General Disequilibrium Analysis with Inside Debt

Abstract

This paper incorporates inside nominal debt into a Keynesian general disequilibrium model. It shows how nominal wage adjustment may be insufficient to restore Walrasian equilibrium. Nominal wage reductions lower aggregate demand by increasing debt service burdens. This aggravates Keynesian deficient demand unemployment. When there is classical unemployment, falling nominal wages mean that the economy may hit a Keynesian constraint before it attains Walrasian full employment. In situations of repressed inflation, rising nominal wages reduce debt service burdens and increase aggregate demand, thereby worsening the extent of excess demand.

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1 <u>Introduction</u>

Inside debt is a notable feature of economies with developed financial systems, and Irving Fisher (1933) emphasized its importance in his debt - deflation theory of economic depressions. The existence of inside debt means that nominal wage reductions can have a negative effect on aggregate demand and therefore be destabilizing with regard to the problem of unemployment.

The argument is as follows. If worker households are debtors, nominal wage reductions will increase the burden of their debts and reduce their consumption spending. To the extent that nominal wage reductions lower prices, creditors will be made better off and they will increase their spending. However, aggregate demand can fall in response to lower nominal wages if (i) the marginal propensity to spend of debtors exceeds that of creditors, and (ii) this net negative debt effect swamps the Pigou effect.

The importance of inside debt has been evident in recent economic experience. The extended sluggishness of the recovery following the last U.S. recession has been attributed to the build up of debt which needed to be worked off before a sustained recovery could begin. Another instance is the U.K.'s withdrawal from the European exchange rate mechanism in 1992. The British government needed to increase interest rates to support Sterling, but it was unable to do so because of the potential negative aggregate demand impact arising from massive levels of mortgage debt. In this instance, higher interest rates rather than lower prices and nominal wages would have effected an adverse transfer between debtors and creditors.

Despite its potential significance, inside debt is absent in most macroeconomic analyses. The current paper seeks to fit considerations of inside debt into a general

disequilibrium analysis of the type pioneered by Barro and Grossman (1971) and by

Malinvaud (1977). Such a treatment illuminates the difficulties for macroeconomic

adjustment posed by the existence of inside debt.

2 Micro foundations of the Fisher debt effect

Before beginning the macroeconomic analysis, it is worth exploring the

microeconomic foundations of the Fisher debt effect. One argument rests on

psychological disposition: debtors are psychologically more optimistic than creditors and

have a higher marginal propensity to consume (MPC). A second argument rests on

liquidity constraints: debtor households are liquidity constrained and have a MPC of

unity. A third argument is based on the conventional short run Keynesian consumption

function, according to which the MPC falls with income. If on average debtor households

have lower incomes than creditor households, then the MPC of debtor households will

tend to be higher than that of creditors. A fourth argument is based on rule of thumb

saving behavior, whereby households separate wage income from other types of income,

and finance consumption out of wage income while saving more out of profit and interest

income. In this case, debtors will have a larger propensity to consume than creditors,

since the latter will treat interest payments as part of non-wage income.

Institutional developments associated with the proliferation of indirect credit markets

may also have made the Fisher debt effect more important. With direct credit markets, the

Fisher debt effect operates directly on the transfer of income from debtors to creditors.

With indirect credit markets there is a double filter that magnifies the effect. In the first

instance, debtors feel the adverse effect of increased real debt burdens. However, debt

service is now paid over to a financial intermediary, and the intermediary likely only pays

out a fraction of the real debt service windfall as dividends. As a result, the real income

of creditor households does not increase by the same absolute amount as the decline in

debtors' real incomes. This serves to compound the Fisher debt effect as creditors have a

lower MPC and receive a smaller absolute increment in income.

3 <u>A general disequilibrium model</u>

The model consists of five equations. Signs above functional arguments represent

signs of partial derivatives. The definition of variables is:

y = output y^d = aggregate effective demand,

$f(.)$ = aggregate production function $n^s(.)$ = labor supply function
w = real wage $n^d(.)$ = notional labor demand function
n = employment i = nominal interest rate P = price level
L = level of nominal inside debt W = nominal wage
g = real government spending M = nominal money supply

Equation (1) is given by:

$$y = \text{Min}[\ \overset{+}{y^d},\ \overset{+}{f(n^s(w))},\ \overset{+\quad-}{f(n^d(w))}] \tag{1}$$

This equation determines the level of output. The Min argument means that the level of

output can be constrained by the level of aggregate demand, the availability of labor

supply, or the willingness of firms to supply output.

Equation (2) determines the notional demand for labor which is obtained from the

inverse of the marginal product of labor function and given by

$$n^d = \overset{-}{f'^{-1}(w)} \tag{2}$$

Equation (3) determines the level of employment conditional on the level of output, with

employment being a positive function of output. This relation is obtained from the

inverse of the production function and is given by

$$n = \overset{+}{f^{-1}(y)} \tag{3}$$

Equation (4) determines the level of aggregate demand (AD). The level of AD depends positively on the level of employment. It depends negatively on the price level, reflecting the Pigou effect, and negatively on the interest rate. It also depends positively on the level of real wages, reflecting the Kalecki (1942) effect whereby workers have a higher MPC so that consumption demand depends positively on real wages.[1] AD also depends negatively on the debt service burden of debtors, and this burden is scaled by reference to total nominal wage income. Debtor households are identified with worker households, and debt burdens are therefore scaled by reference to nominal wages. Were debtors identified with the corporate sector, then the price level would be the relevant nominal scalar as it affects the nominal value of output. Given the current treatment, nominal wage declines raise debt service as a proportion of worker household income. Finally, demand also depends positively on government spending. The aggregate demand function is given by

$$y^d = y(\overset{+}{n}, \overset{-}{P}, \overset{-}{i}, \overset{+}{w}, \overset{-}{iL/Wn}, \overset{+}{g}) \qquad\qquad (4)$$

Henceforth it is assumed that $\partial y^d/\partial n < \partial f(n)/\partial n$. This corresponds to assuming that the additional real spending resulting from a marginal increase in employment is less than the marginal product of labor. Consequently, a small increase in employment results in an increase in AD that is less than the increase in output. This assumption is analogous to the expenditure multiplier stability condition in the income - expenditure model whereby the MPC is less than unity.[2]

Lastly, equation (5) determines the nominal interest rate and is given by

$$i = i(\overset{+}{P}, \overset{+}{n}, \overset{-}{M}) \qquad\qquad (5)$$

The nominal interest rate depends positively on the price level and employment. Higher prices reduce the real money supply which drives up interest rates: this is the Keynes effect. Higher employment raises income and money demand which increases interest rates. Substituting (5) into (4) yields

$$y^d = y(n, P, i(P,n,M), w, i(P,n,M)L/Wn, g) \qquad (4')$$

Differentiating with respect to n yields

$$dy^d/dn = y_1 + y_3 i_2 + y_5[i_2 L/Wn - iL/Wn^2] \gtrless 0$$

The sign of this expression is ambiguous. Increases in employment directly positively impact demand, but they also raise interest rates which reduces demand. Henceforth, it is assumed that employment has a positive effect, reflecting the dominance of the direct AD effect over the indirect interest rate effect.

Figure 1 provides a graphic analogue of the model illustrating the case of unconstrained Walrasian equilibrium. The labor market clears with labor supply and labor demand at the real wage of w^* both being equal to the level of employment, n^*. Simultaneously, the goods market clears with the level of output equal to the level of AD. The triangular region lying above the labor supply schedule and below the labor demand schedule represents the economically relevant region of the labor market. Actual real wage - employment outcomes are bounded by this region. Points below and to the right of the labor supply curve are not feasible as labor supply constrains employment, whereas points above and to the right of the labor demand curve are not feasible as labor demand constrains employment.

4 <u>Regimes of disequilibrium</u>

The previous section detailed the static macroeconomic model. This section examines the different regimes of disequilibrium. Following Malinvaud (1977), there are four possible regimes:

- If $y = y^d = f(n^s(w)) = f(n^d(w))$, the economy is in an "unconstrained Walrasian equilibrium" with both the goods and labor markets clearing.

- If $y = y^d \leq f(n^s(w))$, $f(n^d(w))$, the economy is in a "Keynesian regime" with the level of output being constrained by the level of aggregate demand.

- If $y = f(n^d(w)) \leq y^d$, $f(n^s(w))$, the economy is in a "classical regime" with output being constrained by firms' demand for labor at the going real wage.

- If $y = f(n^s(w)) \leq y^d$, $f(n^d(w))$, the economy is in a "repressed inflation regime" in which output is constrained by the level of the labor supply and there is also excess demand for labor in the labor market.

The analytical characterization of these regimes depends importantly on the specification of the AD function. Nested within equation (4) are four special cases deserving of note.

Case 1: orthodox Keynesianism. Orthodox Keynesianism corresponds to Keynes' (1936) <u>General Theory</u> model in which the price level, real wages, and nominal debt have no impact on demand. This implies restricting the partial derivatives of equation (4) such that $y_2 = y_4 = y_5 = 0$.

Case 2: neo-Keynesianism. Neo-Keynesianism can be identified with the standard IS-LM model found in most macroeconomics textbooks. In this case there is a Pigou effect so that $y_2 < 0$, but real wages and nominal debt are absent so that $y_4 = y_5 = 0$.

Case 3: Cambridge (U.K.) Keynesianism. Cambridge Keynesianism has real wages affecting demand, but it disregards the Pigou effect as empirically irrelevant and there is no nominal debt effect. This implies that $y_4 > 0$, but $y_2 = y_5 = 0$.

Case 4: Tobin Keynesianism. Tobin (1980) incorporates the negative effect of nominal debt on aggregate demand but ignores the positive effect of real wages. This implies that $y_2 < 0$ and $y_5 < 0$, but $y_4 = 0$.

For current purposes, the paper analyses the general case given by equation (4) in which the Pigou price effect, the Kalecki real wage effect, and the Fisher nominal debt effect are all present. However, it begins with an analysis of the neo-Keynesian case which serves as a benchmark since this is the most widely recognized case.

The neo-Keynesian case:

Figure 2a describes the regimes of disequilibrium for the neo-Keynesian case. The nominal wage (W) - real wage (w) space is divided into Keynesian (K), classical (C), and repressed inflation (R) regimes.[3] w* is the Walrasian labor market clearing real wage, and it is associated with an equilibrium nominal wage of W^*. Point A corresponds to an unconstrained Walrasian full employment equilibrium.

The logic of the spatial division contained in figure 2a is as follows. Starting at point A and moving due north means that the real wage has increased. Labor demand therefore decreases while labor supply increases so that $n^d(w) < n^s(w)$. With the nominal wage unchanged, the price level must have fallen, which means that AD has increased owing to the Keynes and Pigou effects. As a result, the economy is in a regime of classical unemployment with $n^d(w) < n^s(w)$ and $y^d > f(n^d)$.

Continuing from a point in the classical regime and moving due east means that the real wage is unchanged but the nominal wage increases. This implies the price level also increases to maintain the real wage. Consequently, AD falls due to the Keynes and Pigou effects, and sufficient eastward movement generates a situation in which $n^d(w) < n^s(w)$ and $y^d < f(n^d)$. At this stage, the economy shifts to a Keynesian regime so that the boundary between the classical and Keynesian regimes lies in the north-east quadrant.

Thereafter, moving directly due south means that the real wage starts to fall. With the nominal wage fixed, this implies the price level rises and AD falls. The economy therefore moves further into the Keynesian regime with $n^d(w) < n^s(w)$ and $y^d < f(n^d)$. When the real wage falls below w^*, the Keynesian regime becomes characterized by $n^d(w) > n^s(w)$ and $y^d < f(n^s)$. This proves that the Keynesian regime extends into the south-east quadrant. In this region, employment is constrained by the shortage of AD despite the fact that the real wage is below its Walrasian equilibrium level.

The division between the classical and repressed inflation regime is arrived at as follows. Starting at point A and moving north places the economy in the classical regime. Thereafter, moving due west implies a constant real wage and a falling nominal wage, which implies a lower price level and rising AD. Consequently, AD continues to exceed firms' willingness to supply so that $n^d(w) < n^s(w)$ and $y^d > f(n^d)$, and the economy remains in the classical regime.

The classical regime persists as long as $w > w^*$ and then turns into the repressed inflation regime in which $n^d(w) > n^s(w)$. The boundary between these two regimes is demarcated by the line $w = w^*$. On this boundary line there is an excess demand for goods. The proof is as follows. Moving directly due west of point A implies an

unchanged real wage and a lower nominal wage, which implies a lower price level. The Keynes and Pigou effects therefore increase AD relative to point A, so that $y^d > f(n^s)$ and $n^d(w) = n^s(w)$.

The repressed regime lies in the south-west quadrant. A move south below $w = w^*$ implies a lower real wage, a constant nominal wage, and a higher price level. Both AD and n^s fall, but since $y^d > f(n^s)$ on the boundary where $w = w^*$, this inequality must hold for some area below w^*. Thus, $y^d > f(n^d)$ and $n^d(w) > n^s(w)$ immediately below $w = w^*$.

Finally, the location of the boundary between the repressed and Keynesian regimes can lie in either the south-west or the south-east quadrants. Beginning in the repressed regime and moving due east implies a constant real wage, a rising nominal wage, and a rising price level. AD falls owing to the Keynes and Pigou effects and sufficient eastward movement ultimately results in a situation where $y^d < f(n^s)$ and the economy shifts into the Keynesian regime. If the Keynes and Pigou effects are strong, the boundary will tend to lie in the south-west quadrant; if weak, it will tend to lie in the south-east quadrant.

The general case.

Figure 2a details the benchmark neo-Keynesian characterization of disequilibrium regimes. This can be contrasted with figure 2b which details the location of disequilibrium regimes for the general case with nominal debt and real wage effects.

As before, point A corresponds to an unconstrained Walrasian full employment equilibrium. Starting at A, a small northerly movement increases the real wage which increases AD. With the nominal wage fixed, it also implies a lower price level which further increases AD. The increase in the real wage lowers firms' demand for labor. Thus, the economy is shifted into a classical regime with $n^d(w) < n^s(w)$ and $y^d > f(n^d)$.

Thereafter, moving due east implies a fixed real wage, a rising nominal wage, and a rising price level. The rising nominal wage is expansionary owing to the Fisher debt effect; the rising price level is contractionary owing to the Keynes and Pigou effects. If the Fisher nominal debt effect dominates, then AD increases and the economy remains in the classical regime.

Turning and moving due south implies that the real wage is falling, the nominal wage is fixed, and the price level is rising. AD therefore falls. However, the economy remains in the classical regime as long as $w > w^*$. This is because $W > W^*$, so that with the Fisher debt effect dominating, AD remains greater than it was at point A so that there is continuing excess goods demand. Once w falls below w^*, then $n^d(w) > n^s(w)$ and the economy shifts from the classical regime into the repressed inflation regime.

Moving due west from a point in the repressed regime implies that the real wage is constant, the nominal wage falls, and the price level also falls. With the Fisher debt effect dominating the Keynes and Pigou effects, AD falls and sufficient westward movement places the economy in the Keynesian regime. The exact location of the boundary between the repressed inflation and Keynesian regimes is unclear. If the Kalecki real wage effect is strong, then the boundary tends to slope in a south-easterly direction: a higher nominal wage is needed to offset the negative demand effect of a lower real wage.

Finally, starting from a point in the Keynesian regime and moving north implies that the real wage is increasing, the nominal wage is constant, and the price level is falling. This combination means that AD is rising. When $w = w^*$, the economy is still in the Keynesian regime. This is because $W < W^*$, which means that AD is less than it was at point A owing to the Fisher debt effect. However, sufficient northerly movement will

have AD increase so that $y^d > f(n^d(w))$ and $n^d(w) < n^s(w)$, and at this stage the economy enters the classical regime. The boundary between the Keynesian and classical regimes therefore slopes in a north-westerly direction.

Points on the loci extending out of point A in figure 2a correspond to points where two constraints are identically equal. Thus, on the locus extending in a north-westerly direction $y^d = f(n^d(w)) < f(n^s(w))$, and the Keynesian constraint exactly equals firms' willingness to supply so that the economy is in both a Keynesian and classical regime. On the locus extending in a south-easterly $y^d = f(n^s(w)) < f(n^d(w))$, and the Keynesian aggregate demand constraint exactly equals firms' ability to supply so that the economy is in both a Keynesian and repressed inflation regime. Lastly, on the locus extending due east $y^d > f(n^s(w)) = f(n^s(w))$ and $n^d(w) = n^s(w)$ so that firms' labor demand exactly equals labor supply, and the economy is in both a classical and repressed inflation regime.

Examination of figures 2a and 2b is revealing. First, both figures show that the real wage can equal its Walrasian equilibrium level yet the economy can still be in disequilibrium owing to the presence of a goods market constraint. Second, in the neo-Keynesian world, Keynesian unemployment tends to be associated with a high nominal wage. This is because the high nominal wage is associated with a high price level which reduces AD through the Keynes and Pigou effects. Contrastingly, in a world where the Fisher nominal debt effect dominates, Keynesian unemployment is associated with a low nominal wage because this increases debt service burdens.

5 The problem of adjustment

Figures 2a and 2b can be used to highlight the difficulties of restoring Walrasian full employment equilibrium. This requires adjustment of both nominal and real wages, yet

both the Keynesian and classical regions cover diverse spaces in which the directions of adjustment of nominal and real wages conflict.

Particularly problematic is the fact that resolving Keynesian unemployment when there is nominal debt can require higher nominal wages, yet this is something labor markets are unlikely to produce given the existence of unemployment. Similarly, resolving repressed inflation requires lower nominal wages but this is also something labor markets are unlikely to produce since there is excess demand for labor.

The equations of price and nominal wage adjustment are

$$dP/P = P(y^d - Min[f(n^d(w)), f(n^s(w))]) \qquad P' > 0 \qquad (6)$$

$$dW/W = W(Min[f^{-1}(y^d), n^d(w)] - n^s(w)) \qquad W' > 0 \qquad (7)$$

The economic logic behind the price adjustment mechanism is that goods prices are driven by the gap between aggregate demand and the minimum of firms' desired supply or ability to supply. The logic behind the nominal wage adjustment mechanism is that they are driven by the gap between effective labor demand and labor supply. Labor demand is the minimum of the level of employment as determined by goods demand or firms' desired employment at the going real wage.

Given equations (6) and (7), price and nominal wage adjustment is as follows:

Classical: $dP/P = P(y^d - f(n^d(w))) \quad > 0$

$\qquad dW/W = W(n^d(w) - n^s(w)) \quad < 0$

$\qquad\qquad P(y^d - f(n^d(w))) \quad < 0, \quad w \geq w^*$

Keynesian: $dP/P =$
$\qquad\qquad P(y^d - f(n^s(w))) \quad < 0, \quad w < w^*$
$\qquad dW/W = W(f^{-1}(y^d) - n^s(w)) \quad < 0$

Repressed: $dP/P = P(y^d - f(n^s(w))) \quad > 0$

$$W(n^d(w) - n^s(w)) \quad > 0, \quad f^{-1}(y^d) \geq n^d(w)$$

$$dW/W =$$
$$W(f^{-1}(y^d) - n^s(w)) \quad > 0, \quad f^{-1}(y^d) < n^d(w)$$

In the classical regime prices rise and nominal wages fall so that real wages

unambiguously fall. However, in the Keynesian and repressed inflation regimes, prices

and nominal wages both move in the same direction so that the direction of change in real

wages is ambiguous. Consequently, there are two cases. In the first, nominal wages adjust

faster than prices: in the second, the adjustment speeds are reversed.

The neo-Keynesian case

Figure 3a shows the dynamics of nominal and real wage adjustment in the neo-

Keynesian model under the assumption of faster nominal wage adjustment. The C - K

boundary is the constant price isocline since $y^d = f(n^d(w))$. The K - R boundary is both the

constant price and nominal wage isocline since $y^d = f(n^s(w))$ and $f^{-1}(y^d) = n^s(w)$. Lastly,

the C - R boundary is also the constant nominal wage isocline since $n^d(w) = n^s(w)$.

Furthermore, the repressed inflation regime is divided by a constant real wage isocline.

The logic is that on the C - R boundary nominal wages are constant but there is excess

demand so that prices are rising and real wages are falling. However, as the economy

moves deeper into the repressed inflation regime, nominal wages catch up with price

inflation owing to faster wage adjustment.

Thus, in the classical regime, prices rise, nominal wages fall, and real wages fall. In

the Keynesian regime, prices and nominal wages both fall, but nominal wages fall faster

so that real wages also fall. In the repressed inflation regime, prices and nominal wages

both rise, but real wages fall in one part and rise in another. Given this pattern of dynamic

adjustment, the economy is stable and driven to an equilibrium on the K - R border, the

very end point of which includes the Walrasian full employment equilibrium. On this border there is no unemployment, but firms have vacancies everywhere except the point of Walrasian equilibrium. In terms of figure 1, the economy settles on the labor supply schedule below the point of Walrasian full employment equilibrium.

Figure 3b shows the dynamics of adjustment for the neo-Keynesian case when prices adjust faster. The figure is similar to figure 3a except that real wages now rise in the Keynesian regime, and they fall throughout the repressed inflation regime. Real wages rise in the Keynesian regime despite falling nominal wages because prices are falling even faster. In the repressed inflation regime real wages fall despite rising nominal wages because prices are rising even faster. Once again, the K - R border is a stable equilibrium with no unemployment, but with less employment than the Walrasian equilibrium.

The general case.

Figure 4a shows the dynamics of adjustment for the general case when nominal wages adjust faster. The classical regime borders the repressed inflation regime, and the C - R boundary is the nominal wage isocline along which nominal wages are constant since $n^d(w) = n^s(w)$. The K - R is the price and nominal wage isocline along which prices and nominal wages are constant since $y^d = f(n^s(w))$ and $f^{-1}(y^d) = n^s(w)$. Once again, there is also a real wage isocline in the repressed inflation region along which real wages are constant. The logic is as before. On the C - R boundary nominal wages are constant, but prices are rising because of excess demand in goods markets. Consequently real wages are falling. However, because nominal wages adjust rapidly, deeper movement into the repressed region leads to accelerated nominal wage adjustment which catches up price adjustment.

Inspection of the phase arrows in figure 4a shows that the model is unstable, being driven away from the Walrasian full employment equilibrium in both the Keynesian and repressed inflation regimes. In the Keynesian regime, falling nominal and real wages give rise to negative Kalecki real wage and Fisher nominal debt effects which aggravate the shortage of demand. In the repressed inflation regime, rising nominal wages generate a positive Fisher nominal debt effect which aggravates excess demand. The rising real wage can also aggravate excess demand if the positive Kalecki real wage effect exceeds the impact of higher real wages on labor supply and output.

Lastly, figure 4b shows the phase plane diagram under the assumption that prices adjust faster than nominal wages. Now, real wages rise in the Keynesian regime, but they fall throughout the repressed inflation regime because price adjustment is faster than nominal wage adjustment. Once in the Keynesian regime to the left of point A, the economy is unstable driven away from the Walrasian equilibrium. The K - R border remains a stable equilibrium with no unemployment but less employment than the Walrasian equilibrium. The phase arrows indicate that the economy can be driven to this border when in the repressed inflation regime or certain portions of the Keynesian regime. What is required is rapid adjustment of real wages so that the Kalecki real wage effect offset the Fisher nominal debt effect.

The presence of downwardly flexible nominal wages generates instability as claimed by Keynes in Chapter 19 of The General Theory (1936, p.269). Introducing downward nominal wage rigidity can solve the instability problem but it does not solve the problem of unemployment. If the economy is initially in the Keynesian or classical regions, it will get pushed to the K - C border. Once on the border, aggregate demand equals firms'

willingness to produce so that prices would remain constant. With nominal wages downwardly rigid, real wages would also remain constant and the economy would remain on the border. However, though instability would have been eliminated, there would still be no tendency toward Walrasian equilibrium and unemployment would remain.

Adjustment through monetary and fiscal policy

Increases in nominal debt service payments (iL) shift the Walrasian equilibrium to the right along the line the $w = w^*$. The logic is that maintaining constant aggregate demand requires an unchanged debt service burden, which requires an increase in debtors' nominal wage income. The boundary lines between the K - C and K - R regimes also shift right correspondingly. Reductions in nominal debt service payments have the exact opposite effect.

These shifts imply that interest rate policy can be used to shift the economy between regions by changing nominal debt service payments. Contractionary monetary policy raises interest rates and increases debt service burdens. This shifts the point of Walrasian equilibrium to the right since a higher nominal wage is now needed to compensate for higher nominal service burdens. The K - C and K - R boundaries also shift right. Expansionary monetary policy has the exact opposite effect and shifts everything left.

Fiscal policy works in a similar fashion. Higher government spending requires a lower nominal wage (i.e. increased debt burden) to maintain unchanged aggregate demand, and this shifts the K - C and K - R boundaries left. The reverse holds for contractionary fiscal policy.

These effects show how monetary and fiscal policy can be used in an economy with downward wage rigidity to restore Walrasian equilibrium. Suppose the economy is stuck

on the K - C border. Expansionary policy can shift this border left by alleviating the demand constraint and making firms' willingness to produce the binding constraint. At that stage prices will start to rise, causing real wages to fall and thereby pushing the economy closer to the Walrasian equilibrium. This is illustrated in figure 5. The economy is initially stuck at point X on the K-C border. Expansionary policy shifts the border left, causing real wages to start falling, and the economy then moves toward the new Walrasian equilibrium denoted A'.

6 <u>Endogenous levels of debt, expectations, and cycles</u>

The above model assumes an exogenous level of inside debt, and this is a key factor in explaining why the model is unstable. By way of closing the discussion it is worth considering some implications of endogenizing the level of inside debt and introducing expectations, as these features may transform the model into a business cycle model.

The introduction of expectations about future prices and nominal wages means that agents will have an incentive to adjust their levels of indebtedness. This then requires introducing a market for credit. One issue is what determines borrowers' indebtedness. A second issue is what determines the level of credit supply.

This second issue in turn raises questions regarding the modelling of credit in a monetary economy. In a classical loanable funds model, new borrowing involves a transfer of wealth from lender to borrower. In a Keynesian economy with endogenous bank money there is no necessary transfer of wealth, and instead banks can create new inside debt. Such inside debt creation represents a pure supplement to goods demand.

Expectations and the endogeneity of credit will both influence the level of borrowing. If debtors anticipate falling nominal wages, they will have an incentive to reduce current

consumption and repay existing loans. Such repayments will reduce demand, and in a Keynesian regime they would exacerbate the demand constraint. However, over time, the repayment of debt would reduce the debt service burden which would restore demand. These flow (loan repayment) - stock (debt service burdens) considerations can give rise to a multiplier - accelerator credit driven business cycle (Palley, 1997). In the downswing, loan repayments reduce demand but also result in falling debt service burdens. Falling debt burdens ultimately restore aggregate demand, leading to a renewal of borrowing which then fuels spending and pushes the economy into a credit driven upswing. The upswing could then be further fuelled by expectations of higher future nominal wages which will induce agents to increase current consumption in anticipation of lower future debt service burdens.

7 <u>Conclusion</u>

This paper has incorporated inside nominal debt into a general disequilibrium model. The paper shows why nominal wage adjustment may be insufficient to restore Walrasian equilibrium in economies with inside debt. In such economies nominal wage adjustment has demand effects, and these effects can be destabilizing. Inside debt means that nominal wage increases may be required to reduce Keynesian deficient demand unemployment. However, labor markets will generate nominal wage reductions owing to unemployment.

The central lesson is that economies with inside debt respond differently to nominal wage adjustment compared to economies without inside debt. Given the real world prevalence of inside debt, this means that using models without inside debt to guide thinking may be highly misleading.

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Real wage

$n^s(w)$

w^*

$n^d(w)$

n^* Employment

y^*

$y^d = y(n,P,i,w^*,iL/Wn,g)$

$y = f(n)$

Output

Figure 1   Determination of output, employment and the real wage in a Walrasian equilibrium.

Real wage

C

w^*
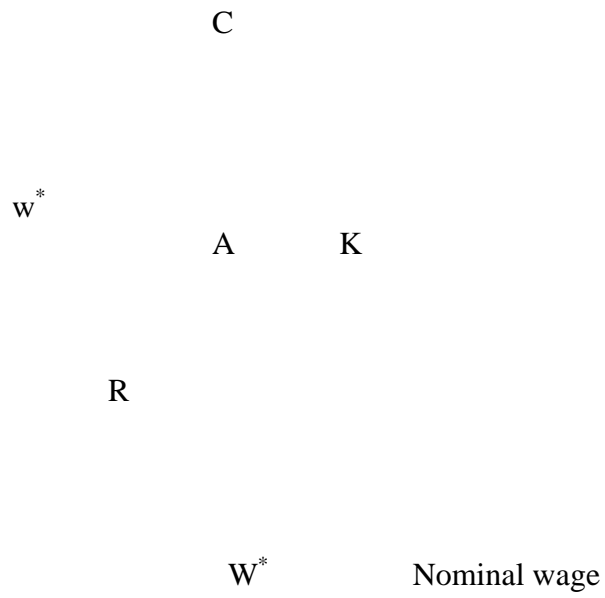
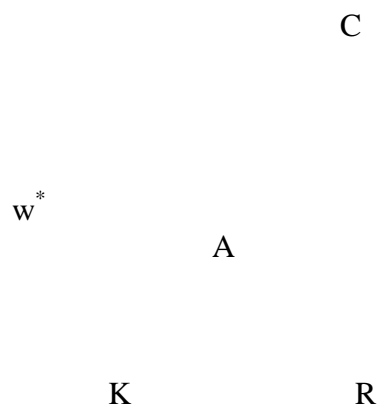A   K

R

W^* Nominal wage

Figure 2a   The neo-Keynesian case. Division of nominal wage - real wage space into Keynesian (K), classical (C), and repressed inflation (R) regions.
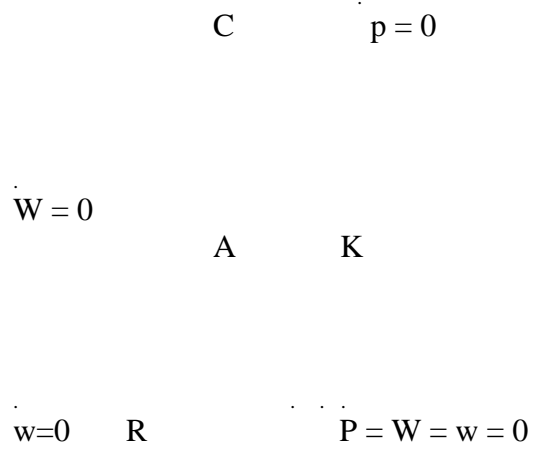
Real wage

C

w^*

A

K   R

W* Nominal wage

Figure 2b The general case. Division of nominal wage - real wage space into Keynesian (K), classical (C), and repressed inflation (R) regions.
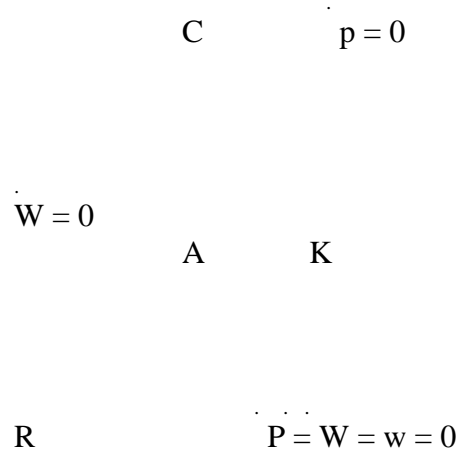
Real wage

C $\dot{p} = 0$

$\dot{W} = 0$

A   K

$\dot{w}=0$ R $\dot{P} = \dot{W} = \dot{w} = 0$

Nominal wage

Figure 3a The neo-Keynesian case. Dynamics of nominal and real wages under the assumption that nominal wages adjust faster than prices.

Real wage

C $\dot{p} = 0$

$\dot{W} = 0$

A   K

R $\dot{P} = \dot{W} = \dot{w} = 0$

Nominal wage

Figure 3b The neo-Keynesian case. Dynamics of nominal and real wages under the assumption that prices adjust faster than nominal wages.

Real wage

$\dot{P} = 0$ C

                                    $\dot{W} = 0$
                    A

                                    $\dot{w} = 0$
              K   R

                          $\dot{P} = \dot{W} = \dot{w} = 0$

                          Nominal wage

Figure 4a The general case. Dynamics of nominal and real wage adjustment under the
assumption that nominal wages adjust faster than prices.

Real wage

$\dot{P} = 0$ C

                                    $\dot{W} = 0$
                    A

              K   R
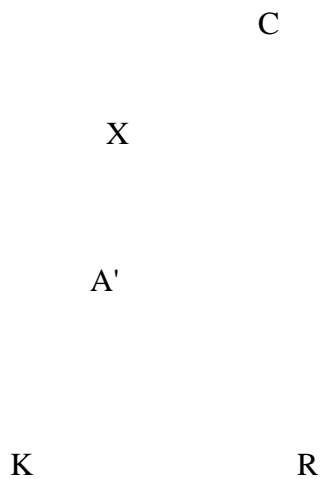
                          $\cdot$ $\cdot$ $\cdot$

$$P = W = w = 0$$

Nominal wage

Figure 4b The general case. Dynamics of nominal and real wage adjustment under the assumption that prices adjust faster than nominal wages.

Real wage

C

X

A'

K   R

Nominal wage

Figure 5   Effect of expansionary monetary policy on the location of
the Keynesian (K), classical (C), and repressed (R) regions.

1..Higher real wages also lower the profit rate, and this could adversely impact investment

spending. Consequently, there is in principle some ambiguity to the sign of the Kalecki effect.

This issue is addressed by Bhaduri and Marglin (1990).

2..In the static model there is no connection between prices and nominal wages. However, the

dynamics of adjustment examined in section V provide a connection. Goods market

disequilibrium changes prices which changes real wages, thereby affecting labor supply and

demand which changes nominal wages. Similarly, labor market disequilibrium changes nominal

wages which changes real wages and aggregate demand, thereby impacting prices.

3.. The figure is similar to those in Malinvaud (1977), except that he works in nominal wage - price

space.