The purpose of this paper is primarily to assess the policy effect of TIP (Tax-based Incomes Policy) both on the real wage rate and the rate of unemployment. Originally it was stressed that TIP could curb the inflationary wage bargaining process between labour and management. In the early 1980's, however, the major target which TIP pursued was to reduce the rate of unemployment rather than the rate of inflation. In the neoclassical context, TIP can reduce the level of NAIRU. However, as far as the Keynesian viewpoint is concerned, we can suggest the possibility that TIP does not succeed in reducing the rate of unemployment. In this case, we would still need to combine TIP with a traditional demand management policy.

1. Introduction

The tax-based incomes policy (TIP) or 'tax on wage increases' has attracted the attention of many economists. Wallich and Weintraub (1971) collaborated in outlining a TIP proposal and its effects in detail. Kotwitz and Portes (1974) and Seidman (1978) analyzed the effects of an inflation tax on reducing unemployment from a microeconomic viewpoint, and more recently Layard (1982) and Grubb, Layard and Symons (1984) tried to provide some theoretical and institutional perspectives on TIP proposals. Calmfors (1984, 1985) has advocated a different type of TIP in a centralized system where there is a high degree of unionization. It has been shown by these researchers that TIP can control an inflationary wage bargaining process which would cause a higher price inflation, and that if TIP can succeed in reducing real wages, then it can also reduce unemployment. It was therefore expected that TIP would become effective against stagflation.

The purpose of this paper is to organize a simple framework for a TIP proposal and to examine the effects of TIP. The TIP model developed here, in a way similar to many of its predecessors, gives the trade union an active role in setting wage negotiations. Our model brings into focus the macroeconomic effects of TIP on real wages and the rate of unemployment. Although TIP itself has been presented as a post Keynesian alternative to neoclassical or monetarist economic policy (see Cornwall (1984)), most TIP models may be characterized as based on the equilibrium theory in the neoclassical context. Accordingly their explanation for existing unemployment can not be considered Keynesian, as it does not take into account involuntary unemployment caused by a lack of effective demand. We will study the effects of TIP on aggre-
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gate demand by modifying the TIP model so as to make it consistent with Keynesian concept. Then we will demonstrate the possibility of a model which contradicts the conventional result: the most important aim of this paper.

In Section 2 we provide a simple TIP model and analyze its impact on inflation and unemployment. Then in Section 3 we present a Keynesian TIP model which is based on effective demand and prove that though the TIP can bring inflation under control, it does not necessarily reduce the rate of unemployment. And in Section 4 we summarize the argument and offer conclusions.

2. The Effect of TIP on the Rate of Unemployment

We start by assuming a strong organized trade union. We assume that the trade union is aiming at increased welfare for not only its members but also for the working class in the aggregate and that it tries to maximize labour's income as a whole, in line with the traditional Dunlop model. On the other hand, it is assumed that a representative firm has a labour demand function which is derived from the myopic profit maximization being fixed in the short run. Hence, our model follows Keynes' first postulate of classical economics. In our model, the firm plays only an passive role on the job front but the trade union plays an aggressive role in setting the real wages.

The production function is defined by the expression:

\[ Y = F((1-u)N, K), \quad F_{(1-u)N} > 0, \quad F_K > 0 \]

where \( Y \) is the total output; \( u \) is the rate of unemployment assumed to be \( 0 < u < 1 \); \( N \) is the working population consisting of the employed persons \((1-u)\times N\) and the unemployed \((u\times N)\); \( K \) is the stock of capital. Assuming that (1) exhibits the constant returns to scale in \((1-u)N\) and \(K\), we have

\[ y = f((1-u)n), \quad f'' > 0, \quad f''' < 0 \]

where \( y(=Y/K) \) is the output-capital ratio; \( n(=N/K) \) is the labour-capital ratio when full employment is realized. For the present we will regard \( n \) as a constant.

TIP is a prescription for using a penalty tax on the excess of a percentage wage increase over a certain TIP norm set by government. Although various TIP proposals can be utilized here, we

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1) Layard (1982) analyzed a different type of TIP model in which the tax is imposed not on the workers but on the firm. The firm will regards this tax as a part of labour cost. It is assumed that the government will give a tax rebate to the firm in order to appear fiscally neutral. The condition for profit maximization is

\[ f' = R(1 + \tau - r) - \tau R_n \]

where \( r \) is the rate of tax rebate. (A-1) gives the demand curve for labour. The trade union will maximize \( W = R_0u + R(1-u) \) subject to (A-1). Hence we obtain

\[ R_0 - R - (1-u)nf''/(1+\tau-r) = 0. \]

If the government can choose the tax rebate properly so that the fiscal effect on labour demand comes to be neutral, then we have \( R = f' \) again. As a result, TIP with a tax-cum-rebate keeps the demand curve for labour unchanged. Taking this into account, we can rewrite (A-2) in the formula for \( R \):

\[ R = [(1 + \tau - r)\sigma/(1 + \tau - r)\sigma - \mu]R_n. \]

(A-3) clearly corresponds to (4). Since \( dR/d\tau < 0 \), a rise in the TIP tax rate will cause the real wage to reduce and, therefore, the rate of unemployment to decrease. This occurs because TIP with tax-cum-rebate makes the labour demand curve faced by the trade union more elastic than before TIP is introduced. On the other hand, TIP with an extra personal income tax, studied in this text, has an effect of shifting the welfare function of the trade union.

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will adopt the TIP model in which the wage inflation tax is directly imposed on the real wages, so no money illusion of workers is included. In this case the optimal program for ensuring that workers are not placed under a money illusion can be formulated as follows:

(3) \[
\text{maximize } W = [R_0u + (R(1 - \tau) + R_\tau)[1 - u]] \\
\text{subject to } R = f'
\]

where \( R \) is real wages; \( R_0(>0; \text{const.}) \) is regarded as the unemployed benefit or livelihood assistance which ensures a subsistence level for the working class; \( \tau \) is a TIP tax rate.\(^2\) The constraint means the marginal productivity condition which gives the demand curve for labour. The before-tax income of a worker is equal to \( R \times (1 - u) \) but it will be reduced by \( (R - R_\tau) \times \tau \) after tax, which corresponds to wages in excess of the 'wage guidepost (= \( R_\tau \)'). Our experience tells us that \( R_\tau > R_0 \) so that if we define \( \alpha = R_\tau/R_0 \), then \( \alpha > 1 \). We will use \( W \) as the objective function of the trade union.

If we define
\[
\sigma = \frac{(f - (1 - u)nf')f'}{(1 - u)nf''}, \\
\mu = \frac{f - (1 - u)nf'}{f},
\]
then the optimal solution is written as:

(4) \[
R = \frac{\sigma}{(\sigma - \mu)} R_1
\]

where \( R_1 = \{(1 - \alpha \tau)/(1 - \tau)\}R_0 \). \( \sigma \) is the elasticity of substitution between labour and capital and \( \mu \) is the share of capital. Since the optimum real wage must be positive, we must assume \( \sigma/\mu > 1 \). And we need an additional assumption to set bounds for \( \alpha \):

(5) \[
\alpha \leq (\sigma/\mu)[(\sigma/\mu - 1 + \tau), \text{ for } \tau \geq 0.
\]

It should be noted that on condition (5), both \( R \geq R_\tau \) and \( 1 > \alpha \tau \) are always realized in equilibrium. If the production function (1) gives a constant value of \( \sigma/\mu \), then we differentiate (4) with respect to \( \tau \) and we have:

(6) \[
\frac{dR}{d\tau} = \frac{(1 - \alpha)}{(1 - \alpha \tau)(1 - \tau)} R.
\]

Since \( \alpha > 1, \alpha \tau < 1 \) and \( \tau < 1 \), the sign of \( dR/d\tau \) comes to be negative. This means that if we introduce a TIP proposal and levy tax on the part of labour income which exceeds a government-set guidepost level, the trade union would be forced to accept a lower real wage than before. Fur-

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\(^2\) In our model developed here, it is not clear how \( R_0 \) is financed because it does not include the budget constraint of the government. If we assume that the unemployment compensation is financed by the firm and the government as well as workers, we can write the budget constraint as follows:

\[
R_0 = (t/x)A, \quad A = [(1 - u)/u]R
\]

where \( t < 1 \) is the unemployment insurance tax rate and \( x \) is the workers' share of the total unemployment compensation (= \( t(1 - u)RN/R_0uN < 1 \)). It is clear that \( dA/du < 0 \) if \( \sigma/\mu > 1 \). Therefore, we can suggest that if a reduction in \( u \) occurs as a result of TIP, \( t/x \) must decrease unless \( R_0 \) changes. It is also possible to argue that if the government intends to keep \( t \) and \( x \) constant, a rise in \( \tau \) should be accompanied by an increase in \( R_0 \) because of a reduction of the rate of unemployment.
thermore, the trade union would opt for a higher level of employment than before at the same time because of the marginal productivity condition which shows a systematic trade-off between real wages and employment. Thus, in the short run, it is possible to conclude that TIP is so effective that it can mitigate both inflation and unemployment.

Equation (4) shows that, to make the real wage stabilize at the guidepost level and realize a desirable rate of inflation, the government must fix the TIP tax rate to

\[
(7) \quad \tau = (\sigma/\mu)/\alpha + (1 - \sigma/\mu).
\]

For a numerical example, let \( \sigma = 1.0, \mu = 0.5 \), as illustrated in Figure 1.\(^3\) Note that in the case of \( \tau = 0 \), the level of real wage is independent of \( \alpha \) and it is always twice as large as \( R_0 \). Let \( \alpha = 1.8 \). If the government raises the TIP tax rate from 0% to 11% (from point \( A \) to point \( B \) in Figure 1), then the real wage will fall from \( 2.0R_0 \) to \( 1.8R_0 \), the 'guidepost' level of the government. Note that employment at point \( B \) will be greater than at point \( A \), by about 23%. If we reduce \( \alpha \) from 1.8 to 1.6, then \( \tau \) must be set up to 25% (point \( C \)): otherwise the real wage rises to \( 1.85R_0 \) and employment falls about 5% lower than that at point \( B \). Why does employment decrease (i.e., unemployment increase) in response to a reduction of \( \alpha \)? It is due to the fact that the smaller \( \alpha \) is, the more likely workers are to accept to take unemployment benefits \( (R_g) \) without working, rather than having to work for wages \( (R_g) \). It follows, therefore, that a decrease in employment caused by a reduction of \( \alpha \) can be regarded as an increase in voluntary unemployment. If the government can fix \( \tau \) at a suitable rate, i.e., \( \tau = 25\% \), then employment at point \( C \) would show an increase of 22.2% compared to the level of employment at point \( B \).

The above observations suggest that TIP has the effect of lowering both the rate of inflation and the rate of unemployment. Further, since the TIP tax rate itself is dependent on the level of \( \alpha \), it should be fixed not according to governmental discretion but according to a rule. The above numerical example shows that if the TIP tax rate is fixed at 11%, the decrease of \( \alpha \) from 1.8 to 1.5 causes both the rate of unemployment and the rate of inflation to rise. Hence, it is nec-

\[3\) It is easy to show how the TIP tax rate changes in order to assure \( R = R_g \) when the various values of \( \sigma/\mu \) are adopted. Clearly, the greater \( \sigma/\mu \) is, the smaller the TIP tax rate corresponding to a given \( \alpha \) is.

---

**Figure 1** Wage Guidepost and the TIP Tax Rate

---
In the long-run, we can assume $R = R_g = \alpha R_0$ if industrial technology remains unchanged. Let $n^*$ be a long-run labour-capital ratio, and we have an equilibrium rate of unemployment ($u^*$) which is given by

$$u^* = \frac{1 - \alpha}{R_0} \int (1 - u^*) n^*.$$  

(8)

Here $u^*$ represents the NAIRU (Non-Accelerating Inflation Rate of Unemployment) in the long-run equilibrium, and one of our major problems is how to deal with it. As noted above, one possible answer is that the correct setting of $\tau$ would reduce the real wage in such a way that it could cause the NAIRU to reduce. To lower the NAIRU is to improve employment, but it is also to reduce the real wages. How probable is it that the welfare of the working class will not suffer by a TIP introduced hypothetically? From (3), (4) and (7), we have

$$W^* = [(1 - \alpha)u^* + \alpha]R_0$$

where $W^*$ is the long-run equilibrium value of per capita income of the working class. By total differentiation of (9),

$$dW^* = (1 - \alpha)R_0 du^* + (1 - u^*)R_0 d\alpha.$$  

Since, from (8), $R_0 d\alpha = -n^* f'' du^*$, it follows that

$$dW^* = [1 + (\mu/\sigma - 1)\alpha]R_0 du^*.$$  

(10)

Clearly, in condition (5), we find that the sign in brackets on the right hand side of (10) comes out positive, which means that the welfare of the working class will decrease as the result of a reduction of NAIRU, itself the result of the rise of the TIP tax rate, in the long-run equilibrium. This, however, raises the question of what would happen if there were a shortage of effective demand. We shall devote the following section to finding the answer to this question.

3. TIP in the Traditional Keynesian Model

We have proved without making any reference to the level of effective demand that the TIP is effective in cutting real wages and increasing the level of employment. The reason why the TIP succeeds in reducing the rate of unemployment is that it can reduce the level of voluntary unemployment, although it cannot reduce the level of involuntary unemployment. Now, in order to see the long-run effect of TIP we shall examine in what way the labour-capital ratio is determined.

The long-run equilibrium of the system, which is presented by the neoclassical growth theory,

---

4) This implies that $\alpha$ as well as $\tau$ is also a policy variable. As noted above, since there is a negative correlation between $\alpha$ and $\tau$ (see Figure 1), a reduction of $\alpha$ is accompanied by an increase in the real wage and, therefore, a rise in the rate of unemployment. This result is compatible with Oswald (1985).
is characterized by the state:

\[(11) \quad sf[(1 - u^*)n^*] = \lambda,\]

where \(s\) is a constant saving ratio (the ratio of total savings, which are equal to the growth of capital stock, to total output); \(\lambda\) is the constant percentage growth rate of the labour force. (11) with the marginal productivity condition shows that if both the savings ratio and the rate of labour force growth are unchanged, the real wage will never change. Nevertheless, given these conditions, we can still prove that TIP is useful for reducing NAIRU. This process is illustrated by Figure 2. At first, let point \(A\) in Figure 2 be a long-run equilibrium point before TIP is introduced. If we utilize the TIP in order to reduce the real wage, then a new temporary equilibrium will be at point \(B\). \(u^*\) will fall to \(u^0\). Since \(n = n^*\) but \(u = u^0 < u^*\) at point \(B\), we have \(sf > \lambda\). This inequality shows that the rate of capital growth is greater than the rate of labour force growth. Hence the labour-capital ratio falls so as to meet with (11). This causes the curved line of \(n = n^*\) to shift rightwards and we will reach point \(C\). If we intend to stay at point \(C\) in order to keep the NAIRU low, then the TIP tax rate should be fixed to the same level as it was at point \(B\). This implies that the TIP proposal proves to be effective if and only if it is continuously executed by the government.\(^5\) All this goes to show that the TIP, according to the neoclassical hypothesis, affects not the real wage but the NAIRU in the long-run. The mechanism through which the NAIRU is reduced depends on the speed of labour-capital ratio adjustment.

However, as clearly proved by Keynes, the major determinant of the real wage, and therefore of the level of employment, is effective demand (see Keynes (1936) and McCombie (1985–86)). To see this it is necessary to revise the model to incorporate the effective demand side.

From the Keynesian viewpoint, it should be noted that industrial technology is not necessarily adjusted so rapidly that it can not equalize the desired savings to the desired investment, and that if there is some reduction in effective demand, involuntary unemployment may increase.

---

\(^5\) Permanence is a characteristic feature of TIP. See Layard (1982). Unlike TIP, the traditional incomes policy should be a temporary expediency.
we shall modify our original model, and see how it changes our previous conclusions.

Instead of (11), the Keynesian system has

\[ y = c + g \]

where \( g \) is the rate of capital accumulation (investment/total output) which we regard as an exogenous variable for convenience,\(^6\) and \( c \) is consumption per unit of capital. By assuming that there is no consumption by managers and no savings by workers, we get \( c = n \times W \). And then, in order to organize the Keynesian system, it is convenient to put all the equations together and re-number them as follows:

\[
\begin{align*}
(K-1) & \quad y = f((1 - u)n) \\
(K-2) & \quad R = f'(1 - u)n \\
(K-3) & \quad W = (1 - u)((1 - \tau)R + \alpha \tau R_0) + uR_0 \\
(K-4) & \quad R = \rho(\tau)R_0, \quad \rho(\tau) = (\sigma(\sigma - \mu))(1 - \alpha \tau)/(1 - \tau) \\
(K-5) & \quad y = nW + g.
\end{align*}
\]

The system includes five endogenous variables: \( y, R, W, u \) and \( n \). If a value of \( g \) is given, \( (K-1)-(K-5) \) will compose a complete Keynesian model.\(^7\) We can rewrite this system in terms of \( u \) and \( n \):

\[
\begin{align*}
\Phi(u, n; \tau) = \rho(\tau)R_0 - f'((1 - u)n) &= 0 \\
\Psi(u, n; \tau, g) = f - n[(1 - u)[\rho(\tau)(1 - \tau)R_0 + \alpha \tau R_0] + uR_0] - g &= 0.
\end{align*}
\]

By means of the comparative statics, we shall analyze the effect of a change of parameter, \( g \) or \( \tau \), on the rate of unemployment or on the labour-capital ratio.\(^8\)

If the TIP tax rate is unchanged, we obtain

\[
\frac{du}{dg} < 0, \quad \frac{dn}{dg} < 0.
\]

This shows that if the rate of capital accumulation happens to fall, the result will be a rise in both

\(^6\) If we assume that \( g \) is an endogenous variable denoted by

\[ g = g(f), \quad g' > 0, \]

then we will have another model. However, it is easy to show that as far as the effectiveness of TIP is concerned, our general conclusions remain the same.

\(^7\) If we use (11) instead of (K-5), we have a neoclassical TIP model.

\(^8\) By the partial derivatives of \( \Phi \) and \( \Psi \), we have

\[
\begin{align*}
\Phi_1 &= nf'' < 0 \\
\Phi_2 &= -(1 - u)f'' > 0 \\
\Phi_\tau &= \rho'R_0 < 0 \\
\Psi_1 &= -nR_0[(1 - \alpha \tau) + \rho(\tau)\tau] < 0 \\
\Psi_2 &= R_0[(1 - u)(\rho(\tau)\tau - \alpha \tau) - u] \\
\Psi_\tau &= n(1 - u)\alpha R_0(\sigma(\sigma - \mu)) > 0 \\
\Psi_\mu &= -1 < 0.
\end{align*}
\]

From them, we have

\[
\begin{align*}
\frac{du}{dg} &= \Phi_2\Psi_\mu/J < 0 \\
\frac{dn}{dg} &= -\Phi_1\Psi_\mu/J < 0
\end{align*}
\]

and

\[
\begin{align*}
\frac{dn}{d\tau} &= (\Phi, \Psi_1 - \Phi_1\Psi_1)/J > 0 \\
\frac{du}{d\tau} &= (\Phi_2\Psi_\tau - \Phi_\tau\Psi_2)/J,
\end{align*}
\]

where \( J = \Phi_1\Psi_2 - \Phi_2\Psi_1 = -nf''R_0 > 0. \)
the rate of unemployment and the labour-capital ratio. As \( \alpha \) and \( \sigma/\mu \) are assumed to be constant, (K-4) shows that the real wage will never change. Although the level of real wage is still as it was \( (\rho \times R_0) \), the rate of unemployment will be forced to increase as a result of the reduction of the rate of capital accumulation. Since it is not the rise in the real wage but the reduction of capital accumulation that raises the rate of unemployment, we shall assume that it is involuntary unemployment.

Nevertheless, it can still be argued, as mentioned above, that TIP has the effect of lowering the rate of unemployment as it reduces the real wage. It is significant that in the following analysis not only is the investment schedule restricted to a constant level but also consumption may be suppressed by the decline in the real wage caused by TIP. If \( g \) is unchanged, then \( dn/d\tau > 0 \) but the sign of \( du/d\tau \) is not certain. The sign depends on the sign of \( \Psi_2 = \partial \Psi / \partial n \);

\[
\Psi_2 = \partial f / \partial n - \partial c / \partial n
\]

If \( \Psi_2 > 0 \), then \( du/d\tau \) is positive so that a rise in the TIP tax rate will cause the rate of unemployment to rise. Therefore, we refer to \( \Psi_2 > 0 \) as a sufficient condition for \( du/d\tau > 0 \). The positive value of \( \Psi_2 \) means that consumption must increase by less than total output to the extent that \( n \) increases independently of \( u \). Note that per capita consumption \( (=W) \) decreases whenever the TIP tax rate is raised. But the most important fact that is emerging from studies of the Keynesian TIP model is that TIP cannot always affect the real wage so as to lower the rate of unemployment. The determination of real wage and rate of unemployment can be described in Figure 3. Let the equilibrium point before TIP is introduced be point \( A \). The first impact of an increase in the TIP tax rate is a fall in the real wage (from \( R^* \) to \( R_0 \)). Since labour demand decreases as a result, a restricted investment will cause \( n \) to rise, thus shifting the demand curve for labour leftwards. The size of the shift is dependent on what happens to real consumption. If consumption cannot increase enough (namely \( \Psi_2 > 0 \)), then the new equilibrium point will be at point \( C \), the rate of unemployment having risen to \( u_0 \).

In our Keynesian TIP model, unlike the neoclassical model, \( n \) does not change so as to reduce the rate of unemployment. As proved above, a restricted capital accumulation and a suppressed consumption seem to cause the rate of unemployment to rise even if TIP proves to be effective in
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reducing the real wage. This is contrary to the optimistic results and conclusions reached by employing the neoclassical hypothesis.

4. Concluding Remarks

We have constructed a simple framework that is capable of characterizing the Keynesian approach in order to study the effectiveness of TIP. The most important finding of this paper is that if we adopt the Keynesian model which is based on the theory of effective demand, the effectiveness of TIP is uncertain.

Originally, the major objective of TIP was to curb inflationary collective bargaining by using the tax system. However, in the early 1980’s when inflation was under the control of monetary policy exemplified by quantitative credit control, it was suggested that TIP should be utilized in order to reduce the rate of unemployment rather than the rate of inflation. In the neoclassical context, it is possible to argue that TIP can reduce the level of NAIRU in the long run although it does not affect the real wage in the long run.

If we adopt the Keynesian TIP model, however, we are governed by different considerations. From the Keynesian viewpoint, we must insist that although TIP can reduce the rate of inflation, it may not succeed in reducing the level of unemployment. On the contrary, it may very well cause the rate of unemployment to rise. Hence, we are still confronted with a trade-off between inflation and unemployment and as a result we need to combine TIP with a different policy instrument such as demand management, to produce a desirable effect on the economy.

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