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Income Tax Cuts and Inflation in Ireland

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Abstract: A two sector model of the Irish Economy is used to analyse whether either temporarily or permanently deferring reductions in labour tax rates would cut inflation in the short run. If the deferral of tax cuts is seen as permanent, simulations indicate the demand reduction caused by the higher tax rate may outweigh the reduction in supply causing prices to fall. If the deferral of tax cuts is seen as temporary the supply side effects dominate and the price level will rise as long as labour's share of non-traded output is higher than labour's share of traded output. This indicates that the argument being made by some economists that reductions in income tax should be temporarily deferred to curb inflation may be misguided.

I INTRODUCTION

The Irish economy has grown rapidly in recent years while still maintaining low inflation. Increasingly, economists have warned that the economy is reaching full capacity and that unless demand is curtailed inflationary problems will result. In particular some economists argue that cuts in labour taxes that have been promised should not be delivered on now, in the interests of maintaining a stable growth path. The argument being that such tax cuts will stimulate demand and inflation. In this paper I extend the model of the Irish economy in Barry (1997) to endogenise the labour market and simulate how deferring tax cuts will affect inflation in the short run. The results suggest that a temporary deferral of tax cuts would only lower inflation if workers believed it to be permanent. If labour tax cuts are temporarily deferred and workers believe the deferral to be temporary, the model suggests that the negative supply side effects of the tax increase will

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dominate any reduction in demand, leading to a rise in prices.

It could be argued that given the current climate of uncertainty, internationally in particular, that if tax cuts are postponed this year, workers may be unsure that they will be implemented next year. The argument in this paper is not about whether the optimal labour tax should be higher or lower in the long run. Rather it questions the appropriateness of using income tax rates as an instrument in short term stabilisation policy. In the current climate in Ireland given the healthy fiscal position there seems to be a compelling case for cutting taxes. If the optimal tax rate is lower than the current rate then it would clearly be inefficient to maintain the current rate in the long run, while as I argue below temporarily changing tax rates as a short term stabilisation instrument will not work unless the government can systematically fool workers that short term changes are in fact permanent.

In the analysis a deferral of tax cuts is analysed as a tax increase. The tax increase will decrease both supply and demand and the effect on inflation depends on which effect dominates. The supply side effect comes from an increase in labour costs which decreases the supply of non-tradable goods. The decrease in demand is the result of the decrease in disposable incomes caused by the tax increase. This drives down the price of non-tradable goods. If taxes are not cut this year in an effort to curb inflationary pressures, but consumers believe that taxes will be cut in the near future, consumers expected permanent income and expenditure plans are unlikely to be significantly altered. In this scenario the negative supply side effects of this temporary tax increase in increasing labour costs are more likely to dominate the reduction in demand resulting from smaller disposable incomes.

II THE MODEL

There are two sectors in the economy, a traded (T) sector and a non-traded (N) sector. Prices in the T sector are determined exogenously, while prices in the N sector are determined by domestic supply and demand. See Kenny and McGettigan (1996) for an empirical study of the determinants of traded and non-traded inflation. Firms in any sector i maximise profits subject to a Cobb-Douglas production function:

$$\pi = P_i K_i^{\alpha_i} L_i^{(1-\alpha_i)} - wL_i - rK_i \qquad (1)$$

This is a short run analysis so capital (K) is fixed in each sector. The short run labour demand curve is:

$$L_i = \left(\frac{w_i}{p_i}\right)^{-\frac{1}{\alpha_i}} K_i(1-\alpha_i)^{\frac{1}{\alpha_i}} \tag{2}$$

This is a constant elasticity demand curve of the form $L_i = \gamma_i(w_i / p_i)^{\varepsilon_i^d}$, where ε_i^d is the short run elasticity of labour demand. I also assume that the elasticity of labour supply is constant so the labour supply curve is $L_s = \gamma_s(w_i(1-t)/p)^{\varepsilon_i^s}$. P is the consumer price index. A fixed fraction θ of disposable income is spent on non-tradable goods, implying that the log of the consumer price index satisfies: $\ln P = \theta \ln P_n + (1-\theta)\ln P_t$ (See Lindbeck, 1979). I assume the type of labour employed in the tradable sector is different to the non-tradable sector so that the equilibrium wage in each sector is solved separately. This assumption is made to make the analysis easier. By setting labour supply equal to labour demand in each sector, taking logs and rearranging I get the following equilibrium expression for the log of the nominal wage rate in each sector:

$$\ln w_N = B^N + \frac{\left(\varepsilon_N^d - \varepsilon_N^s\theta\right)\ln p_N + \varepsilon_N^s \ln(1-t)}{\varepsilon_N^d - \varepsilon_N^s} \tag{3}$$

$$\ln w_T = B^T + \frac{-\varepsilon_T^s\theta \ln p_n + \varepsilon_T^s \ln(1-t)}{\varepsilon_T^d - \varepsilon_T^s} \tag{4}$$

B_N and B_T are exogenous parameters. Labour's share of income in any sector is given by $(1-\alpha_i)$. Real income evaluated in traded goods prices is $Y = Y_T + [P_N/P_T]Y_N$. If a tax rate t is levied on labour income, in equilibrium, disposable income is income in each sector as above less the tax rate times labour's share in income:

$$P_T Y_D = P_T Y_T\left[1-(1-\alpha_T)t\right] + P_N Y_N\left[1-(1-\alpha_N)t\right] \tag{5}$$

using the fact that $P_N Y_N = \theta P_T Y_D$ and rearranging, we get:

$$P_N = \frac{\theta\left[1+(\alpha_T-1)t\right]}{1-\theta\left[1+(\alpha_N-1)t\right]} P_t \frac{Y_T}{Y_N} = A(t) P_T \frac{Y_T}{Y_N} \tag{6}$$

Next we substitute the short run labour demand functions in Equation (2) into the production function in Equation (1). The resulting expression is substituted for output in Equation (6). Taking logs allows us to separate out

the effect of wages in an equilibrium equation for the natural log of non-traded prices:

$$\ln P_N = \alpha_N \ln A(t) + \alpha_N \ln C - \frac{\alpha_N}{\alpha_T}(1-\alpha_T)\ln W_T + (1-\alpha_N)\ln W_N \qquad (7)$$

C is an exogenous term. We can substitute the equilibrium wages in Equations (3) and (4) into Equation (7) and solve for the non-traded price level in terms of exogenous parameters and the tax rate:

$$\ln P_N D = E + \ln\left[1+(\alpha_T-1)t\right] - \ln\left(1-\theta\left[1+(\alpha_N-1)t\right]\right)$$
$$-\frac{\alpha_N(1-\alpha_T)}{\alpha_T\left(\varepsilon_T^d-\varepsilon_T^s\right)}\varepsilon_T^s \ln(1-t) + \frac{(1-\alpha_N)}{\varepsilon_N^d-\varepsilon_N^s}\varepsilon_N^s \ln(1-t) \qquad (8)$$

$$\text{Where } D = 1 - \frac{\alpha_N(1-\alpha_T)\varepsilon_T^s\theta}{\alpha_T\left(\varepsilon_T^d-\varepsilon_T^s\right)} - \frac{(1-\alpha_N)\left(\varepsilon_N^d-\varepsilon_N^s\theta\right)}{\varepsilon_N^d-\varepsilon_N^s}$$

E is exogenous and has no bearing on the affect of a tax change on non-traded prices. The derivative of non-traded prices with respect to the labour tax is:

$$\frac{\partial \ln P_N}{\partial_t} = -\frac{1-\alpha_T}{\left[1-(1-\alpha_T)t\right]D} - \frac{\theta(1-\alpha_N)}{1-\theta\left[1-(1-\alpha_N)t\right]D}$$
$$+\frac{\alpha_N(1-\alpha_T)}{\alpha_T(\varepsilon_T^d-\varepsilon_T^s)(1-t)D}\varepsilon_T^s - \frac{(1-\alpha_N)}{(\varepsilon_N^d-\varepsilon_N^s)(1-t)D}\varepsilon_N^s \qquad (9)$$

D is exogenous and will not affect the sign of the derivative since it can be shown that it must always be positive unless the labour supply elasticity is negative.[1]

III SIMULATIONS

Simulations of the above equation are given in the following tables. In the tables I examine how a baseline scenario with reasonable parameter values is affected by changing the different parameters. It should be emphasised that the simulations below all assume that workers treat the tax change as if it were permanent. It will be shown in the following section that this assumption is crucial in determining the effect of a tax change on prices. The

1. In particular D will be positive unless the labour supply elasticity for tradables is negative and a little smaller in absolute value terms, than the labour demand elasticity for tradables.

simulations demonstrate that while it is possible for a tax increase that is perceived as permanent to increase prices this only happens for an unlikely mix of parameter values.

We notice that given the production function the short run elasticity of labour demand in a sector i is given by $\varepsilon_i^d = -1/\alpha_i$. By assuming values for labour supply elasticities and labour share in each sector, for the tax rate and θ (the share of disposable income spent on non-tradables) we can see how the derivative in Equation (9) behaves. The first two terms reflect the effect of lower disposable incomes of workers in the tradable and non-tradable sectors respectively, resulting from a tax increase. These terms will always be negative. The two final terms reflect the supply side effects of a tax increase plus the demand side effects of the fall in income resulting from these supply side effects. When the tax rate is increased labour costs rise and output falls in both sectors. Lower traded output reduces income and non-traded prices. Lower non-traded output increases non-traded prices. Thus as long as labour supply elasticities are positive and labour demand elasticities negative, the third term will be negative and the fourth term positive.

Table 1: *Effect of Higher Tax or Lower Theta on Baseline Case*

	Baseline Case	*Higher Tax*	*Lower Theta*
$1-\alpha_t$	0.5	0.5	0.5
$1-\alpha_n$	0.7	0.7	0.7
α_t	0.5	0.5	0.5
α_n	0.3	0.3	0.3
t	0.3	0.4	0.3
θ	0.4	0.4	0.3
ε_t^d	–2.0	–2.0	–2.0
ε_n^d	–3.3	–3.3	–3.3
ε_t^s	1.0	1.0	1.0
ε_n^s	1.0	1.0	1.0
dlnPn/dt	–0.515	–0.521	–0.48

The values chosen for θ in the baseline case is based on the values used in Barry (1997). A given value for labour's share determines the labour demand elasticity in any sector. Table 1 shows that lower values for θ imply a smaller effect on prices since it implies that a smaller share of a change in disposable income resulting from a tax change feeds into the demand for non-tradables. A higher level for the labour tax rate increases the derivative in Table 1, but

the effect of the initial tax rate on the derivative in Equation (9) depends on the other parameter values since it affects both supply and demand.

Table 2: *Effect of Higher Labour Supply Elasticities on Baseline Case*

	Baseline Case	*Higher* ε_n^s	*Higher* ε_t^s	*Higher* ε_n^s *and* ε_t^s
$1-\alpha_t$	0.5	0.5	0.5	0.5
$1-\alpha_n$	0.7	0.7	0.7	0.7
α_t	0.5	0.5	0.5	0.5
α_n	0.3	0.3	0.3	0.3
t	0.3	0.3	0.3	0.3
θ	0.4	0.4	0.4	0.4
ε_t^d	–2.0	–2.0	–2.0	–2.0
ε_n^d	–3.3	–3.3	–3.3	–3.3
ε_t^s	1.0	1.0	1000.0	1000.0
ε_n^s	1.0	1000.0	1.0	1000.0
dlnPn/dt	–0.515	–0.057	–0.661	–0.265

If labour supply is more elastic this increases the supply side effect of a tax change. Since traded prices are exogenous, however, a higher labour supply elasticity in the traded sector means a tax increase causes a bigger reduction in traded output which reduces disposable income and hence the demand for and price of non-tradables. A higher labour supply elasticity in the non-traded sector means a tax increase leads to a big fall in non-traded output and a rise in non-traded prices. While labour supply could be more elastic in the non-traded sector (for example, if non-traded workers tended to have less firm specific skill and these workers were more mobile in the short run or if different degrees of unionisation across sectors affected mobility) there is no compelling evidence to support these stories. Allowing the labour supply elasticities to differ across sectors does help to illustrate the workings of the model.

The size of the labour supply elasticity we choose is clearly important from Table 2. Increasing the size of the elasticity in both sectors makes the derivative in Equation (9) less negative. The Irish labour market is often modelled as a region of the UK labour market so that the labour supply elasticity could indeed be large. Honohan (1992) for example shows that the Irish unemployment rate is largely explained by lagged values of the British rate implying the two labour markets are closely integrated and Walsh (1994) provides evidence that the Irish and UK labour markets are closely

integrated. More recent influxes of workers from other European countries makes the assumption of a large labour supply elasticity even more reasonable. An argument against the validity of assuming large values for the labour supply elasticities is that it is not appropriate for the kind of short run analysis of this paper. Additionally recent work by Fitz Gerald and Kearney (1998) on migration flows suggests that given the strong employment growth of recent years the stock of potential return migrants currently in other countries such as the UK may be small.

The model implies values for the labour demand elasticities once we assume labour's share in output. The implied numbers for reasonable values of labour's share are higher than the numbers found in Bradley, Fitz Gerald and Kearney (1991 and 1993). Table 3 imposes the labour demand elasticities used in Barry (1997) which are based on the above studies, rather than those implied by the model. We see that this does not change the results dramatically. Finally, Table 3 shows a mix of parameters that can generate an increase in the price level resulting from a tax increase. To get a rise in the tax rate increasing prices we need a combination of factors. A smaller labour share in the traded sector ensures that the supply side effect of the tax increase on the traded sector is small (a small labour share in the non-traded sector would have the opposite effect on prices). A small value for θ and very elastic labour supply also increase the value of the derivative in Equation (9) as explained earlier.

Table 3: *Effect of Lower Labour Demand Elasticities on Baseline Case, and Case with Positive Price Effect*

	Baseline Case	*Lower* ε_t^d *and* ε_n^d	*Parameter Mix with Positive Price Effect*
$1-\alpha_t$	0.5	0.5	0.4
$1-\alpha_n$	0.7	0.7	0.7
α_t	0.5	0.5	0.6
α_n	0.3	0.3	0.3
t	0.3	0.3	0.4
θ	0.4	0.3	0.3
ε_t^d	–2.0	–0.6	–1.7
ε_n^d	–3.3	–1.0	–3.3
ε_t^s	1.0	1.0	1000.0
ε_n^s	1.0	1.0	1000.0
dlnPn/dt	–0.515	–0.417	0.023

IV TEMPORARY VERSUS PERMANENT TAX CHANGES

A tax change which is seen as temporary is unlikely to affect expenditure plans as much as a permanent tax change. In the current climate of tax reduction postponing expected tax reductions for a year would not significantly alter expected permanent income, while it could have a large effect on labour supply. While the income effects on labour supply would be small there would be intertemporal as well as intratemporal substitution towards current leisure. To illustrate we can go back to Equation (7) and treat A as a constant term. The tax increase raises labour costs and reduces output in both sectors. Demand side effects are not completely eliminated since a fraction θ of the *change* in output resulting from the wage change affects the demand for non-tradables. In terms of the change in the price of non-tradables from a change in the labour tax, the first two terms in Equation (9) which were formerly negative, will now be zero. Assuming that labour supply elasticities are the same across sectors, a sufficient condition for a temporary tax increase to increase the price of non-tradables is that $(1-\alpha_n) > (1-\alpha_T)$. That is if labours share in non-tradables is greater than in tradables, the sum of the last two terms in Equation (9) will be positive. Such an assumption seems plausible.

V CONCLUSION

While it may be desirable that macroeconomic policy be anti-inflationary in the current climate of rapid growth, we should be careful in choosing the instruments used to stabilise the economy. Temporarily postponing tax cuts may well add to inflation because the negative effects on demand could be outweighed by adverse supply side affects.

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