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# Real wages in the business cycle: an unresolved conflict between theory and facts in mainstream macroeconomics<sup>\*</sup>

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## 1. Introduction: the nature of the problem

The focus of this paper is the recurring tension between mainstream macroeconomics and observed facts in relation to the difficult task of providing explanations of the business cycle consistent both with the traditional theory of income distribution and with the empirical evidence concerning the co-movements of real wages and employment over the cycle.<sup>1</sup> Tensions of a similar nature can be found also in other fields of macroeconomic analysis (as to some extent will emerge in what follows) but will not be considered in this paper.

Of course what exactly are the ‘facts’ is generally largely controversial in economic analyses and very few are accepted as such by all or even most economists. Yet, some of the ‘facts’ we shall refer to belong to this limited set. Namely, the observation that in the business cycle relatively large fluctuations of output and employment are *not* systematically associated with real wage movements in the opposite direction appears to be confirmed by a large number of empirical studies (based on aggregate or individual data) and is no longer controversial. Empirical results in other fields that will be referred to, even if they may be regarded by some economists as non conclusive, will at any rate be such that (because of the reputation of the authors or journals and/or because of the number of the studies giving similar results) they may be regarded as influential enough in the profession to have contributed to a drive towards the construction of new (classes of) mainstream macroeconomic models capable of consistency with those empirical results.

The meaning of ‘mainstream’ too needs some clarification. I take it to mean all those approaches to macroeconomics which predict a tendency of the economic system towards full employment equilibria (net of frictional unemployment) or towards the potential output, which may be lower than full employment but is the *maximum* that can be achieved given existing rigidities and imperfections.<sup>2</sup> In turn, such a tendency relies on the existence of decreasing demand curves for labour and capital (and, accordingly, aggregate investment – see footnote 19 below) derived from

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<sup>\*</sup> I certify that I have the right to deposit the contribution with MPRA. I wish to thank P. Arestis, T. Aspromourgos, F. Petri and F. Serrano for their comments on earlier drafts of this paper, while I retain the responsibility of its contents.

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<sup>1</sup> A comprehensive discussion of analytical problems and applied results on this subject was developed in Michie, 1987. For a retrospective on the debate see Dunlop, 1998.

<sup>2</sup> What is significant here is the *concept* of potential output, while its *empirical measurement* is very problematic, and ends up consisting of the average value of actual output (Palumbo, 2013)

the principle of factor substitutability, under the assumption that such a substitution will give rise to ‘well behaved’ factor demand functions.

Given these premises, the nature of the problem that will be the focus of the following critical assessment can thus be outlined. In the 1970s the rise of monetarism, in both the adaptive and rational expectations versions, involved a return to the traditional theoretical approach (as had already happened to a large extent, from a theoretical point of view, with the neoclassical synthesis)<sup>3</sup> combined with the rejection of the assumption of nominal rigidity that had characterized the neoclassical synthesis. The monetarist ‘revolution’ thus bore with it a claim to analytical rigour, understood as consistency between microfoundations (that is the traditional marginalist theory of prices and income distribution) and macroeconomic analysis and the rejection of any *ad hoc* assumptions inconsistent with those theoretical foundations.

Monetarist models hence share the traditional view that the economy spontaneously tends towards full employment (natural unemployment rate) equilibrium and also emphasize that it does so rapidly. The business cycle is interpreted as a transitory deviation from equilibrium, in which however all the ‘agents’ behave rationally – on the basis of available information – and maximize utility and profits, under the assumption of well behaved neoclassical production functions. Therefore workers and firms move along *their supply and demand functions for labour* respectively. That is, for example, in an expansion (generated by a ‘surprise’ in economic policy) firms will be moving along a decreasing labour demand function, while the workers will be moving along an increasing labour supply function. This obviously gives rise to a very thorny problem – albeit seldom openly recognized in these terms<sup>4</sup> – since it requires market signals to be interpreted in *opposite* ways by workers and firms. In addition to this already substantial difficulty, the empirical studies concerning the behaviour of real wages over the business cycle pose a further problem, since they indicate that the data are generally not consistent with the assumption that the economic system is moving along either of those curves.

In the following I intend to assess the ways in which various mainstream macroeconomic models have attempted to overcome these analytical and empirical difficulties: Monetarist analyses (section 2); Real business cycle models (section 3) and New-Keynesian models (section 4). All these approaches, which are discussed here in their foundational and distinctive aspects, contribute also, sometimes in an eclectic manner, to the construction of stochastic general equilibrium macro-models, currently widely used for macroeconomic forecasts and policy prescriptions. The last section concludes with a critical assessment and outlines an alternative approach.

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<sup>3</sup> See Roncaglia and Tonveronachi, 1985.

<sup>4</sup> See however Ackley, 1983 p. 10 and Michie, 1987, p. 18.

## 2. Labour supply and demand in the business cycle in monetarist models with aggregate demand shocks

### 2.1 Labour supply and the role of search theory in the explanation of the business cycle

On the basis of what has just been explained, monetarist macro-models must assume that the increase in employment following an aggregate demand shock reflects an increase in aggregate labour supply (usually supposed to be a positive function of the real wage); yet under neoclassical assumptions firms will be hiring more workers only if the real wage is falling. Since in the traditional neoclassical approach the individual choice concerning the supply of labour services is not constrained by the possibility of finding a job, changes in labour supply will have to reflect changes in relative prices, and particularly in the real wage. The solution suggested in monetarist models involves the existence of information problems that lead the workers to *interpret* the change in nominal wages as a change (increase, in the present example) of the real wage, although the price level is increasing (because of rising marginal costs) more than nominal wages, thus allowing firms to expand output and employment along their decreasing labour demand curves. This allows this first difficulty to be worked around, albeit not too satisfactorily, since the same objection of being an *ad hoc* assumption as had been levied against nominal rigidity (and to adaptive expectations in first-generation monetarist models) can easily be extended also to imperfect information on the price level.<sup>5</sup> Another difficulty arises however: it is generally recognized that employment varies significantly over the cycle, and this must be reconciled with an aggregate labour supply curve which, both in principle and empirically, does not exhibit a high positive elasticity to changes in the real wage. The combination of income effects and substitution effects when the real wage increases is such that it cannot be excluded that individual supply curves are backward-bending and leads at any rate to conclude that even if the aggregate supply curve is a positive function of the real wage, its elasticity is likely to be low. But with a low elasticity labour supply curve, the observed changes in employment would require a substantial increase in the ratio of the nominal wage to the price level perceived by workers. Such increases are improbable, particularly if we consider that according to the model firms increase prices more than nominal wages. This further problem has been tackled by means of two theoretical constructions, which may be complementary, as in the seminal contribution by Phelps *et al.* (1970): search theory and intertemporal labour supply. We

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<sup>5</sup> A common criticism of imperfect information concerning price changes is that it appears inconsistent with the parallel assumption of rational expectations (that is, expectations formed on the basis of all available information) since statistics regarding price levels and money aggregates are public and frequently disseminated (monthly and quarterly bulletins published by central banks and national statistical offices), while the real effects of aggregate demand shocks tend to be protracted. (Romer, 2011, p. 300)

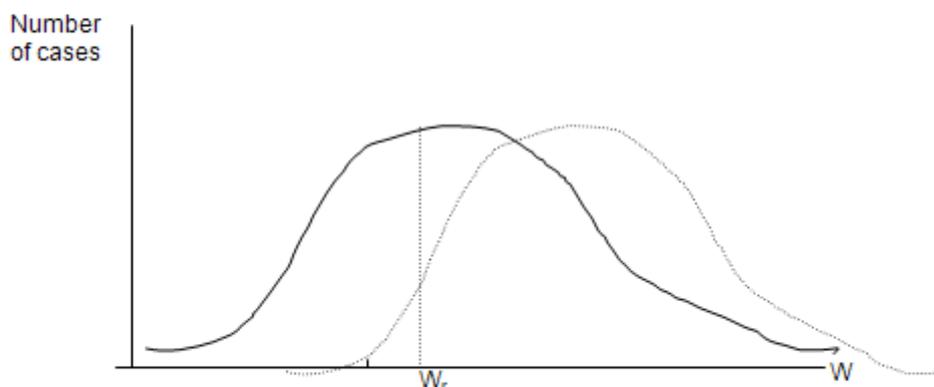
shall look here at how the first construction can be used to cope with the above difficulty, while the second will be discussed in connection with real business cycle models, in which it plays a fundamental role.

In a Walrasian world with perfect information in any given homogeneous labour market we should observe a uniform wage and no unemployed workers or vacancies. In monetarist macro-models the reasons why this is not observed lie in the existence of incomplete information on the part of workers concerning all the vacancies and associated wages, and on the part of firms concerning available workers and the wages offered by other firms. This implies that in each labour market wages are not uniform but are normally distributed around an average. In stationary conditions, as firms and workers acquire more information, wages would converge towards the equilibrium value and unemployment and vacancies would disappear; but since continuous disturbances affect the economy, such as changes in tastes and technology which lead to changes in the equilibrium wage, the convergence is never fully realized. In such conditions it is rational for workers to 'invest' a period of time - during which they remain unemployed - in a search activity aimed at collecting information and placing themselves in a good position in the existing distribution of wages. On the basis of the acquired knowledge they will determine the reservation wage, that is, the minimum wage at which they are prepared to accept a job (figure 1). The reservation wage will be such that the costs of continuing the search activity will be equal to the benefits in terms of expected higher incomes. Thus, 'search' unemployment is voluntary, and its extent essentially depends on the intensity of the shocks to the economy and on the costs of acquiring information through search, largely influenced by unemployment benefits.

In this class of models, if an expansionary policy increases aggregate demand (shifts the AD curve upwards in a AD-AS model) firms will have a larger number of vacancies and will increase their search activity. Since the latter is costly, they will find it appropriate to increase the nominal wage they offer in order to attract workers. With imperfect information: a) workers interpret increased money wages as increased real wages and b) workers do not perceive the shift of the entire distribution of wages offered by firms, hence do not change their reservation wage, which leads to a higher acceptance of job offers (figure 1) and to a reduction of 'frictional' unemployment. Unemployment however decreases only as a consequence of misperceptions: as soon as these are corrected it will return to its natural rate.

Figure 1

- Shift of the distribution of wages offered by firms, with a given reservation wage



What is of particular interest for our discussion here is that the working of the model as described above is such that employment can be increased in the cycle also by means of the contraction of the pool of the voluntarily unemployed, and hence to a greater extent than would be allowed by the movement along an aggregate labour supply curve in response to the perceived increase in real wage.

## 2.2 Empirical difficulties of search theory

A fundamental assumption in search models is that job search can be carried out more effectively by unemployed than by employed people. Otherwise, workers would accept the first job offered and then continue their search for a better position. It would appear crucial therefore to test this assumption, as suggested from the outset by Tobin (1972), who was critical of monetarist positions. The empirical studies aimed at assessing this important assumption have come up with results that actually do not fully support the model. Layard *et al.* (1991), surveying a number of studies on US and UK data conclude that: ‘off-the-job search is not typically more productive than on-the-job search’ (p. 235 and ff);<sup>6</sup> Kahn and Low (1982) find some *weak* evidence that unemployed search yields higher offers than employed search, while Holzer (1987) finds that employment status has a negligible effect on the probability of receiving an offer after checking personal and labour market characteristics, the number of search methods and the time spent on each method. Conceivably search intensity depends on employment status, but in this regard Devine and Kiefer (1991) report

<sup>6</sup> The only exception being highly qualified workers who have accepted low-skill jobs.

in their survey of an impressive collection of empirical studies that there is no direct evidence owing to lack of data (p. 302), while on the other hand there is evidence that search intensity on the part of individuals depends inversely on the unemployment rate in the relevant labour market (p. 224). A less direct way to check whether the status of unemployed is important in rendering search activity more effective is to assess the intensity of the search activities of the unemployed. Several investigations of the behaviour of the unemployed have shown that in general the actions undertaken are limited in number, and such that they could be undertaken also by an employed person (Layard *et al.*, 1991, p. 235 and ff). Finally, particularly adverse to search models is the conclusion reached by a number of empirical studies that the probability that an unemployed person will accept a job offer is close to one and accordingly the duration of unemployment actually depends on the probability of receiving a job offer (Devine and Kiefer, 1991, p. 302; Layard *et al.*, 1991, p. 242), which in turn has been found to be highly correlated with demand conditions in the labour market relevant for the unemployed (Osberg *et al.*, 1986).

Much of the empirical research based on search theory has been aimed at estimating the influence of supply side factors, particularly unemployment benefits, on individual unemployment duration.<sup>7</sup> The results obtained concerning the relation between individual duration of unemployment and the access to unemployment benefits are weak and consistent with the above-mentioned finding in other studies that the probability of refusal of a job opportunity is very low. Devine and Kiefer (1991) conclude on this point that ‘the effect of unemployment benefits...appears to be positive, but with uncertain magnitude...estimates vary across samples...also vary with the estimation techniques, and this sensitivity of results suggests specification error in modeling the effects of benefits’ (p. 304; see also Layard *et al.*, 1991, p. 249).

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<sup>7</sup> Concerning the effects of unemployment benefits on individual’s attitude towards accepting job offers a caution may be in order. Even in the case of it being an accurate description of reality that the workers who have access to unemployment benefits persist in their job search longer than workers who do not have access to such benefits, this would not necessarily imply that at a macroeconomic level the extent of unemployment would be much affected by the existence of unemployment benefits. If one adopts a theoretical standpoint different from the monetarist one, with aggregate employment solely determined by effective demand, then it would be:

$$U = N - (mA/q)$$

Where U is the number of unemployed, N is the labour supply, m is the keynesian multiplier, A is autonomous demand and q is output per worker. If we now want to take into account the existence, at any time, of labour turnover and vacancies two components of the unemployment emerge:

$$U' = N - mA/q - V$$

Where V is the number of vacancies

And a frictional component:

$$U_f = V$$

With then  $U = U' + U_f$ . In this perspective a change in workers’ behavior concerning job acceptance would only affect the frictional component of unemployment (for the sake of simplicity disregarding here the likely adverse effects on demand and employment of a cut in unemployment benefits). Even on the extreme assumption that vacancies could be reduced to zero, this would only eliminate the  $U_f$  component. But this often represents only a small fraction of the number of unemployed. To give an order of magnitude  $V/U$  in Italy according to Istat data has recently varied between 15% in an expansion year to 3% in the current recession.

### *2.3 Employment fluctuations, the labour demand function and real wage changes over the cycle.*

In macroeconomic models with neoclassical microfoundations and cycles generated by aggregate demand shocks real wages must move in the opposite direction with respect to output, otherwise, with decreasing labour marginal product, profit maximizing firms would not increase employment. Nor is it possible for firms to advocate misperception of actual changes in real wages based on imperfect information, since each firm must know the ratio between its product price and wages. This condition must be satisfied even in analyses that admit involuntary unemployment, and hence do not face the problem discussed in the previous section of explaining labour supply increases in a cyclical expansion in terms of changes in labour supply in response to wage changes, but accept the traditional labour demand curve. Accordingly the problem involves also Keynes's *General Theory*, where increases in the employment level are determined solely by changes in effective demand, yet require an increase in the price level with respect to the nominal wage. Already in the 1930s Tarshis (1938) and Dunlop (1938) had provided empirical evidence that real wages do not vary in an opposite direction with respect to output and employment. In commenting on those results Keynes (1939, p. 39-40) argued that the results obtained by Tarshis and Dunlop would be more favourable to his own conclusions than the opposite, traditional view, but was reluctant to abandon the latter solely on the basis of their results, which he did not regard as conclusive. More recently a large number of empirical studies on both aggregate and individual data carried out on the basis of greater data availability and more sophisticated methods than in the '30s, have substantially confirmed those initial findings, and there is now widespread agreement on the fact that real wages are not countercyclical. On the contrary, they are found to be either acyclical or, more often, moderately pro-cyclical (see the surveys by Brandolini, 1995; Abraham and Haltiwanger, 1995). In addition, the relation between real wages and cyclical fluctuations appears to vary over time and across countries (a result emphasized in Michie, 1987). Although there have been attempts to argue that these results would not be inconsistent with traditional microfoundations (Lucas, 1970) it appears that they have in fact contributed to undermine monetarist explanations of the cycle and to drive macroeconomic modelling in new directions: on the one hand towards real business cycle models where fluctuations are caused by technological shocks, and where real wages are expected to vary pro-cyclically, leading to significant increases in labour supply along a short period labour supply function; on the other the New-Keynesian models featuring micro-founded nominal and real rigidities.

### **3. Real business cycle models and the co-movements of wages and employment**

### 3.1 Inter-temporal labour supply

In the basic version of real business cycle models (RBC) cyclical fluctuations are entirely due to exogenous shocks in technology (or tastes) which *shift* the production function and hence *the labour demand schedule*. Empirical evidence often offered in support of this view consists of the pro-cyclical variations of productivity – an uncontroversial empirical regularity, whatever the measure chosen: Solow’s residual or output per worker or output per hour. The notion that they are related to technology shocks however has been challenged by the finding that pro-cyclical variations of productivity may be observed also when fluctuations in output are clearly caused by changes in aggregate demand as in the great depression of 1929-30 or in fluctuations associated with changes in military expenditure (Basu, 1996; Bernanke and Pankinson, 1991; Hall, 1988). The cyclical changes in productivity are thus attributed to increasing returns (Hall, 1988);<sup>8</sup> or a greater intensity in the use of fixed capital and labour, associated with a constant proportion between intermediate inputs and output (Basu, 1996); or to the existence of labour fixed costs and labour hoarding (Bernanke and Pankinson, 1991) – all these explanations being consistent with Okun’s law.<sup>9</sup>

Although the literature has cast doubt on the plausibility that shocks in technology or tastes cause the cyclical alternation between expansions and slowdowns, RBC models might at first sight appear to have some advantage concerning consistency with the evidence on pro-cyclical changes in real wages – so much so that it might be thought that the search for such consistency played a role in the development and acceptance of these models. Indeed, since technology (or taste) shocks cause a shift in the labour demand function, countercyclical wage movements are not required by the model, while the elasticity of inter-temporal labour supply (discussed below) plays an essential role in the propagation of technology shocks, and movements in the same direction of real wages and employment are therefore predicted by the model. However, even in this area the models encounter problems of consistency with the empirical evidence.

As argued above the standard aggregate labour supply curve has, in principle and empirically, a low (if any) positive elasticity and is difficult to reconcile with the assumption that workers are normally on their supply curve on the one hand and on the other with the relatively wide fluctuations in employment observed in the cycle. Inter-temporal labour supply however introduces a distinction between the long-run and short-run responses of labour supply to changes in the

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<sup>8</sup> The term ‘increasing returns’ is used in this literature to mean that the firm produces on the decreasing section of its average cost curve. The ‘returns’ are *not* therefore returns *to scale*, since some of the inputs are fixed.

<sup>9</sup> Okun (1962) established a short-run empirical relation between changes in output, productivity and unemployment, with the assumed causality clearly of a Keynesian type, running from a change in aggregate demand to changes in the same direction of output, productivity, hours worked by the employed, employment and participation rate, with a final effect on the change in unemployment in an opposite direction with respect to output, but affected also by the parallel changes induced in the variables listed above.

expected (normal) wage or to transitory wage fluctuations, respectively. The latter will be much more elastic than the former: this is so because it must be supposed that workers maximize their utility intertemporally. Accordingly, given the *expected* level of wages, it will be convenient for the workers to increase their working activity when the real wage is high, and enjoy more leisure when it is low with respect to the expected value. The unemployed are thus workers that choose to enjoy more leisure time, and a conceptual distinction no longer exists between unemployed and inactive workers. When exogenous technological shocks occur, the variation in the wage level which is perceived as transitory will have, according to the intertemporal model, a significant effect on labour supply.

### *3.2 Inter-temporal labour supply: empirical problems*

The short-run labour supply based on intertemporal substitution and originally proposed by Lucas and Rapping (1969) has not however encountered much empirical support. Altjoni (1982) finds that the estimated parameters concerning the relationship between labour supply measured in hours and real wage have a sign opposite to the one expected on the basis of the model, and argues that this is probably due to the omission of variables that are important in explaining labour supply, such as demand side constraints to workers' choices concerning hours of work. Clark and Summers (1982) find that individual decisions concerning labour force participation tend to be persistent rather than transitory. Individuals who enter the labour market during an expansion tend to remain active in subsequent periods, while those who leave the labour market in a depression tend not to re-enter. A similar conclusion was reached, using Italian data, by Leoni (1987). Ball (1990) concludes in his study of individual supply of hours of work that the sign of the parameter is the expected one only for individuals who declare that they are not constrained in their choice about how many hours they work and that are well off (which means that they do not need to become indebted when they choose to work less or not to work). However, even within this group, adult male individuals are found to have a labour supply elasticity that is close to zero and statistically non-significant (see also Altjoni 1986 for similar conclusions). It is widely accepted today that the intertemporal labour supply theory is not supported by empirical analyses. Even though some studies have found that individual real wages tend to be rather sensitive to the economic cycle, the pro-cyclical changes observed in wages are not large enough to explain the observed cyclical changes in employment as resulting from an increase in labour supply, given the generally rather low values of the estimated elasticity of the latter (Romer 2011, pp 228, 254-55).

Because of these empirical difficulties, even economists working within the RBC framework have been seeking other routes (see Ham and Reilly, 2002 and 2012 for a brief overview). Among these the most popular is the introduction into RBC models of efficient implicit contracts, which (it is claimed) allows parameters to be obtained concerning the elasticity of labour supply consistent with observed data on changes in hours of work and real wages over the cycle. Efficient implicit contracts are (unwritten) contracts that can enhance workers' utility (with respect to a 'Walrasian' labour market) without impairing profits. This is possible since they insure the workers – who are risk-averse – against fluctuations in income and consumption. The literature has shown that optimal contracts must ensure continuous full employment, but can explain fluctuations in hours if the worker can obtain an income, albeit reduced, during layoffs. The insurance implicit in these contracts smoothes wages in the face of the fluctuations in labour marginal product by allowing workers to obtain more than their marginal product in depressions, while they obtain less than the marginal product in expansions. On the other hand, it is convenient for the workers, in order to raise their expected income, to agree to work more when the marginal product of labour is high and less when it is low (Rosen 1985). In each period/state of the world  $t$ , if workers' utility is maximized by the implicit contract subject to the constraint that expected profits cannot be less than in a Walrasian outcome, the following condition must hold:

$$M_{ht} = V'(H)_t / U'(C)_t$$

Where  $M_{ht}$  is the marginal product of labour, measured in hours, in a state of the world  $t$ ,  $V'(H)$  is marginal disutility of  $H$  working hours and  $U'(C)$  is the marginal utility of consumption (under the assumption that in each state of the world  $t$  it is:  $C_t = w_t H_t$ , with  $w$  the real wage).

Since implicit contracts stabilize the marginal utility of consumption, maximization requires that when the marginal product changes hours of work change in the same direction. However, since real wages vary less than the marginal product the changes in the former cannot be taken as a measure of the latter. This would explain the fact that observed cyclical changes in wages are small compared to the fluctuations in employment. Yet once again this variant of RBC models encounters empirical problems.

One of these is that since it is assumed that consumption in each period equals the period income  $w_t H_t$ , consumption smoothing should imply that when hours increase, wages should be lower (and *vice versa*), that is, consumption smoothing requires countercyclical wages, in contrast to their observed pro-cyclical behavior (Romer 2011, p. 482). Another major problem is that marginal product is not directly observable. Thus, empirical testing of the models (that is, of labour supply

elasticity to changes in marginal product) requires that some proxy can be found. The strategies actually followed in testing the model may appear questionable; for example Ham and Reilly (2002 and 2012) chose as indicators of the cycle and hence proxies of the marginal product of labour the unemployment rates and employment growth in various occupations. They found a high elasticity of individual labour supply measured in hours to these cyclical indicators and accordingly claimed the model is successful. Yet quite evidently their result may have a different and more direct ‘Keynesian’ interpretation, i.e. that individuals are constrained in their labour supply choices by demand conditions and hence labour supply responds to changes in demand (as suggested by other empirical studies mentioned above – p 6).

Finally, these models can only deal with fluctuations in hours worked by workers who remain tied to their occupation (as in the case of layoffs) and continue to receive some income, but fail to explain the cyclical changes in labour supply of non contractualized workers.<sup>10</sup>

#### 4. New-Keynesian models

##### *4.1 The objectives of New-Keynesian economics and the role of imperfect competition*

The declared purpose of New-Keynesian models is to overcome the criticism originally addressed to the neoclassical synthesis of making *ad hoc* assumptions. They therefore seek to provide consistent microfoundations to two main propositions: A) it is possible to have equilibrium positions with involuntary unemployment; B) macroeconomic policy has real effects in the short run. The development of New-Keynesian models however can also to some extent be interpreted as an attempt to construct models that are consistent with empirical observations, including the co-movements of real wages and employment.

The New-Keynesian approach is often defined as the imperfect competition approach. However, imperfect competition in product markets does not entail major consequences concerning the system’s tendency towards full employment or the real effects of aggregate demand. With imperfect competition the price level is determined as  $P = C_{mg}(1+m^*)$ , where  $m^*$  is the mark-up determined by the elasticity of product demand for the ‘representative firm’, and  $C_{mg}$  is its marginal cost.<sup>11</sup> If labour is the only variable factor, then  $C_{mg} = W/M_h$  (where  $W$  is the money wage and  $M_h$  is the labour marginal product). Therefore it will be  $W/P = M_h/(1+m^*)$ . As represented in figure 2,

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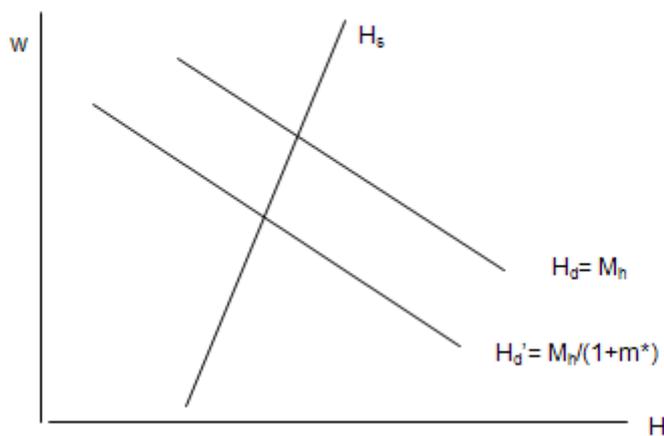
<sup>10</sup> Mankiw 1991 also notes that implicit contract models imply greater real wage cyclical volatility in less contractualized sectors, which is not evident.

<sup>11</sup> Here and in what follows I do not discuss the problems connected with deriving the *aggregate* mark-up from the mark-up in individual firms. On this see Steedman, 1992.

although the employment level in imperfect competition is lower than in perfect competition (unless labour supply is vertical), in equilibrium the workers will still be on their labour supply function, and aggregate demand can affect employment only if some assumptions are made (money illusion, incomplete information, incorrect expectations) that in the model can determine at the same time a fall in real wages and an increase in labour supply. The only role of imperfect competition in product markets is to allow firms to be treated as price makers rather than price takers, thus introducing the possibility of analyzing the price fixing behavior of firms. In order to support the above two propositions, however, some rigidity of real wages and price stickiness is needed and, as will presently be illustrated, the explanations of the two are actually interconnected. In the following I focus on those aspects of this literature that may be regarded as part of an attempt to reconcile the models with the observed movements of real wages and employment over the cycle.

**Figure 2**

- Labour demand curve with perfect and imperfect competition

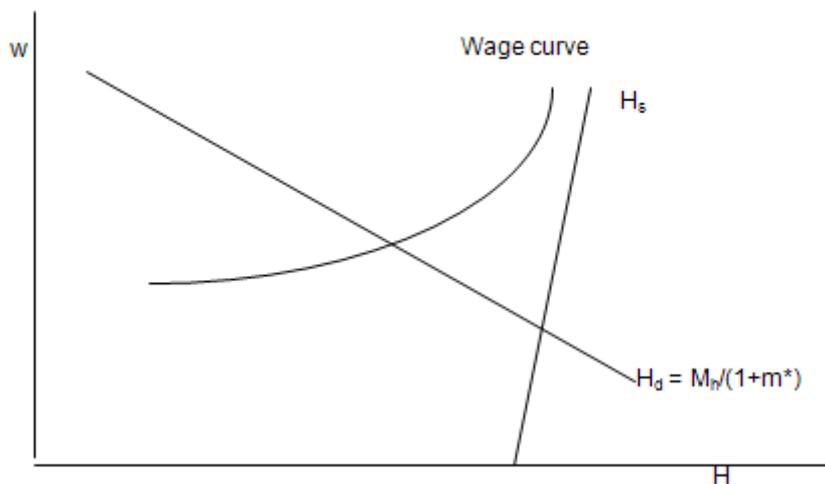


#### 4.2 Real rigidities in New-Keynesian models and labour supply

The models that provide microfoundations for real wage rigidity are aimed at supporting the possibility of macroeconomic equilibria with involuntary unemployment, and at the same time, as we shall see, they provide support for nominal rigidities and the (short run) relevance of aggregate demand. The great variety of efficiency wage or bargained wage models proposed as microfoundations for real rigidities all lead to the construction of a ‘wage curve’ which lies above of the traditional labour supply curve, is a decreasing function of the unemployment rate and an increasing function of labour market institutions such as employment protection or unemployment

benefits. A fall in the degree of employment protection or in unemployment benefits would shift the curve (see figure 3) downwards, allowing lower equilibrium unemployment.

**Figure 3**  
The labour market with the wage curve, imperfect competition and constant mark-up



According to the proponents of these models, this equilibrium is characterized by involuntary unemployment, since the unemployed workers would be available to work at the current or even at a somewhat lower wage. In addition, if the intersection with the demand curve is in the flatter section of the wage curve, as is usually supposed, an increase in employment might take place with only a very moderate increase in real wages. It is also worth noting that in contrast to what happens with the labour supply curve, such an increase here is not *required* to stimulate additional labour supply, but is something that tends to take place *as a consequence* of lower unemployment because of the latter's effect on bargaining or on the firm's incentive systems. Thus the models with real rigidity remove the constraint on the expansion of employment represented by the traditional labour supply curve, and do so in a way that appears more plausible than the short run intertemporal labour substitution hypothesis. However the equilibrium has in other respects the same features as the traditional labour market equilibrium: wage flexibility<sup>12</sup> when the economy is out of equilibrium would be able to return the economy to the equilibrium unemployment rate, and changes in aggregate demand would not be able to alter the unemployment rate for any length of time. In order for aggregate demand to affect the unemployment rate it is necessary to provide foundations for some nominal rigidity.

<sup>12</sup> When the money wage falls, prices fall too, but less than proportionally, since the marginal product of labour falls (marginal cost increases) when employment rises. Thus some decline in real wage is also needed.

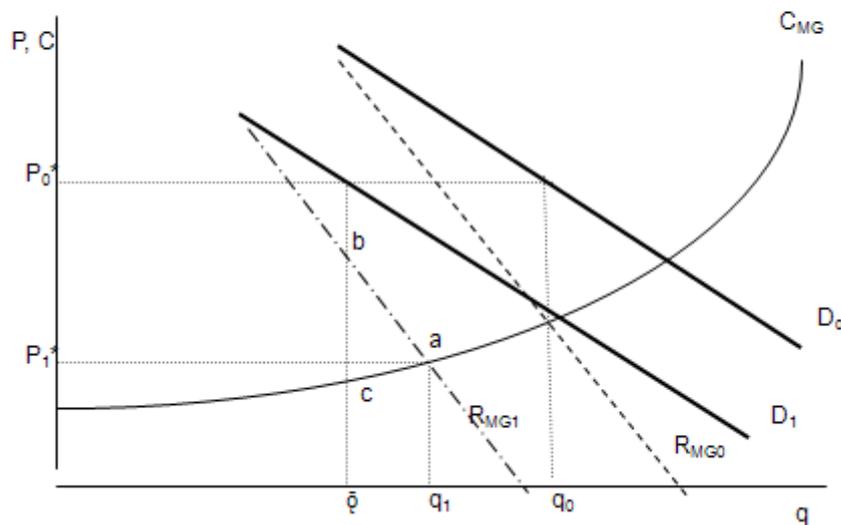
#### *4.3 Nominal rigidities, real rigidities and counter-cyclical mark up in NK models*

Even with imperfect competition and real wage rigidity, a foreseen aggregate demand change would only lead to a parallel increase in wages and prices; in order to have real effects – at least in the short run – it is required that prices do not adjust immediately to the increase in costs. There are many (perhaps too many) explanations of price stickiness. Here we consider the one based on the existence of ‘menu costs’ (that is of costs related to price adjustment) which appears to be the prevailing one in New-Keynesian literature.

The argument runs as follows: first the losses made by the firm if it does *not* adjust the price but only the quantity produced are identified; second it is claimed that if these losses are small, and smaller than the costs associated with changing the price, then it will be rational for the firm to keep the price unchanged. Figure 4 shows for a given ‘representative firm’ the product demand and marginal revenue curves for two different states of aggregate demand ( $D_0$  and  $D_1$ ) together with the marginal cost curve. The loss of profit incurred if the price is not changed when demand falls from  $D_0$  to  $D_1$  is represented by the triangle bac. This loss is smaller, the less costs change with changes in demand - that is, if the marginal cost function is ‘flat’ (for given wages) and if the cost curve is not shifted downwards by a fall in wages. However, if the change in demand depends on an aggregate demand shock, and all firms change the quantity produced (and not the price) there will be an aggregate change in the demand for labour, with consequences for nominal and real wages that would tend to increase the profit loss due to not adjusting the price. Also, if the change in aggregate demand persists, the profit losses from not adjusting the price accumulate over time.

Once the profit losses have been identified, the second step in the reasoning is to show that these losses may be small relative to the costs of changing prices. If this can be demonstrated then price inertia, at least in the short run, is rational behaviour for firms, which provides a microfoundation for nominal rigidity and the real effects of macroeconomic policy.

Figure 4. Loss deriving from non adjusting the price when demand changes



The costs of changing prices are represented by the costs associated with the need to change catalogues and inform the clients, computational costs of determining the new price, the costs of renegotiating with clients. In addition, there is the risk for the individual firm to lose its clients if it raises its price when a number of other firms are not doing so.

Empirical research on pricing behavior tends to confirm price stickiness, but at the same time shows that price adjustment is less frequent than the reprinting of catalogues, thus to some extent questioning the motivation for price stickiness provided by ‘menu costs’ (Cecchetti, 1986; Blinder, 1998, among others). Logical objections to these models have also been addressed on the grounds that automatic pricing rules, such as indexation to the aggregate consumer price index, might significantly reduce the costs of price adjustment.

After reviewing the critical arguments, Romer maintains:

‘if prices are posted and wages are paid in dollars and not continuously adjusted, individuals may come to attach significance to dollar prices and wages – and unchanged nominal price and wage may come to be viewed as the norm. The end result is likely to be that costs which in a frictionless world would be associated with changes in real prices – costs of collecting and processing information and reaching a decision, negotiation costs, costs of offending customers and employees who prefer stable prices and wages, and so on – become attached, in part, to changes in nominal prices’ (Romer, 1993, p. 18)

This is a line of argument very reminiscent of ‘money illusion’.

However, since price adjustment involves one-off costs, while profit losses from non adjusting prices persist, it has been shown that nominal rigidities are plausible only if changes in costs are

really small (Ball and Romer, 1990; Romer 1993 and 2011, p 276-78). In turn, this would not be compatible with aggregate demand shocks in which labour supply increases along a standard labour supply curve, since this would require significant changes in wage costs (causing a shift of the individual cost curves for firms). It may thus be perceived that real rigidities, which bring about the existence of involuntary unemployment in equilibrium, are also a logical necessity to provide support to ‘microfounded’ nominal rigidities

Finally, it has to be remarked that nominal price rigidity also means that firms are *not moving along their labour demand curve*, since  $P_i \neq (W_i/M_h)(1+m^*)$  entails  $(W_i/P_i) \neq (M_h/1+m^*)$ . Hence price rigidity and the associated counter-cyclical mark-ups also *allow the ‘constraint’ represented by the labour demand curve when analyzing the cyclical co-movements of employment and real wages to be removed* (Rotemberg and Woodford, 1991).

In New-Keynesian models the mark-up on marginal costs must be counter-cyclical, as a result of the combination of sticky prices and increasing marginal costs (i.e. decreasing labour marginal product). Countercyclical mark-ups may be regarded as simply the outcome of price stickiness in the face of changing marginal costs, and in this sense endogenously determined by the factors that determine nominal rigidity, so that over the cycle the actual mark-up will be different from  $m^*$ , the mark-up determined by the elasticity of product demand curves. If, for instance, prices remain fixed over the cycle, mark-up variations would exactly compensate the change in marginal costs, and the labour demand curve would as a result be horizontal, even though labour marginal product is decreasing. Alternatively, it has also been argued that the elasticity of product demand curves is pro-cyclical – among other things, because the entry of new firms would become easier in expansions, or because of the change in the composition of output in favor of industries (particularly the investment goods sector) with higher elasticity of demand during expansions (and vice versa). If this is the case, it is the mark-up  $m^*$  determined by the elasticity of demand in product markets that changes over the cycle, thus determining *shifts* in the imperfect-competition labour demand curve (Rotemberg and Woodford 1991 and 1999).

#### *4.4 Cyclical behavior of the mark-up on marginal costs: empirical evidence*

Is there any empirical evidence that mark-ups are indeed countercyclical? And if so, is it possible to distinguish between changes determined by nominal rigidity or by varying the elasticity of product demand curves?

Concerning the first question the problem that immediately arises is that, as discussed above, average labour productivity is procyclical, and hence, for a given wage rate, total average labour

costs diminish when output and employment expand. It is therefore necessary to show that marginal labour costs nevertheless are increasing and the mark-up on marginal costs falls in expansions.

The starting point for empirical investigation of the mark-up is:

$$1+m = \eta_h S_h^{-1}$$

where  $\eta_h$  is output elasticity to changes in labour input, and  $S_h^{-1}$  is the inverse of the wage share in national income. The right hand side actually represents the ratio of labour marginal product to the real wage:

$$\eta_h S_h^{-1} = (\delta Y / \delta H)(H/Y) (YP/WH) = (\delta Y / \delta H)(P/W)$$

where  $Y$  is the national income,  $H$  is the amount of labour measured in hours,  $P$  is the price level and  $W$  is the money wage. Supposing for the moment that  $\eta_h$  is constant, then the changes in the inverse of the labour share measure the changes in the mark-up, and the latter is counter-cyclical to the extent that the wage share is pro-cyclical. However, the wage share is not procyclical, but rather countercyclical, as is generally recognized and as is shown by the data in Rotenberg and Woodford (1999 , p. 110) who have made the major contributions in support of the countercyclical behavior of the mark-up. This behavior of the wage share is the natural consequence of the cyclical changes in productivity (sect 3.1 above) if not accompanied by more than compensatory changes in the real wage. In the US economy between 1950 and 1990 (the period examined by Rotenberg and Woodford 1999) the wage share tends to peak in the declining phase of the cycle (just before the trough) and to reach a minimum in the upward phase of the cycle before the peak in output. Accordingly, the correlations reported in Rotenberg and Woodford (table1, p. 114) show a negative correlation (the opposite of that desired) between the wage share and various indicators of the cycle among which are detrended GDP and detrended worked hours. Only after a lag of three quarters does the correlation become positive and it reaches its maximum positive value only after a lag of six quarters.<sup>13</sup> However, Rotenberg and Woodford point out a number of reasons why the mark up over marginal costs may in fact be more countercyclical than would appear by looking at the wage

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<sup>13</sup> Note that the duration of the cycle in terms of distance between between peak and trough in the US in the period considered by Rotenberg and Woodford and measured with one of the cycle indicators they use (Hodrick and Prescott filtered GDP) has generally been of two or three quarters (Romer, 2011, p. 190). It is therefore uncertain what one is really measuring when the lag structure described in the text is introduced. The above- mentioned duration of the cycle is specific to the particular theoretical perspective and associated method of estimation. In a survey of empirical evidence concerning business cycles in the US after the second world war, Zanowitz (1985, p. 3) wrote that: ‘they are persistent--lasting as a rule several years, i.e., long enough to permit the development of cumulative movements in the downward as well as upward direction’. According to Zanowitz the average duration of GDP contractions had been one year, and four years the overall duration of the cycle.

share. They observe that the elasticity of output to labour input  $\eta_h$  is likely not to be constant in the short run but counter-cyclical (i.e. falling when output increases) because the capital stock is fixed in the short run. They then add that the existence of fixed labour costs would cause a reduction in average labour costs, and hence in the observed wage share in an expansion (and vice versa), thus providing a distorted measure of marginal costs. Indeed if there are fixed labour costs it becomes:

$$\eta_h S_h^{-1} = (\delta Y / \delta H_v)(H_v/Y) (WH_t)/(PY) = (\delta Y / \delta H_v)(P/W)(H_v/H_t) = (1+m) (H_v/H_t)$$

where  $H_v$  is variable labour used in production, while total employment  $H_t = H_v + \hat{H}$  is the sum of variable and fixed labour. Accordingly when there are fixed labour costs the appropriate measure of the mark-up over marginal costs is:

$$(1+m) = \eta_h S_h^{-1} \{ 1/[1 - (\hat{H}/H_t)] \}$$

Where the term between curly brackets on the right hand side clearly drops when total employment increases and is thus counter-cyclical. Simple calculations show that a proportion of overhead labour of 30% would cause (with constant elasticity  $\eta_h$  and given the wage) a change in the observed wage share of -4% for each 1% increase in output and hours worked, which is the parameter used by Rotemberg and Woodford to correct the changes in  $\eta_h S_h^{-1}$ . However, the parameter is not calculated on the basis of a direct measure of overhead labour, but deduced from the estimated steady state value of the mark-up, on the basis of the reasoning that the latter is an index of the proportion between average and marginal costs, which in turn allows a measure of fixed costs (pp 16-17) to be obtained – a way of proceeding that presupposes a good deal of confidence in the fact that the model is an accurate description of reality.

As in the case of fixed costs, the existence of labour hoarding (here represented as the possibility to shift workers between maintenance and production according to the cycle) implies that the observed changes in  $\eta_h S_h^{-1}$  represent a distorted measure of the mark-up on marginal costs, and need therefore to be corrected.<sup>14</sup>

Further corrections require consideration of: i) labour adjustment costs; ii) increasing marginal wage costs for overtime work; iii) increasing wage costs of effort per hours of work – according to

<sup>14</sup> When labour hoarding is taken into account the correct measure of the mark-up is:

$$(1+m) = \eta_h S_h^{-1} [(H_v + H_m)/H_v].$$

Where  $H_v$  and  $H_m$  are labour employed in production and in maintenance, respectively, and where the square bracketed term on the right hand side is clearly counter-cyclical.

the authors this cost element might not be captured by the data when there are implicit contracts which smooth wage incomes over time (see above sec 3.2)

Empirical estimations of the cyclical changes in the mark-up are carried out only after the introduction of at least some parameters which allow the ‘corrections’ described above to be made, and the values of which are often derived from indirect procedures rather than from direct observation and measurement. As the authors remark: ‘not surprisingly, mark-ups are now much more countercyclical’ (p. 15). Yet the maximum negative value of the correlation of the mark-up with a constructed indicator of the cycle still takes place with a time lag of two quarters (p. 111).

It should be noted that average productivity (output per worker and per hour) is pro-cyclical and average labour costs are decreasing in an expansion, while it is suggested that marginal costs are increasing: this means that, if average and marginal cost curves have the usual U shape, firms must be producing an output such that they are at the same time on the downward-sloping part of the average cost curve and on the upward-sloping part of the marginal cost curve. The first condition is indeed a feature of long-run imperfect competition equilibria, but the second appears rather arbitrary. Actually, Rotemberg and Woodford argue that the marginal cost curve is not U-shaped, and on logical grounds criticize the decreasing part of the curve. The argument itself is sound and not new,<sup>15</sup> but the consequence drawn by the authors that the marginal cost curve will be continuously rising (under the assumption that machinery of different efficiency exists and will be used in a succession – p. 91, n 17) appears controversial. It is often maintained that the marginal cost curve may be horizontal, at least over a certain output range: this might be the case for example if, as is most plausible, the fluctuations in output are associated with changes in the number of hours of plant utilization. Thus, the notion that marginal costs are increasing seems rather to be rooted in the view that the economy is always, in the aggregate, close to full employment of all productive factors, which must then give rise to decreasing marginal product and increasing wage costs when output increases. However Blinder (1998), in his interview-based investigation, finds that among the prevailing motivations expressed by firms concerning why price changes are infrequent is the fact that firms do not want to antagonize their clients and generally feel ‘competitive pressures’, and also that ‘our costs do not change more often’ (p. 127). The latter motivation seems to suggest that either marginal costs do not vary very much or, alternatively, that the costs that are relevant to price

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<sup>15</sup> Sraffa, 1925, in re-examining the foundations of Marshallian cost functions argues among other things that the increasing part of the marginal product curve (hence the decreasing section of the marginal cost function) holds only if there are indivisibilities or there are costs associated with the non utilisation of the super-abundant factor. If this is not so, it will be cost-minimizing for the firm always to use the factors in the proportion which allows the costs per unit of output to be minimized. This proportion – and hence the marginal product – will remain constant till the level of production is such that one of the factors is fully utilized. Only after this point is reached will the marginal product curve of the other, variable factor decrease (and marginal cost increase)

fixing are normal, average costs, which are independent of short-run fluctuations in output, as is maintained in the full cost pricing literature (Coutts, Godley and Nordhaus, 1978)

Thus, to sum up the cyclical behavior of mark-ups on marginal costs: the methods used in empirical analyses tend to introduce parameters that contribute to countercyclical outcomes and that are not in many instances based on direct estimation, while the cyclical behavior of marginal costs is not analyzed directly (however Hall, 1988, who attempts an estimate of marginal costs in a neoclassical framework, concludes that they are not increasing). Notwithstanding, the econometric studies as yet have not produced any conclusive results. While Rotemberg and Woodford (1991, 1999), among others, find that mark-ups are countercyclical, there are also a number of studies that come to different conclusions. The differences in results appear to be independent of whether the mark-up is calculated on marginal direct labour costs only, or instead intermediate input costs are also taken into account. Domowitz *et al.* (1988) using US data find that mark-ups have different cyclical behaviors according to the sector, but are in most instances pro-cyclical; Macallan *et al.* use the same estimation procedures as in Rotemberg and Woodford 1999 with UK data, but find that mark-ups are pro-cyclical; with a different estimation procedure, still on UK data Haskel *et al.* (1995) also find pro-cyclical mark-ups; Neckarda and Ramey (2010) using US data find that the mark-up is a-cyclical, J. Marchetti (1999), on Italian data, finds that there is diversity among sectors, with a significant number of industries where the mark-up is a-cyclical. Thus, countercyclical behavior of the mark-ups does not appear to be an outstanding empirical regularity of economic cycles.

Now moving briefly on to the question of whether it is possible to distinguish empirically between ‘endogenous’ changes in the mark-up that simply result from price stickiness, and changes that are due instead to changes in the elasticity of product demand curves over the cycle, which produce shifts of the demand curve and may therefore be regarded as mechanism propagating aggregate shocks, the attempt made by Rotemberg and Woodford (1999) to discriminate between these two phenomena produces results so paradoxical that the authors conclude *there must be* ‘large errors’ in the statistics concerning wages and the wage share (and chose therefore to use constructed indicators in place of statistical data, p. 61). The findings are nevertheless extremely sensitive to the specification of the model, according to which autonomous variations of the mark-up either have no role in cyclical fluctuations, or can instead explain about 90% of output changes (pp 63 and 67).

## **5. Conclusions: state of the art in mainstream macroeconomics and outline of an alternative.**

Economists willing to emphasize the positive contribution of mainstream macroeconomics might argue that the discipline proceeds in a truly scientific manner, since empirical tests and findings lead to some of the models being abandoned and new ones developed in search of greater consistency with empirical observation, thus enhancing our knowledge.

The developments that have been assessed above however perhaps suggest a different, less favorable evaluation, namely that contemporary macroeconomics has become entangled in an unresolved conflict between the attempt to be consistent with its marginalist (neoclassical) analytical foundations and ‘realism’ – understood as consistency with the findings of applied research.

As Lindbeck observed: ‘Indeed the development of macroeconomic theory in recent decades may to a considerable extent be seen as a long and cumbersome attempt to escape the “tyranny” of the downward sloping labour-demand curve and hence also to overcome the classical dichotomy’ (1998, p 171). The attempts to reconcile the facts with traditional theory have led to the continuous introduction of specific and arguably *ad hoc* hypotheses, in sharp contrast with the search for greater theoretical rigour that had been claimed to be the inspiration for the development of all the various streams of macroeconomic modelling subsequent to the neo-classical synthesis. Thus, in this respect the judgement expressed by Romer about the New-Keynesian models, that is, ‘they are so flexible that they are extremely difficult to refute’ (2005, p 338), appears well suited to all streams in macroeconomic modelling, with the exception of those versions that we might define as the base-models which closely reflect the neoclassical foundations without (many) additional assumptions, such as the monetarist and RBC models. These however, as we have seen, are unable to come to terms with the observed co-movements of employment and real wages over the cycle (which of course does not exclude that other problems may be encountered in other areas). In addition, the specific assumptions introduced in the models to render them more consistent with empirical observation, or their implications, are in turn in most cases contradicted by subsequent empirical research, or, at best, not confirmed by results that turn out to be contradictory and non conclusive.

Indeed one could argue that contemporary macroeconomics is like Ptolemaic astronomy before its abandonment, seeking to reconcile the geocentric view with an increasing number of ‘anomalous’ observed facts. The difficulty in keeping together in a simple and consistent framework theory and facts may be linked, in contemporary mainstream macroeconomics as in the old Ptolemaic astronomy, to the erroneous theoretical premises – that is, in the case of macroeconomics, to the logical difficulties of the notion of decreasing factor demand curves. These

difficulties emerged during the controversy over marginalist capital theory (Sraffa, 1960, Pasinetti 1966, Garegnani 1970 and 2012), which brought to light that cost-minimizing choice of technique does not necessarily imply a decreasing relation between a factor rate of return and its demand. On the other hand, the difficulties that have been the focus of this paper concern the analysis of economic fluctuations, and hence particularly short period factor demand curves. Even apart of the criticisms to marginal capital theory, the notion of decreasing factor demand curves *in the short run* – which appears so difficult to reconcile with observed facts - is analytically very fragile, as acknowledged even by the founders of the marginalist approach. A through discussion of this lies outside the scope of the present work and would need a separate treatment,<sup>16</sup> but it may be worth considering the view originally held on the subject by Hicks:

“...a rise in the marginal productivity of labour with constant wages...does not necessarily lead employers to expand their demand for labour at once. Similarly, the fact that the employment of certain men has become less advantageous does not always lead to an immediate contraction in the demand for labour ... The principal reason for this ‘lag’ is to be found in the fact that one of the cooperating factors - capital – is, at any particular moment, largely incorporated in goods of a certain degree of durability ... if the capital is at present invested in durable goods, the change in conduct which follows from the change in relative profitability cannot immediately be realized...only a small portion of the total supply of capital is ‘free’ – available for investment in new forms – and that in itself may make very little difference to the demand for labour. ... Since the whole conception of marginal productivity depends upon the variability of industrial methods, little advantage seems to be gained from the attempt which is sometimes made to define a ‘short period marginal product’ ... It is very doubtful that this conception can be given any precise meaning which is capable of useful application” (Hicks, 1932, pp 19-21)

In this perspective then the problem should not be seen in terms of the existence in economics as a discipline of a tension between ‘rigour’ and ‘relevance’, as has sometimes been suggested (Blaug, 2009), but in terms of flawed foundations of the dominant economic theory, that quite naturally are reflected in the difficulty it encounters in explaining observed phenomena.

It may be wondered why, despite the difficulties of short run factor demand curves, much contemporary macroeconomic analysis has been so keen to argue that the adjustment towards equilibrium tends to be very fast (in the monetarist approach) or that it is possible to analyse the economic cycle as the result of fluctuations in the equilibrium position itself (in RBC models). This might be due to the difficulties of the dominant theory in its contemporary version to incorporate

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<sup>16</sup> For critical discussion of short run labour demand curves see Petri 2004, pp 29-30; 295-304

processes of gradual adjustment taking place out of equilibrium;<sup>17</sup> or, as it has been argued, to the fact that a time-consuming adjustment towards equilibrium would *by itself* (that is, even conceding well-behaved factor demands) undermine the proposition, common in mainstream macroeconomics, that effective demand is irrelevant for investments and long run economic growth (Petri, 2013).

Non mainstream developments in economic theory may offer an alternative approach that appears quite consistent with many of the ‘stylized facts’ concerning the economic cycle that have been discussed so far, and can fill the void left by abandoning the flawed foundations of mainstream theory. The main pillars of such an alternative, which can be recalled here only in its most general lines, are the theory of output (both in the short and in the long run) based on the principle of effective demand, combined with the revival of the theory of value and distribution of the classical surplus approach.<sup>18</sup>

To illustrate this we may recall Keynes’s own reaction to the findings by Dunlop (1938) and Tarshis (1938) concerning the changes in the same direction of output, employment and real wages over the cycle:

[...] my own readiness to accept the prevailing generalisation [...] was much influenced by an a priori argument [...] The supposed empirical fact, that in the short period real wages tend to move in the opposite direction to the level of output, appeared, that is to say, to be in conformity with the more fundamental generalisations that industry is subject to increasing marginal cost in the short period, that for a closed system as a whole marginal cost in the short period is substantially the same thing as marginal wage cost, and that in competitive conditions prices are governed by marginal cost; [...] I now recognise that the conclusion is too simple, and does not allow sufficiently for the complexity of the facts. [...] *That I was an easy victim of the traditional conclusion because it fitted my theory is the opposite of the truth. For my own theory this conclusion was inconvenient, since it had a tendency to offset the influence of the main forces which I was discussing and made it necessary for me to introduce qualifications, which I need not have troubled with if I could have adopted the contrary generalisation favoured by Foxwell, Mr. Dunlop and Mr. Tarshis.* (Keynes, 1939, p. 39, emphasis added)

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<sup>17</sup> Contemporary mainstream macroeconomists claim that the theoretical foundations for their models is general equilibrium theory. This theory however has undergone a profound change over time from having as its object the determination of long-period equilibria in which the composition of the capital stock was determined endogenously in order to satisfy the uniform profit condition, given tastes, technology and endowments (the capital endowment being represented by a single magnitude whose physical form could change in the process of adjusting towards equilibrium), to the present situation in which the equilibria are instantaneous or intertemporal, and in which the physical composition of the capital stock is given exogenously and is among the data that determine the equilibrium outcome. In the latter framework trading at non-equilibrium prices would involve changes in the data (the physical composition of capital) and therefore of the equilibrium outcome itself. (See Garegnani, 1976; Petri, 2004).

<sup>18</sup> See Eatwell and Milgate 1983 and Garegnani 1992 for seminal contributions along these lines and Petri 2004 pp 309-323 for a summary of the main arguments.

This reply shows Keynes believed his conclusions about the role of effective demand in determining employment and output would be made stronger if the traditional apparatus based on labour demand curves could be abandoned. Today not only does a much larger amount of evidence confirm the initial findings by Dunlop and Tarshis, but there are also analytical reasons, mentioned above, to question the conclusion that the principle of substitution between production factors is a sound basis for deriving decreasing demand functions for labour and capital (and hence investments), thus undermining traditional theory as a whole. As Keynes had already seen, this strengthens the role of effective demand in determining output and employment with a given productive capacity, since endogenous adjustment mechanisms bringing effective demand into line with the output corresponding to the full utilization of capacity and labour can no longer be envisaged, even under the assumption of full flexibility of prices, wages and interest rate (Eatwell and Milgate, 1983).<sup>19</sup> In addition to the fact that not necessarily at any point in time will firms be operating at the desired level of utilization of capacity, a further consequence of the independence of demand from capacity is that firms will normally expect fluctuations in product demand and it will be in their interest to be able to face the peaks in order to satisfy their clients (Steindl, 1952, Ciccone, 1990, among others). As a consequence, it will generally be the case that installed capacity, even when utilized to the degree originally programmed by firms, will allow an increase in production if there is an increase in demand. For both reasons then, there are no grounds for believing that marginal costs (with given wages) are *necessarily* increasing with output.

In this perspective, increases in the employment level would not require a fall in real wages, and would essentially depend on effective demand. On the other hand, with regard to labour supply, since there is no endogenous tendency of the system towards full employment, there is also no reason to wonder why increases in effective demand can easily be met by increased production and employment, since there will normally be labour ‘reserves’ in the economy represented by explicit and disguised unemployment and underemployment. This will not *necessarily* require increases in wages, although the latter may result as a consequence of increased employment.

Concerning this last point it is important to emphasize that the abandonment of the theory of output and distribution based on factor demand curves entails a separation between the determination of output and employment on the one hand and the determination of distribution on

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<sup>19</sup> Even conceding to traditional theory that over- or under-utilization of capacity would give rise to inflation or deflation, and that the ensuing changes in the proportion between money supply and the price level would cause changes in the interest rate, this would not be able to determine an adjustment of effective demand to capacity output since, without a decreasing demand schedule for capital, there no longer exists a solid foundation for the decreasing investment function (see Petri, 2004, chap. 7, for a detailed discussion). Note that, in addition, the relationship between rate of interest and aggregate investments has not been confirmed by empirical analyses (Chirinko, 1993; Blinder 1997, p. 240). On the other hand, the adjustment based on the so-called Pigou effect or real balance effect is not reliable (Patinkin, 1987).

the other. Income distribution can be regarded as the result of acquired living standards and the bargaining position of the parties, in turn affected both by labour market conditions and the institutional set-up – as increasingly recognized also in mainstream literature.<sup>20</sup> In this perspective, it is likely that a fall in the unemployment rate, either in the cycle or on average over longer periods of time will have a positive effect on nominal and real wages, owing to the improvement in the bargaining position of the workers (see for example Levrero and Stirati, 2006; Stirati, 2011a), but also that the existence and strength of this effect will largely depend on the specific social and institutional condition of the period and country under consideration (as pointed out in Michie, 1987). If the increase in wages relative to productivity brings about a change in income distribution, the effect on employment will depend on its consequences for effective demand. From this point of view, a change in income distribution favourable to labour may generally be expected to have positive effects on output, since it tends to determine an increase in the propensity to consume.

Thus, the ‘puzzle’ of the co-movements of wages and employment over the cycle appears to be such only from a mainstream perspective, while the observed empirical regularities fit quite naturally into an analysis of the cycle and the general working of the economic system centred around the principle of effective demand and the explanation of income distribution based on the bargaining strength of the parties and the role of institutions.

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<sup>20</sup> In the non-orthodox perspective however, institutions (such as legal minimum wages, trade unions agreement, unemployment benefits, or social norms) setting limits to wage competition do not represent a ‘distortion’ or an interference with market forces understood as labour demand and supply functions, but on the contrary represent the *necessary way of functioning of the market*, when decreasing demand functions for production factors and the consequent tendency of the economic system to full employment (or to potential output) are not assumed. This is so because unlimited competition over wages, being unable to bring about increased employment, would turn out to be economically and socially destabilizing and destructive. (Garegnani 2007; Levrero 2011; Stirati 1992 and 2011b).

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