

Involuntary unemployment, macroeconomic policy, and a behavioral model of the firm: Why high real wages need not cause high unemployment

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Abstract

The perspective of modern macroeconomic theory, be it new classical or old and new Keynesian, is that unemployment can be reduced only if real wages are cut. The modern Keynesians, basing themselves upon the microfoundations of efficiency wage theory, argue that real wages cannot and will not be cut by firms for efficiency wage reasons. This generates involuntary unemployment based on a market coordination problem. A behavioral model that contrasts with efficiency wage theory is presented here which suggests that reducing real wages need not affect the marginal cost of labor and, therefore, the number of individuals employed. In the behavioral model, wherein there exists some linearity in the relationship between real wages and working conditions and labor productivity, a lower real wage rate is not a necessary condition for reducing the unemployment rate nor is a higher real wage an obstacle to reducing it. In this scenario, unemployment, to the extent that it is demand-side induced, is not related to movements in real wages. Therefore, restoring full employment after a negative demand shock becomes a matter for demand management, not demand management that must be coordinated with measures designed to reduce real wages.

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1. Introduction

A common denominator running through the spectrum of modern macroeconomic theory, be it the new classical or old and new Keynesian, is that unemployment can be reduced only if real wages are cut and that relatively high rates of unemployment are a function of relatively high real wage rates. The key philosophical distinction between the new classical and Keynesian economics is that for the new classicals unemployment is voluntary whereas for the new Keynesians it is largely involuntary.¹ The new Keynesian theorists, basing themselves on Keynes' own foundation

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¹ See Mankiw (1993) for a summary of the new Keynesian literature. See Greenwald and Stiglitz (1993); Tobin (1993) for a critical review of the same. See Blinder (1997); Solow (1980), Tobin (1972, 1992, 1993) representations of traditional Keynesian perspective. For a post-Keynesian critique of the latter see, for example, Brothwell (1997); Darity (1987–1988); Darity and Horn (1982–1983); Darity and Young (1995), Davidson (1983b, 1998). The new classical position that unemployment, whatever its measured rate, is typically voluntary is presented, for example, in Friedman (1968) and Lucas (1977, 1981).

contribution to the literature, argue that real wages must be cut in the short run (plant size and technology are held constant) for unemployment to fall. A reduction in real wages is a necessary condition for increasing the level of employment and, thereby, the rate of unemployment. This can be done most efficaciously through a mild inflationary process and such cuts would be acceptable to workers at large in a world where prices are sticky downwards (Akerlof, 2002; Akerlof et al., 1996, 2000; Fortin, 2001). Thus, for the new Keynesians, a key explanatory variable to persistent high rates of unemployment and to increasing unemployment rates, is the downward stickiness of real wages. The post Keynesians, on the other hand, focus on increasing aggregate demand, *implicitly* assuming that real wages will fall, as need be, in the process of demand-side expansion—the dynamics of necessary real wage adjustments are largely ignored in this discourse. The new classical economists reject the assumption that workers would accept any such real wage cuts, thereby maintaining, voluntarily, the prevailing macroeconomic rate of unemployment.

A behavioral model presented in this article suggests that changing real wages need not affect the marginal cost of output over a range of wage rates through its effect upon effort inputs and, in the longer term, upon technical change. The behavioral model, therefore, suggests that the production function is not determined independent of real wages or working conditions in the firm, as it is in its traditional rendering. In this scenario, reducing real wages is not a necessary condition for increasing employment. Nor need increasing real wages be a supply side obstacle to increasing employment. In this scenario, unemployment, to the extent that it is demand-side driven, need not be related to movements in real wages. Therefore, restoring full employment after a negative demand shock becomes a matter for demand management, not demand management that must be coordinated with measures designed to reduce real wages. Moreover, in this scenario, maintaining an adequate level of aggregate demand becomes a necessary condition for maintaining low levels of unemployment. Demand management is also modeled as a corollary to increasing the efficiency of labor. In other words, a dynamic dialectical relationship is established between increasing and high real wages, increasing and high levels of economic efficiency, demand management and the rate of unemployment. From this perspective, on the supply side, more attention need be placed on increasing the level of economic efficiency as opposed to reducing real wages. On the other hand, increasing efficiency, without corresponding increases in aggregate demand will generate increasing rates of unemployment.²

Which economic theory is used to design macroeconomic policy is critically important. Measured unemployment remains high and is, indeed, now much higher than it was on average in the first decades following the Second World War. Table 1 presents unemployment rate estimates for 20 advanced market economies for the 1950–2003 time-frame. Average unemployment has increased from 3% in the 1950–1973 period (pre-oil shock), to 5.5% in the 1974–1983 period, to 8% in the 1984–1993 time-frame. At least for the first few years of the new millennium the unemployment rate was 6.2%. From the mid-1970s, governments in these economies by and large pursued relatively tight macroeconomic policy being largely concerned in the post-1973 period with inflationary pressures as opposed to unemployment, with the underlying belief that real wage inflexibility played and continues to play a pre-eminent role in maintaining the relatively high rates of unemployment (Eatwell, 1997; Lombard, 2000; Maddison, 1984, ch. 6; Michie and Wilkinson, 1994; Tarling and Wilkinson, 1997).

The gist of this paper is to improve the standard modeling of the causes of involuntary unemployment by introducing alternative assumptions contained in a behavior model presented here, that wages and working conditions impact upon the production function. The framework for this discussion is the macroeconomic demand model contained in the standard IS-LM framework and in the post-Keynesian rendition of Keynes' work and the macroeconomic supply model contained in the neoclassical production function parlayed into the labor market. Particular attention is paid to the importance of supply side factors in these models, specifically real wages, as a constraint to demand side efforts to reduce the rate of unemployment.

2. Keynes and the real wage rate

Since Keynes provided the foundational work for active and effective demand side management of the economy as it relates to determining the level of employment, for the many varieties of Keynesian economics that

² We are not concerned here with the important issue of wage flexibility as it pertains to shifts in the demand for labor across an economy's many labor markets due to structural change or changes in consumer tastes. In this case, wage flexibility relates to movements in wages about some average to accommodate relative shifts in supply and demand across product markets. This is not the same wage flexibility issue addressed in the macroeconomic discourse on the average flexibility of real wages to accommodate changes in aggregate demand across all labor and product markets.

Table 1
Unemployment in selected advanced market economies

	1950–1973	Rank	1974–1983	Rank	1984–1993	Rank	1994–2003	Rank	2001–2003	Rank
Netherlands	2.2	8	7.3	14	8.9	13	4.3	5	3.0	1
Switzerland	0	1	0.4	1	1	1	3.4	1	3.7	2
Norway	1.9	5	2.1	4	4.1	5	4.2	4	4.0	3
Austria	2.6	12	2.3	6	3.5	4	4.1	2	4.1	4
Ireland	5.2	19	8.8	19	16.1	19	7.9	13	4.3	5
Denmark	2.6	11	7.6	16	7.8	11	5.5	7	4.9	6
United Kingdom	2.8	13	7	12	9.6	15	6.5	10	5.0	7
New Zealand	0.2	2	1.9	2	6.8	9	6.3	9	5.1	8
Sweden	1.8	4	2.3	5	3.2	3	7.4	11	5.1	9
Portugal	2.4	9	6.5	11	6.1	6	5.8	8	5.2	10
Japan	1.6	3	2.1	3	2.5	2	4.2	3	5.2	11
United States	4.6	17	7.4	15	6.4	8	5.1	6	5.5	12
Australia	2.1	7	5.9	10	8.4	12	7.4	12	6.4	13
Belgium	3	15	8.2	18	9.6	14	8.5	15	7.4	14
Canada	4.7	18	8.1	17	9.6	16	8.4	14	7.5	15
Germany	2.5	10	4.1	8	6.2	7	8.6	16	8.6	16
France	2	6	5.7	9	10	17	10.5	18	8.9	17
Italy	5.5	20	7.1	13	11.1	18	10.6	19	9.0	18
Greece	4.6	16	3.2	7	7.6	10	10.2	17	10.2	19
Spain	2.9	14	9.1	20	19	20	14.6	20	11.1	20
Unweighted average	2.8		5.4		7.9		7.2		6.2	

Notes and sources: the unemployment estimates are from OECD (2000, 2004), and Maddison (1995).

have developed over the last five decades, it is of some immediate importance to garner an appreciation of his theoretical perspective on the causal relationship between real wages and the level of employment. Keynes accepts the traditional world view that labor productivity is subject to diminishing returns and that diminishing returns occur incrementally as labor inputs increase in the short run. In this scenario, a reduction in demand results in an increase in the marginal product of labor and, in equilibrium, an increase in the real wage. On the other side of the coin, for increasing demand to generate an increase in employment requires a fall in real wage rates, restoring the real wages to its pre-demand reduction level.³ Related to this point are the two definitions of involuntary unemployment put forth by Keynes, which he deems to be substitutes. It is important to first note that involuntary actually refers to unemployment that, in the first instance, is a direct consequence of deficient aggregate demand.⁴ The first definition is (Keynes, 1936: p. 15): “Men are involuntarily unemployed if, in the event of a small rise in the price of wage-goods relative to the money-wage, both the aggregate supply of labor willing to work for the current money-wage and the aggregate demand for it at that wage would be greater than the existing volume of employment.” In this scenario, for employment to increase as aggregate demand rises requires that real wages fall. The decline in real wages is caused by an increase in the price of wage-goods, which, in turn, is a product of an increase in aggregate demand. His second definition for involuntary unemployment is actually a definition for full employment. Of course, at less than full employment, involuntary unemployment exists. Full employment exists when (Keynes, 1936, 26): “...aggregate employment is inelastic in response to an increase in the effective demand for its output.” The latter condition is met when workers resist cuts to real wages as aggregate or effective demand increases.

This point is clarified by one of the summary propositions of the general theory, as specified by Keynes (1936: p. 29): “(6) For every value of N [employment] there is a corresponding marginal productivity of labour in the wage-goods industries; and it is this which determines the real wage...N cannot exceed the value which reduces the real wage to equality with the marginal disutility of labor.” We have involuntary unemployment as long as workers are willing to accept cuts to real wages, determined by the production function, which coincide with increases in

³ Hamilton (1942, 1952) makes the case that long term economic development requires inflation so as to cut real wages, thereby increasing the long run profitability of investment.

⁴ For a critical review of Keynes’ definition of involuntary unemployment see Darity and Goldsmith (1997).

aggregate demand (Keynes, 1936: pp. 289).⁵ For Keynes, the essence of the general theory (1936: pp. 29, 30) is contained in his proposition (5), whereby aggregate demand drives the system with regard to determining the level of employment while real wages accommodates and adjusts to changes in demand. Involuntary unemployment is in the first instance a product of deficient aggregate demand, not of real wages being too high. Nevertheless, the real wage rate plays a determining role in achieving higher levels of employment, given Keynes' acceptance of the classical assumption of a diminishing marginal product of labor.⁶

Once workers are no longer willing to accept real wage cuts, full employment is achieved and further increases in aggregate demand, accommodated by increases in the supply of money, will result, in equilibrium, in proportional increases in wages and prices, leaving real values, such as real wages, employment, and real output unaffected (Keynes, 1936: pp. 289). Such a scenario is one that, Milton Friedman (1968), the founder of the new classical economics, maintains is typical. Increases in effective demand cannot change real values, inclusive of real wages, employment, and output, in any permanent sense. Friedman writes (1968: p. 8): "At any moment of time, there is some level of unemployment which has the property that it is consistent with equilibrium in the structure of real wage rates." This rate of employment will be realized without any active efforts on the part of government to affect aggregate demand. It is implicitly assumed that any existing level of unemployment is the equilibrium or 'natural' level.⁷ And this is so following from the assumption that efforts to reduce the level of unemployment through demand management serves to increase the real wage above the marginal product of labor at the new higher level of employment. In other words, nominal wage rates are assumed to increase at a faster pace than the price of wage-goods. Thus, it is assumed, that workers will typically resist the cuts to real wages required to increase employment given the production function. To increase employment further, that is to reduce the natural level and rate of unemployment requires, according to Friedman (1968: p. 9), the reduction or elimination of minimum wages and the weakening or elimination of labor unions, which would allow market forces to drop real wages to a level consistent with a higher level of employment. The natural rate can also be reduced, given the real wage, by improving employment exchanges, information of job vacancies and labor supply, and the like. Keynes, of course, argues that we would not know what the equilibrium unemployment rate is until we experience it; until through demand management we experience employment inelasticity to increases in aggregate demand. Theory, per se, cannot determine the level of full employment or demand-determined employment.

Although, like the classical economists before him and the new classical economists today, Keynes believed that a fall in real wage rates is a necessary condition for an increase in employment, *ceteris paribus*. But Keynes did not believe that the employed or the unemployed could orchestrate the necessary fall in real wages independent of government intervention on the demand side. He (1936: pp. 9–13; ch. 19) argues that in a competitive economy a reduction in money wages would simply result in a proportional fall in prices, thus maintaining the real wage at its original excessive level. In other words, the real wage cannot be set in the firm through the wage bargain in isolation from the workings of the macroeconomy. Moreover, workers that resist nominal wage cuts does not imply that they are unwilling to accept a cut in real wages that is a function the increasing price of wage-goods (Keynes, 1936: pp. 8–9). In this case, the supply of labor would not be entirely a function of the real wage. Rather, labor supply would be a function of money wages over a certain range of real wage rates. As Keynes (1936: pp. 8) writes: "...it may be the case that within a certain range the demand of labour is for a minimum money-wage and not for minimum real wage. Resisting reductions in the money wage, in this case, would not be the same thing as resisting a cut to the real wage." Keynes (1936: p. 14) argues that workers tend to behave in exactly this fashion for good

⁵ Keynes (1936, 245) writes: "Our independent variables are, in the first instance, the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest [which determine the level of effective demand]. Our dependent variables are the volume of employment and the national income (or national dividend) measured in wage-units."

⁶ Keynes (1939) does not accept the empirical findings of Dunlop (1938); Tarshis (1939) that suggests that real wages do not fluctuate over the course of the business cycle and that real wages need not drop off to restore full employment. Given the classical theoretical framework which assumes diminishing returns given capital stock and technology, Keynes (1939) suggests that, although Dunlop's and Tarshis' empirics would be convenient for his own argument related to demand side unemployment, he remains unconvinced and suggests estimation problems with the Dunlop and Tarshis results. See Marcuzzo (1996) for a detailed discussion of the theory underlying L-shaped marginal cost curves. McCombie (1985–1986) on the possible positive relationship between marginal cost curve shifts and changes in real wages changes as a fall in real wages reduces capacity utilization which in turn reduced labor productivity. If this negative relationship between capacity utilization and marginal costs holds empirically, McCombie's argument would enforce the argument derived from the behavioral model put forth in this paper.

⁷ For a critique of the natural rate hypothesis, see Galbraith (1997).

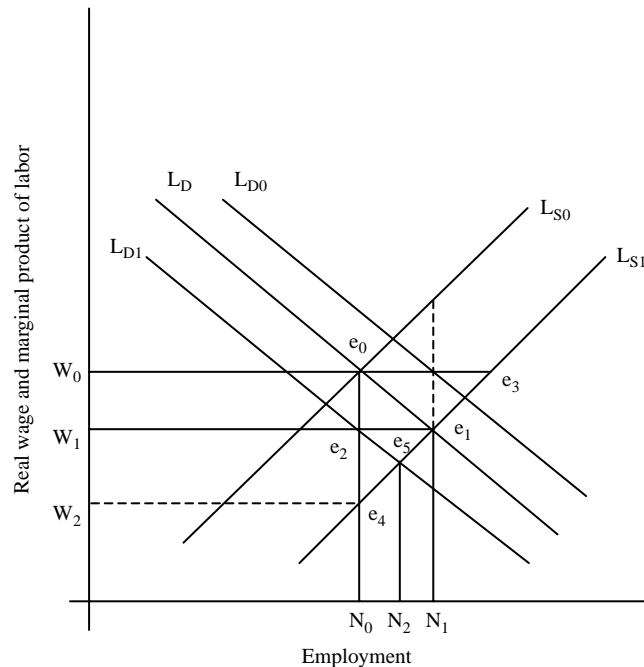


Diagram 1. Real Labor Market.

rational reasons—workers do not suffer from money illusion or related forms of irrational or quasi-rational behavior. Individual workers or groups of workers tend to resist cuts to money wages since such reductions by workers in an uncoordinated labor market will result in a reduction in the relative real wage of these workers. By resisting cuts to money wages, workers are simply resisting cuts to their relative real wage. However, workers tend to accept cuts to the real wage that is a product of aggregate demand induced price increases that are related to efforts to increase the level of employment. Keynes, 1936: pp. 14–15. argues: “Every trade union will put up some resistance to a cut in money-wages, however, small. But since no trade union would dream of striking on every occasion of a rise in the cost of living, they do not raise the obstacle to any increase in aggregate employment which is attributed to them by the classical school.”

This Keynesian labor market narrative can be illustrated in diagram 1, where all values are in real terms. Consistent with Keynes and with conventional economic theory, assume that a negatively sloped marginal product of labor (MPL) curve (L_D) is derived from a short run production function subject to diminishing returns, where capital stock and technology are held constant. The MPL curve yields a supply side demand curve for labor, which indicates the maximum amount of labor a firm could employ at a given real wage if there exists the demand for the output produced by that labor. Also assume a conventional upward sloping labor supply curves given by L_{S0} and L_{S1} . Full employment is given by N_1 , which is consistent with real wage W_1 at e_1 . Assume that demand side problems, an inadequate demand for the output produced by labor, only allows for the employment of N_0 of labor. If product demand side problems result in deflation, the real wage climbs to W_0 , along the MPL curve given by L_D . Keynes argues that this real wage rate at this low level of employment is greater than the marginal disutility of labor given by W_2 , so that workers would accept real wages falling back to W_1 , thereby making it possible for firms to hire N_1 of workers when aggregate demand reaches a level that would make this possible once again. The drop in real wages is achieved by demand side induced price increases. If, on the other hand, real wages remain at W_1 as product demand diminishes, restoring full employment would not require any decrease in real wages. In contrast, the old and new classical economists would argue that if we observe unemployment at N_0 at wage rate W_0 , this would be the equilibrium wage with the labor supply curve at L_{S0} . Indeed, in this scenario, the lower level of employment is a product of the labor supply side driven higher real wage rate. Efforts to reduce the real wage through inflationary policy will not shift the labor supply curve outward to L_{S1} , thus maintaining the equilibrium employment level at the relatively lower level. But this narrative,

which focuses largely on real wages as the causal variable determining the level of employment, represents only one side of the Keynesian coin. The other is the demand side.

3. Keynes and the demand side

It is the demand side that determines whether or not the maximum amount of labor is employed given the labor supply and the production function. Keynes' treatment of the demand side of the economy is consistent with the graphic treatment of the demand side by the Post-Keynesians, well represented in the work of Davidson (Davidson and Smolensky, 1964; Davidson, 1983a,b, 1998). Keynes introduces the aggregate supply function, which is built upon the aggregate supply price of output for a given level of employment. This supply price (Keynes, 1936: p. 24): "...is the expectation of proceeds which will just make it worth the while of entrepreneurs to give that employment." These proceeds must cover the anticipated expenses from the employment of a given amount of labor, inclusive of labor income and payments for other factor inputs (Keynes, 1936: p. 23). It follows that different levels of employment yield a different supply price, where the supply price is a positive function of employment. The supply price of output is the minimum revenue required by the firm for it to realize a particular level of output.

On the other hand, the aggregate demand function stipulates that aggregate income to be expected by firms from sales generated from a particular level of employment. It is positively sloped given that more revenue tends to be generated as employment increases. If aggregate demand exceeds the supply price there is an incentive for firms to increase employment up to the point where the supply price equals aggregate demand income (Keynes, 1936: p. 25): "...for it is at this point that the entrepreneurs' expectation of profits will be maximized." Where aggregate demand, that is the aggregate demand income, just equals the supply price, is referred to by Keynes as the point of effective demand. At the point of effective demand, firms just cover and expect to cover the expenses incurred from producing a given level of output associated with a given level of employment. The level of effective demand thus determines the level of employment assuming that the real wage rate, consistent with this level of employment, can be obtained. Keynes and Keynesians argue that the aggregate demand curve shifts for a variety of reasons, of particular importance would be shifts in investment spending. Thus, there may be an array of points of effective demand. The critical argument made by Keynes is that there no reason to expect that the level of effective demand should be the one which is consistent with the maximum employment point given by real wages and the production function, such as N_1 in [diagram one](#). Nor can market forces be expected to adjust effective demand to its full employment position in either a world of flexible or inflexible prices.

In [diagram two](#), where all values are in real terms, AD and AS are the aggregate demand and aggregate supply functions respectively.⁸ There is only one point of effective demand, b_1 , where the aggregate supply curve AS_0 and the aggregate demand curve AD_0 intersect, which is consistent with full employment N_1 , given by N_1 in [Diagram One](#). Any fall off in demand yields a drop in employment below the initial level. For example, a reduction in investment yields a shift in the aggregate demand curve to AD_1 , yielding a lower level of effective demand (b_0) and a lower level of employment, N_0 , consistent with N_0 in [diagram one](#). What is driving the reduction in employment is a drop in effective demand, not a rise in real wages. For employment to increase, effective demand must rise. Of course, the real wage rate must be consistent with wage rate W_1 in [Diagram One](#) for full employment to be restored. In [Diagram 2](#), it is also possible to show that, ceteris paribus, an increase in the real wage can result in a 'permanent' reduction in the level of employment. An increase in the real wage rate pivots the supply curve upwards to AS_1 , yielding employment level N_3 . In this scenario, simply increasing the level of effective demand could not increase the level of employment, since only by reducing the real wage rate could firms profitably hire more workers at a higher level of aggregate demand.

These arguments can also be illustrated in price-employment space, derived from a price-output space modeling, where the latter is the traditional venue of the conventional macroeconomic wisdom, built upon the IS-LM framework originated by Hicks (1957).⁹ Employment and output are directly linked through the production function. From the

⁸ See Davidson and Smolensky (1964), for the derivation of the macroeconomic aggregate demand and supply curves. AD is sloped upward as more aggregate expenditure is required to employ more workers, ceteris paribus. AS is positively sloped since on the aggregate it is more costly to employ more workers ceteris paribus. Introducing non-linear AD and AS curves would not affect the basic analytics.

⁹ See Branson (1972) for an elaborate presentation of the IS-LM framework.

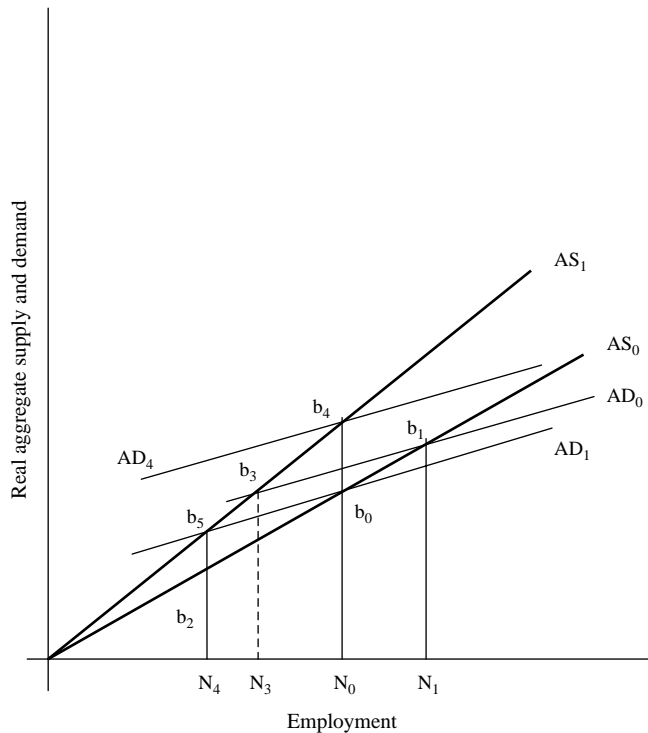


Diagram 2. Supply and Demand.

perspective of Keynes and Keynesian economics, the supply curve is positively sloped, wherein increasing prices result in lower real wages allowing for more workers to be employed as per [diagram one](#). In [Diagram 3](#), supply curve S_1 contains a vertical portion, reflecting the minimum real wage rate below which workers refuse to allow the wage rate to fall. The demand curve is negatively sloped, reflecting the impact that price changes have, for example, upon the real money supply. Where demand curve D_1 cuts supply curve S_1 at c_1 yields the full employment level of employment, N_1 , consistent with N_1 in [diagram one](#). Demand side unemployment is caused by a fall in demand given by an inward shift in the demand curve to D_0 , yielding employment level N_0 . The lower price level, P_0 , yields a higher real wage, as per W_0 in [diagram one](#), which will fall with a reversal in demand back to its full employment position at D_1 . In a world in inflexible money wages, inflation serves to adjust real wages to its production function consistent values as aggregate demand fluctuates. Classical economists would argue that if employment is at N_0 , this is full employment since the supply curve would be vertical reflecting the unwillingness of workers to allow real wages to fall to the extent necessary, given the production function, to generate a higher level of employment. Increasing demand from D_0 to D_1 would simply serve to increase the price level from P_0 to above the original P_1 such as to P_2 .

4. The behavioral model and employment

The behavioral model of the firm, which I've developed in some detail elsewhere (for example, [Altman, 1992, 1998, 1999, 2001, 2002](#)) introduces the assumption that wages and working conditions affect effort levels and technical change.¹⁰ Thus effort is introduced into the short and long run production function as a variable, where the former is most relevant to the traditional Keynesian narrative. The standard assumption in macroeconomics is that effort is invariant to changes in wages and working conditions. Therefore, increases in wages induce lower levels of employment on the supply side. However, the assumption of effort variability and its positive relationship to wages

¹⁰ The theoretical framework adopted is an extension and elaboration of [Leibenstein's x-efficiency theory \(1966\)](#). For more details see [Altman \(2002\)](#).

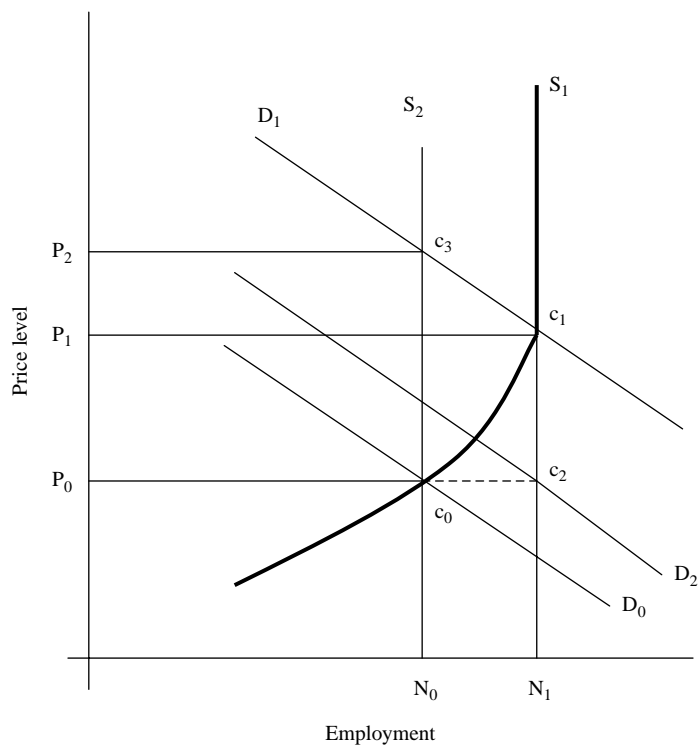


Diagram 3. Prices and Employment.

and overall working conditions has substantial empirical support. Economic theory should therefore incorporate the possibility of effort variability and the implication of this for macroeconomics. Key empirical findings suggest that there is a positive relationship between wages and productivity given technology with effort input being the assumed intermediary variable and, moreover, that changes in wages induce changes in productivity. This positive relationship is strongest when the wage rate is embedded in a particular industrial relations setting (see, for example, Akerlof, 2002; Altman, 2002; Buchele and Christainsen, 1995, 1999; Fehr and Gächter, 2000; Ichniowski, et al., 1996; Levine and Tyson 1990, for some empirical backing for this type of modeling of the economic agent). Moreover, wages tend to be sticky downward over the business cycle because of this positive relationship between wages and effort (for example Bewley, 1999; Akerlof, 2002).

More recently, in the efficiency wage literature, effort variability is introduced to provide one explanation for downward nominal wage inflexibility (for example, Akerlof and Yellen, 1986, 1988, 1990; Bewley, 1999; Stiglitz, 1987; Yellen, 1984). The latter does not affect the standard analytical prediction that more employment requires lower real wages or that persistent high levels of unemployment are largely a product of high real wages or other supply side constraints to employment growth. Another strand of the efficiency wage literature suggests that a high level of unemployment is a product of firms having to pay above market clearing wages so as to minimize costs in world where workers shirk at low levels of unemployment when their bargaining power is greatest (Shapiro and Stiglitz, 1984; Weisskopf et al., 1983; Yellen, 1984). The behavioral modeling of the firm presented here is distinct from what underlies efficiency wage theories, yielding distinct analytical predictions.¹¹

The assumption of effort variability is introduced here to examine its implications for employment in a world where real wages rise as employment increases and where workers resist real wage cuts even if they are a product of price increases. The standard efficiency wage literature as it relates to macroeconomic theory flows from Solow (1979), where he argues that a reduction in the real wage by the firm yields a reduction of efforts inputs by labor. In this scenario, the firm chooses a real wage that minimizes labor costs per efficiency unit. There will be one such

¹¹ See Lavoie (2001) for an application of the shirking variant of efficient wage theory to a Kaleckian modeling of the demand side.

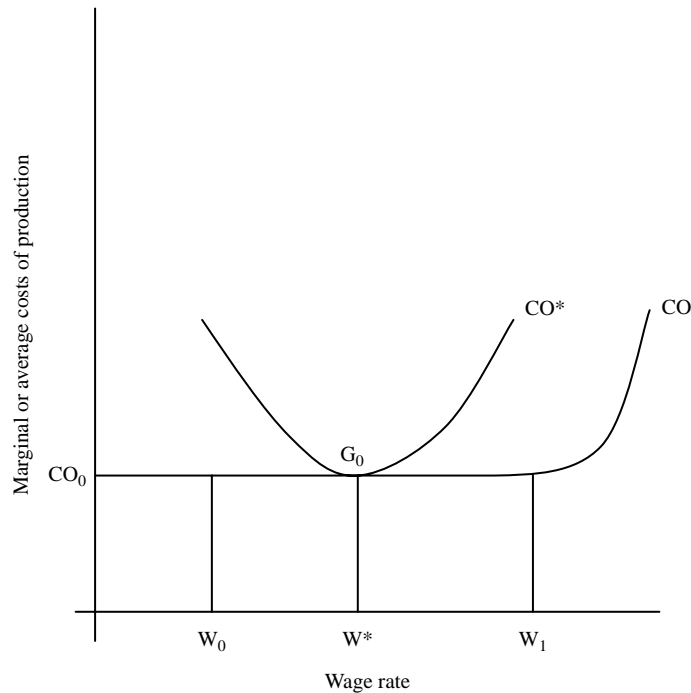


Diagram 4. Wages and Efficiency.

unique wage, which is deemed the efficiency wage. If this wage is above the market-clearing wage on the labor market, there will be unemployment since the profit-maximizing firm has no incentive to cut the real wage in a monetary economy. Nevertheless, leading proponents of the efficiency wage hypothesis argue that inflationary policy can serve to reduce the real wage without any negative impact on the effort dimension, thus allowing for effective demand side policy to increase the level of employment (Akerlof, et al., 2000). In this most recent articulation of the Keynesian perspective, it is assumed that workers are quasi-rational at low levels of inflation and thus suffer from money illusion. Quasi-rationality was, of course, a concept never adopted by Keynes to explain nominal wage rigidity.

Unlike what is assumed in the traditional efficiency wage literature, in the behavioral model presented here it is assumed that there exists some linearity with respect to the relationship between effort inputs and the wage rate which, for simplicity, is assumed to embody the entire system of industrial relations within the firm. In this scenario, there is an array of wage rates consistent with a unique marginal or average cost when productivity changes, brought about through effort changes, just sufficient to offset the cost impact that changes to the real wage might otherwise have. In the conventional efficiency wage view, by assumption, there exists only one unique wage that minimizes costs (Akerlof and Yellen, 1986; Altman, 2001, 2002; Solow, 1979). The behavioral perspective is illustrated in Eqs. (1a) and (1b) and diagram 4.

$$MC = \frac{w}{(dQ/dL)}, \quad (1a)$$

$$AC = \frac{w}{(Q/L)} \quad (1b)$$

where MC is marginal cost, w is the wage rate, (dQ/dL) is the marginal product of labor, AC is average cost, and (Q/L) is the average product of labor. Assuming, for simplicity, that labor is the only input, marginal cost and average cost do not increase in the face of an increasing wage rate nor do they fall when the wage rate falls, if there exists corresponding and proportional changes in the marginal and average product, respectively.

It is important to note that productivity need not increase proportionally to increases in labor costs when labor is only one amongst many inputs into the production process, which is typically the case. When labor is not the only compensated factor input, labor productivity increases less than proportionally to increases in labor costs so as to neutralize increases labor cost. This point is illustrated in Eq. (2)

$$\frac{dAC}{AC} = \left(\frac{dw}{w} \right) \left(\frac{w^*L}{w^*L + NLC} \right), \quad (2)$$

where dAC is the change in average cost, dw is the change in the wage rate, and NLC is non-labor costs. If, for example, the wage rate is increased by 10% (dw/w) and wage costs ($w \times L$) represent 100% of total costs, labor productivity must increase by 10% to compensate for what would otherwise be a 10% increase in average costs. However, if wage costs represent only 50% of total costs, labor productivity must increase by only 5% to compensate for what would otherwise be a 5% increase in average costs.

In [diagram four](#), flowing from the behavioral model, an array of wage rates, including the relatively low real wage W_0 and the relatively high real wage W_1 , result a unique marginal cost of CO_0 . The conventional efficiency wage assumptions yield a unique efficiency wage W^* . Any other wage rate increases the marginal and average costs of production. In the behavior model, firm owners have no immediate economic incentive to change the wage rate up or down from its original level. Productivity changes simply offset changes in labor costs. In other words, in this model, a firm hierarchy that does not voluntarily change real wage rates is behaving rationally. Moreover, in the short term, efforts to cut real wages can result in transitionally higher costs, which generate incentives to maintain the real wage at its original level. At any given wage rate the wage rate cost curve, such as CO_0CO , shifts upward when wages are cut until adjustments are completed.

The behavioral model suggests that even if one assumes that workers resist cuts to their real wages, irrespective of whether these cuts are attempted directly by the firm hierarchy or indirectly through an inflationary process, this need not preclude effective demand side policy from increasing the level of employment. The conventional efficiency wage literature assumes that the efficiency wage yields a point along the marginal product curve of the firm that generates a relatively low level of employment and thus a relatively high rate of unemployment. Only cuts to the real wage will allow for more employment on the supply side. But this need not be the case. If a negative demand shock to the economy yields a higher real wage (W_0-W_1 in [diagram one](#)), as one moves along the negatively sloped marginal product of labor curve given by L_D , for example, (as one would in the standard Keynesian model) and this positively affects labor productivity (as would be the case in the behavioral model), the marginal product curve shifts outward to L_{D0} . The higher real wage would here be consistent with a higher level of employment, such as N_1 as opposed to N_0 . This higher level of employment could be achieved only if aggregate demand increases sufficiently to absorb the increased output. Price increases to reduce the real wage are not required to increase employment in this scenario. Thus, increasing employment from N_0 to N_1 occurs without any cut to real wage rates, with constant prices, as a product of the efficiency effect of increasing the real wage from W_1 to W_0 . Moreover, in the context of an efficiency effect induced by increasing the real wage rate, a particular level of employment such as N_1 , given by the production function, is associated with an array of wage rates. Higher real wages need not imply lower attainable levels of employment and lower real wages higher levels of attainable employment.

In [diagram three](#), the increase in employment is illustrated using vertical supply curves wherein changes in employment are not affected by price changes. Holding the price level constant at P_0 , employment increases from N_0 to N_1 as demand rises as a consequence of an outward shift of the marginal product of labor curve which compensates for any increases in real wages required to induce the requisite increases in labor supply underlying increasing employment. This is reflected in the movement of the employment supply curve from S_2 to S_1 . The employment supply curve is thus perfectly inelastic with respect to price and employment becomes 'full employment' once employment is at a maximum given the labor supply and production functions. In the short run, increasing demand from D_0 would simply increase price given employment curve S_2 , such as to P_2 with demand curve D_1 . In the longer run, as the supply curve shifts outward to S_1 , employment increases to N_1 . An employment supply curve can be given by $P_0c_0c_1$. In this scenario, a price increase can accompany the increase in employment if the demand increases sufficiently, for example to D_1 . But it would not be the increase in the price level that actually causes the increase in employment to N_1 . Rather, it is an increase in

aggregate demand in the context of the real wage rate induced increase in labor productivity that is responsible for an increase in the level of employment. The supply curve shifts to the right for conventional reasons which should incorporate extraordinary increases in efficiency as well as technological change induced by increasing real wages—in the Keynesian short run it is the efficiency effect induced by increased wages which is most pertinent.

In the context of the behavioral model, the question of the potential impact of cutting real wages through inflation can be addressed. Of course, the conventional wisdom suggests that this should result in more employment given a sufficient increase in aggregate demand. In [diagram one](#), as wages fall from W_0 to W_1 , along L_D , employment rises from N_0 to N_1 , if there is an adequate increase in aggregate demand, where N_1 is the initial full employment level of employment and L_{S1} is the labor supply curve. But to the extent that lower real wages generates lower effort inputs and thus an inward shift in the marginal product of labor curve, lower wages do not make it possible for firms to profitably employ more workers given adequate aggregate demand. *Ceteris paribus*, lower real wages might result in the original or even a lesser number of workers being employed. Thus if the marginal product of labor curve shifts inward to L_{D1} , W_1 of real wages will only allow for N_0 of employment. Cutting real wages is not a necessary condition for increasing employment when such cuts contribute towards reducing the level of labor productivity. Contrary to the conventional wisdom, cutting real wages, in this scenario, can instead serve to impede the process of employment growth. Thus lower wages may yield higher rates of unemployment when effort is a variable in the production function. But in the new-Keynesian approach, most recently articulated by [Akerlof \(1996, 2000, 2002\)](#), real wage cuts serve to increase employment only because workers are ‘quasi-rational’, suffering from money illusion.

At a more general level, the behavioral model suggests that increasing real wages and policies which contribute towards higher real wage rates, such as unionization, minimum wages, and unemployment insurance, need not contribute towards lower levels of sustainable employment and thus to higher levels of, what Friedman refers to, natural unemployment rates. To the extent that higher real wages can be causally related to higher levels of labor productivity, one cannot predict that real wage increases are an obstacle to full employment. In fact, such labor productivity increases can make for higher levels of sustainable unemployment. However, for the higher level of sustainable employment to be realized, aggregate demand must be increased sufficiently to absorb the increased output. A more productive workforce will, of course, be producing more than the less productive one. Unless output increases sufficiently employment cannot be increased. This point is clarified in Eqs. (3) and (4)

$$Q = L \times \frac{Q}{L}, \quad (3)$$

where Q is total output and L is total employment and (Q/L) is labor productivity. Eqs. (1a) and (1b) can be transformed into:

$$L = \frac{Q}{(Q/L)} \quad (4)$$

From Eq. (3) and (4) it is clear that when workers become more productive, for the original number of workers to remain employed output must increase and unless output increases proportionally to labor productivity, employment falls.¹² Referring back to [Diagram Two](#), *ceteris paribus*, increasing aggregate supply through an increase in labor productivity, from AS_0 to AS_1 , with the initial level of employment at N_0 given by aggregate demand curve AD_1 at b_0 , will result in a lower level of employment at N_4 at b_5 , unless accompanied by an increase in aggregate demand from AD_1 to AD_4 yielding a new level of effective demand at b_4 . With this in mind, what should be of concern to policy makers is the extent to which real wage increases are matched or surpassed by increases in labor productivity and the extent to which related increases in output are matched by increases in aggregate demand. To the extent that increasing productivity is an option as employment increases, public policy need not focus on developing effective methods to reduce real wages or the growth of real wages which is so much the focus of Keynesian, new Keynesian and of course the various iterations of Classical analysis.

Overall, the behavioral model suggests that increasing real wage rates or the failure of demand management policy to reduce real wages through the inflationary process need not pose an obstacle to increasing the level of employment.

¹² The relationship between employment and productivity growth is addressed in [Davenport \(1982\)](#).

Rather, in the context of increasing real wage rates or the downward inflexibility of wage rates, employment growth might be held back most significantly by slow growth in labor productivity and by restrictive macroeconomic policies.¹³ Needless to say, the behavioral model suggests that higher real wages positively affect labor productivity through its impact upon effort inputs. In a more dynamic modeling of the labor market, higher real wages would also affect labor productivity through its impact on technical change—this would shift the aggregate supply curve in [diagram three](#) outward (Altman, 1998, 2001).¹⁴ In this context, employment would be encouraged by efforts to promote increases in labor productivity and more aggressive demand management strategies designed to accommodate the resulting increase in aggregate output.

This model further suggests the possibility of lower levels of unemployment being associated with higher real wage rates whilst higher levels of unemployment are associated with lower real wages rates. This possibility is manifested in the research of Blanchflower and Oswald (1994, 1995, 2005), who find, using an international sample population, that regions with low unemployment rates are systematically correlated with high wage rates and vice versa. More specifically, they find that for all countries examined, reducing the unemployment rate by 1% is statistically correlated with a 0.1% increase in the wage rate. Blanchflower and Oswald argue that bargaining and efficiency wage models—the model articulated in this article is of this genre—is most consistent with their empirics. In the model presented here, the level of unemployment associated with a particular level of real wages critically depends on the elasticity of labor productivity to the wage rate and the responsiveness of macroeconomic demand side variables to increasing output. Of particular concern in this article is to address what appears to be an empirical paradox to the conventional wisdom: that higher real wages, both in the short and the long run, are consistent with higher levels of employment and lower rates of unemployment and that lowering real wages need not provide the microeconomic incentives for firms to employ more workers. When effort is a variable in the production function, this paradox can be addressed if not resolved (see also Altman, 2001).

The behavioral model presented here also suggests that a positive empirical relationship between the price level or the rate of inflation and employment need not be a causal one. Rather, it might simply reflect underlying dynamics in the economy wherein it is increasing labor productivity in conjunction with increasing aggregate demand that is driving the increase in employment. Inflation might simply be a reflection of an accommodating macroeconomic policy that allows for the absorption of the increasing output flowing from the increase in labor productivity. Inflation would here be a product of overshooting increases in aggregate demand in a world of uncertainty. In this sense, low rates of inflation are consistent with increasing the level of employment, although not the cause of such increases.¹⁵

Finally, the behavioral model is consistent with the assumption of ‘rational’ workers, that is workers who do not suffer from money illusion—‘quasi-rational’ workers is a critical assumption in much of the new Keynesian literature. This assumption of the ‘rational’ worker is consistent with the modeling articulated by Keynes in the general theory and in the works of the new classical macroeconomists following in the footsteps of Friedman’s critical 1968 essay. Resisting cuts to real wages need not impede employment growth to the extent that efficiency changes are such that they prevent unit employment costs from rising as employment increases. Thus, workers do not have to be tricked or forced into accepting low overall rates of labor compensation for employment to be restored to its ‘full employment’ level. To the extent that effort is invariant to changes in labor costs and technological change is exogenous, the

¹³ See Lombard (2000) who suggests that restrictive macroeconomic policy in Western Europe played a determining role in driving unemployment rates here to historically high levels for the post world war two period. Freeman (1995) raises some doubt as the overall efficacy of real wage flexibility as a vehicle to reduce the rate of unemployment in Europe down to current, relatively low, American rates. That wage inflexibility per se need not pose an obstacle to the realization of relatively low rates of employment see Galbraith, Conceicao, and Ferriera (1999); Nickell (1997).

¹⁴ Meltzer (1983, 1984) in his interpretation of the Keynes’ general theory argues that labor productivity is also affected by investment in capital stock, which is slowed down during economic recessions. To the extent that capital stock represents an important embodiment of new technology, recessions serve to further constrain labor productivity growth and, thereby, the realization of the maximum level of employment as determined by the production function. Also Darity and Goldsmith (1996) point out that extended exposure to unemployment might have a lasting and negative impact on the productivity of labor thereby reducing the maximum level of employment. In this scenario, active macroeconomic policy therefore generates the added benefit of increasing labor productivity which, *ceteris paribus*, allows for a higher level of employment to be realized than would be otherwise possible.

¹⁵ The traditional Keynesian perspective articulated early on in the game by Samuelson and Solow (1960) and manifested most recently by Akerlof, Dickens and Perry (1996, 2000) and Fortin (2001), is that price increases result in more employment and thus in lower levels of unemployment by reducing real wage rates or the rate of growth in real wage rates. This Phillips (1958) Curve type relationship is rejected by the new classical economists.

behavioral model collapses into the standard Keynesian model wherein real wages must fall to accommodate increases in employment.

To summarize, some of important testable analytical predictions that flow from the behavioral model are that, assuming rational agents:

1. If a downward demand shock to the economy yields higher real wages, restoring employment to its pre-shock equilibrium does not require an accommodating decrease in real wages if increasing real wages generates an offsetting efficiency effect.
2. Downward stickiness of nominal wages need not be an impediment to increasing employment, given the existence of sufficient aggregate demand, if increasing real wages yields an efficiency effect.
3. Positive demand shocks to the economy need not generate only nominal economics effects if subsequent increases in real wages generate offsetting efficiency effects.
4. In the long run, higher rates of employment would be positively correlated with higher levels of wages if the latter yields efficiency and induced technological change effects.

5. Conclusion

Keynes argued that in monetized market economies unemployment rates can reach high levels and get stuck at these high levels without active government macroeconomic intervention. However, he believed that although the key to achieving low rates of unemployment is demand management he argued, basing himself on the conventional wisdom on the microfoundations of economic theory, that increasing demand must be and would be accompanied by a reduction in the real wage rate even if one assumes ‘rational’ economic agents. This perspective is echoed in the contemporary macroeconomic literature where persistent high rates of unemployment are typically attributed to the downward rigidity of real wages.

The behavioral model presented here suggests that higher real wage rates or the downward stickiness of real wages may have little to do with either generating or maintaining relatively high rates of unemployment if such wage rates positively affect labor productivity. Moreover, lower real wage rates might have the effect of reducing the maximum level of achievable employment by reducing labor productivity. Therefore, the existence of relatively high real wage rates and the downward inflexibility of real wage rates need not signify labor market obstacles to the realization of sustainable lower unemployment rates. In this scenario, the culprit responsible for high rates of unemployment might very well be restrictive and inadequately expansive macroeconomic policy. Efforts to make labor markets more flexible by weakening the bargaining power of labor so as to reduce the unemployment rate might be both unnecessary and counterproductive. The behavioral model therefore suggests that more research effort be expended to better understand the relationship between wage rates and working conditions, and labor productivity, and how this relationship relates to demand-side policy. Simply assuming that labor productivity is determined independent of the wage rate and working conditions and that given diminishing returns real wages must be made flexible downward can very well generate economic policy that needlessly reduces the absolute or relative level of material wellbeing of workers while doing little to bring employment to the currently involuntarily unemployed.

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