiple equilibria. Even if something changes, the same nominal price might remain an equilibrium despite representing a real change. For examples of this, see (e.g. Bhaskar 1990).

[15] It was probably to avoid this problem that RBC practitioners sought to explain cycles by productivity shocks.

[16] In a similar vein from about the same time Fisher remarked "I would maintain that involuntary unemployment as a phenomenon still lacks…empirical support" (Fisher (1976).

[17] The labour "demand curve" is not really a demand curve, but rather the equilibrium price-cost relationship. However, I bow to conventional usage.

[18] This model has a long tradition. However, it has been used in RBC models (Hansen (1985)) since model 1 does not "work" in the RBC context (individual elasticities of labour supply are too small).

[19] I use the standard welfare measure of consumer surplus. Despite its failings, it is probably the best we have that can be measured in practice.

[20] Since is a function of W, L = L(W), a linear approximation is

$$\frac{1}{2}(L_A - L_B)(\Theta_A - \Theta_B) = \frac{L'}{2}(\Theta_A - \Theta_B)^2$$

[21] An obvious exception to this is Game Theory. Since this is inherently about strategic behaviour, it could only have been developed by people who rejected the competitive approach.

[22] Some of the papers of particular interest are Ellison, M. and Scott, A. (1998), Erceg. (1997), Kiley (1997), Jeanne (1997), all as yet unpublished.

[23] The "neo-Keynesian" economics of the 70'a based on fixed-prices dropped the assumption of supply equals demand, but kept the price-taking behaviour of individual agents.

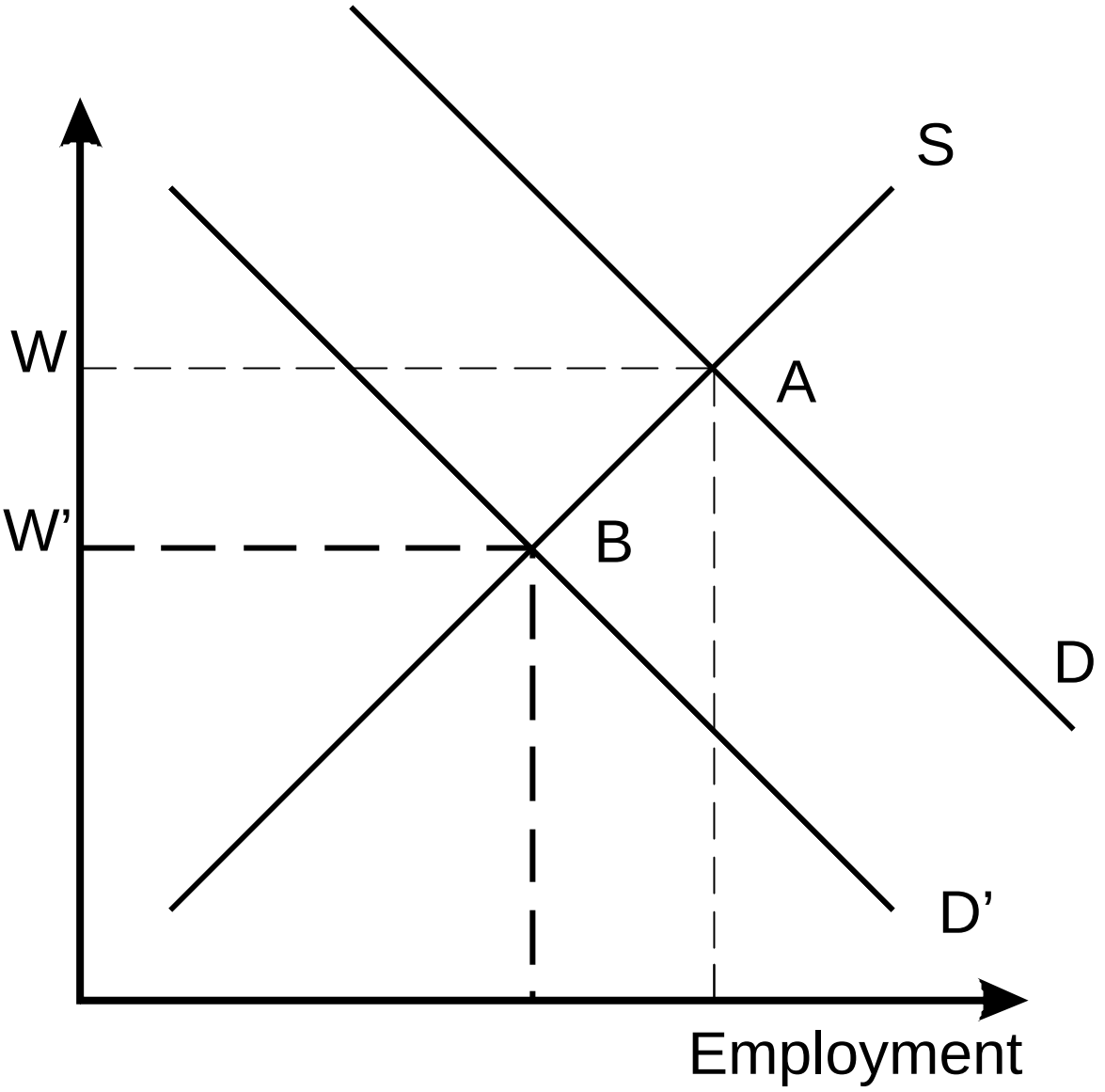


Fig 5.1. A Fall in the demand for Labour.

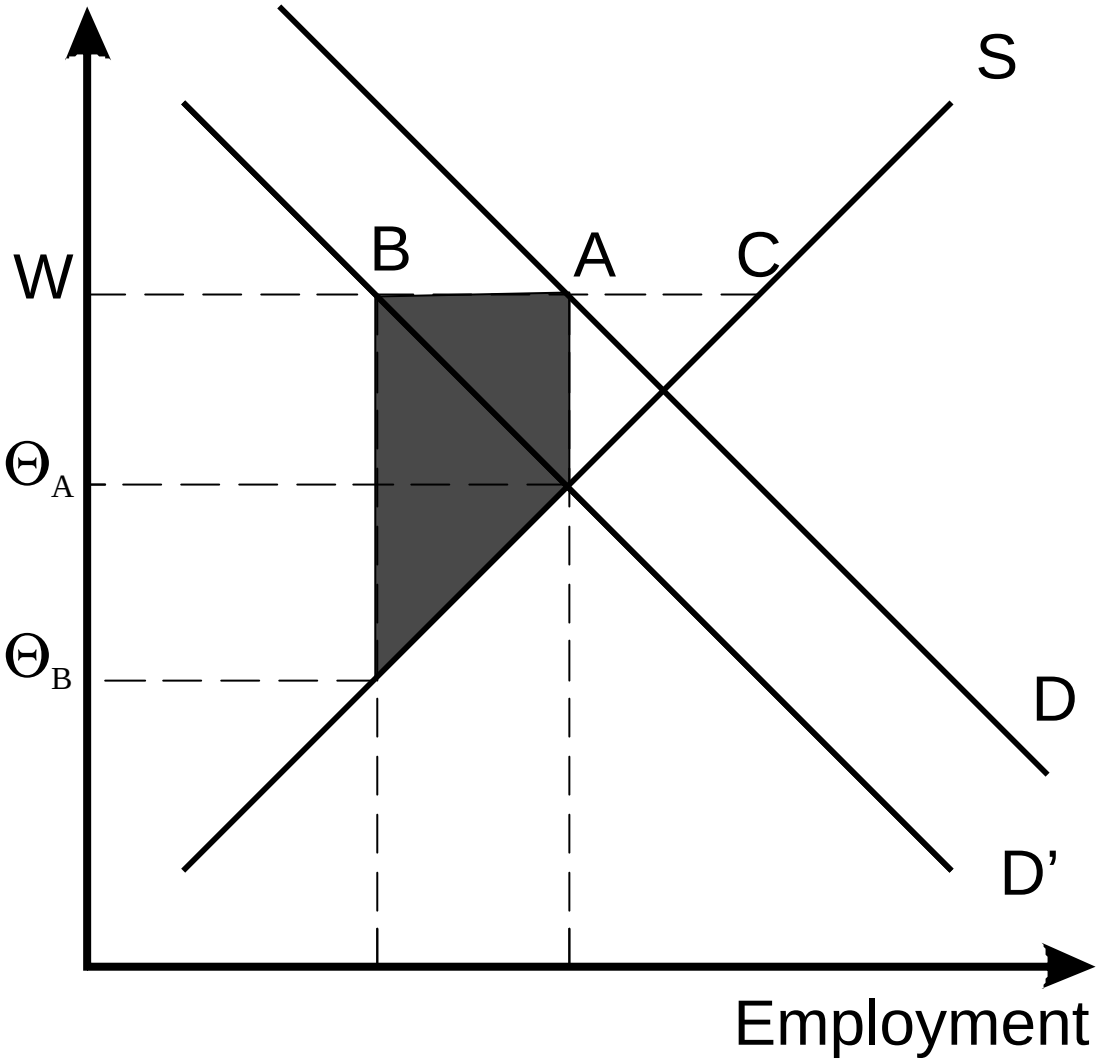


Fig 5.2.Welfare loss with a rigid wage and Involuntary unemployment

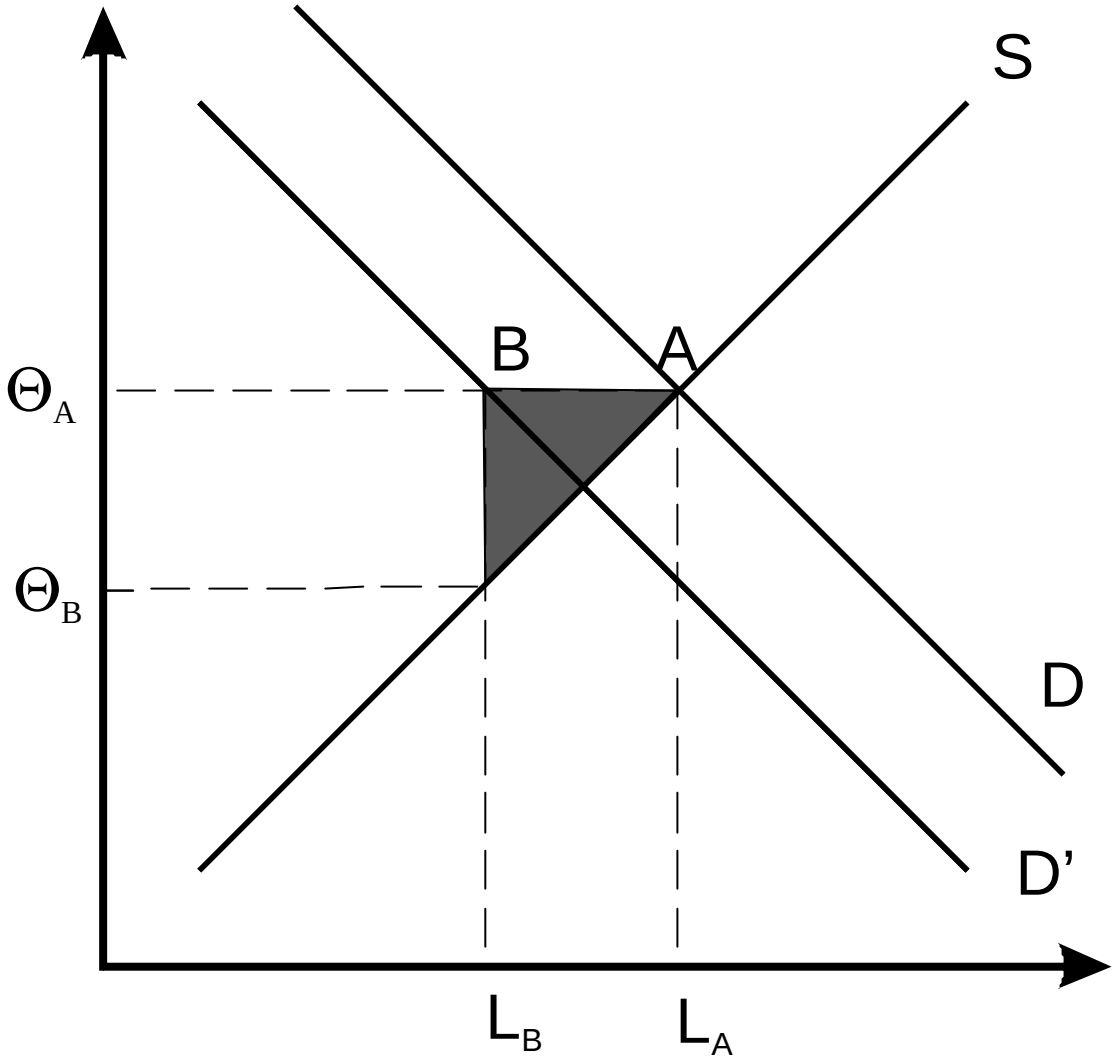


Fig 5.2. Welfare loss in a Walrasian market with rigid wage.

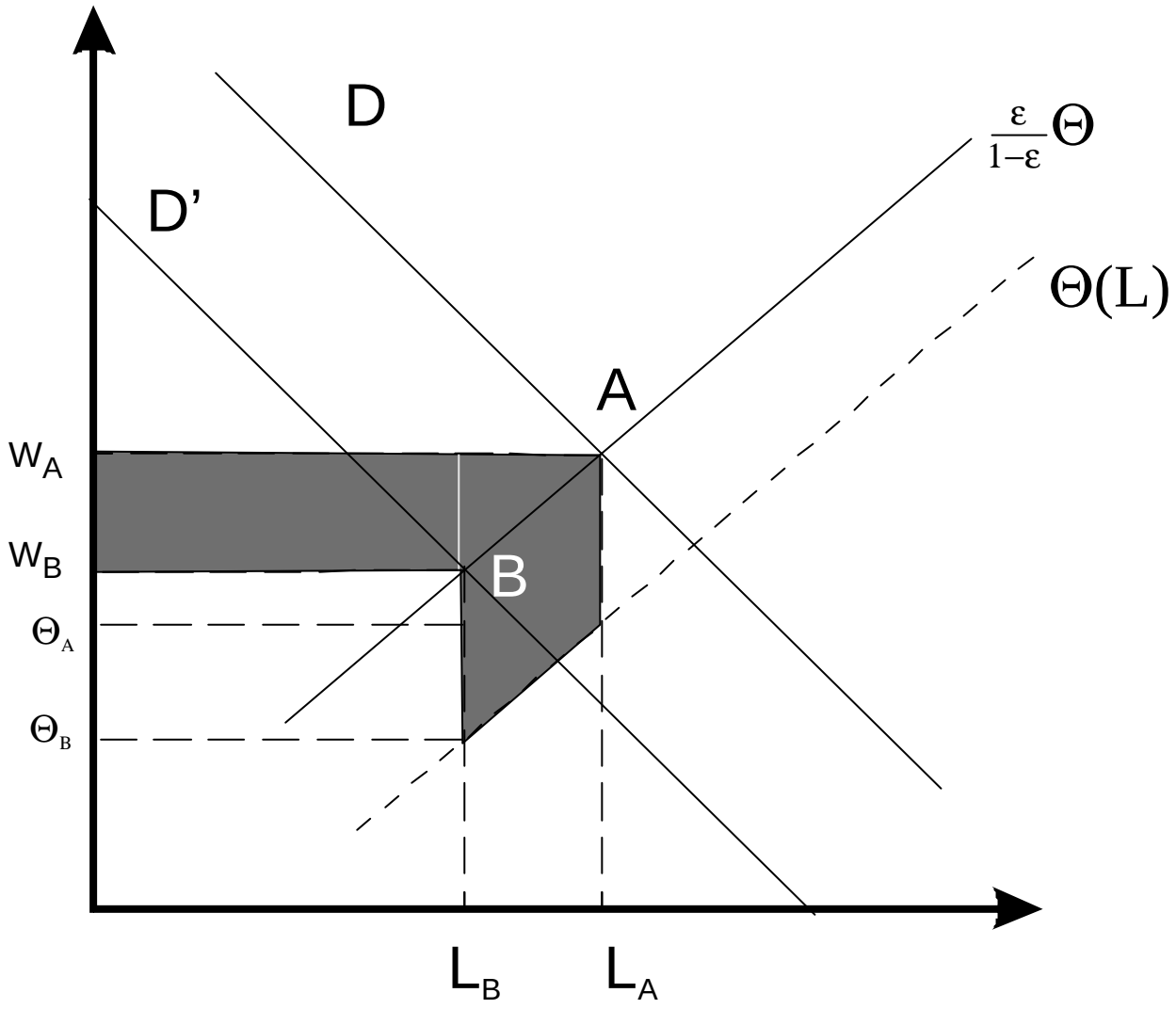


Fig.5.4 Welfare loss in a unionised Labour market.