Does taxation discourage work effort? Consider this question with reference to income (direct) and commodity (indirect) taxes.

Tax and transfers can have an effect on the rewards gained from labour which can affect work effort which affects labour supply (Cullis and Jones, 2009). Optimal tax can depend on the increase in social welfare from the redistribution of income balanced with the effect the tax has on the supply of labour (Piketty and Saez, 2013). The magnitude of this effect depends on several factors as discussed below.

Labour supply can be examined using a two-good model with a fixed amount of time allocated to labour or leisure (Rosen and Gayer, 2014). The wage rate, w is reduced by the tax rate t to give a post-tax wage rate of $w(1-t)$. If there is one consumption good (C) with a price (P) and all income is spent on consumption, then the budget constraint without the tax can be written as:

$$C = \frac{wT}{P} - \frac{wl}{P} \tag{1}$$

And with the tax as:

$$C = \frac{(1-t)wT}{P} - \frac{(1-t)wl}{P} \tag{2}$$

Typically, people work in order to earn an income allowing them to spend on consumption, a proportional income tax reduces the amount of consumption generated by each hour worked, this shifts the slope of the budget constraint, the tax has effectively changed the price of leisure time, illustrated in Figure 1.

There are two effects in force here which work in opposition to each other, the substitution effect and the income effect.

The decrease in the effective wage rate due to taxation reduces the opportunity cost of leisure. This reduction in cost leads to an increase in consumption, an effect that is called the substitution effect, which is illustrated in Figure 2.

However, the fall in income as a result of the tax, under the assumption that leisure is a normal good, will also lead to a decrease in the consumption of leisure; this income effect shifts leisure time

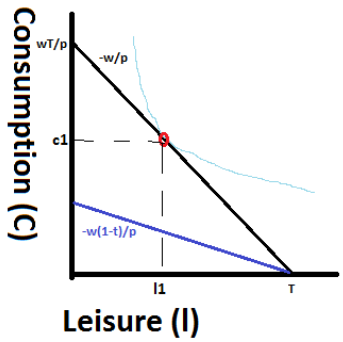

Figure 1: Two good model: labour and leisure (Rosen and Gayer, 2014)

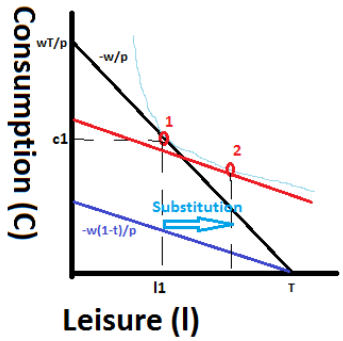

Figure 2: Substitution Effect (Rosen and Gayer, 2014)

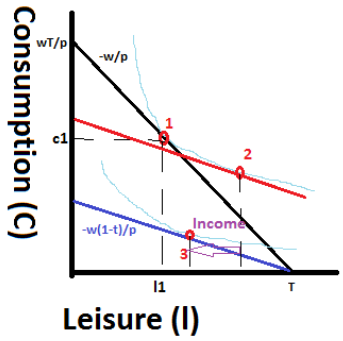

Figure 3: Income Effect (Rosen and Gayer, 2014)

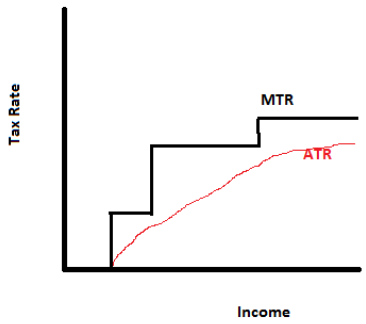

Figure 4: Marginal vs average tax rate in the UK (James and Nobes, 2016)

to the left, illustrated in Figure 3.

In an economy with a progressive tax system such as the UK the average tax rate of a high rate tax payer will be higher than the average rate of a tax payer who earns less than their personal allowance or a basic rate tax payer, as illustrated in Figure 4.

The income effect relates to the average tax rate because average tax rate determines income whereas the substitution effect relates to the marginal tax rate which determines marginal benefit.

The income effect and the substitution effect work against each other and the post-tax choice compared to the pre-tax choice will depend on the relative magnitude of the two effects. If the substitution effect is greater than the income effect labour will decrease, if the income effect is greater than the substitution effect labour will increase. One of the influences on the relative magnitudes of these two effects can be wage rates. At low wage rates the income effect dominates leading to an increase in labour supply with increasing wages, labour supply is highly elastic, but at high wage rates the substitution effect may become more dominant and labour supply becomes highly inelastic leading to a backwards bending supply curve, as illustrated in Figure 5. The combined effect of the substitution and income effects is known as the uncompensated wage effect (Keane, 2011).

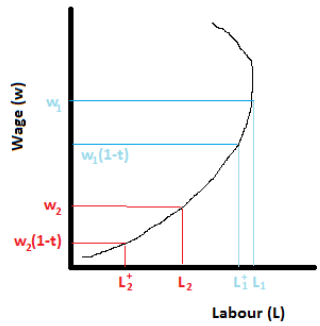

Figure 5: Backwards bending labour supply curve (Keane, 2011)

A factor that is thought to have an effect tax and labour supply is gender, tax can be said to discourage work, especially for married women with young children (Phillips, 2007). Keane (2011) comments that for males most economists believe that labour elasticities are small however the author also argues that there is a statistical difference in results across studies and that there are two factors that drive these differences, the first being the use of direct vs ratio wage measures (direct tends to produce larger elasticities) and secondly, the failure of most studies to account for the value of human capital returns to work experience. In contrast studies regarding females tend to find large labour supply elasticities and therefore traditionally labour supply of married women who are secondary earners in a marriage have been found to be more elastic than married men who are typically the primary earner in the family.

Another reason for a difference between the elasticities of labour supply of males and married females and lone mothers is that the childcare and care for elderly relatives and other household non market activities are often regarded as the females' responsibility leading to females often taking on shorter working hours in order to accommodate these responsibilities resulting in a weaker labour market attachment for women (European Commission, 2015). Males may also have a higher labour supply elasticity at the beginning or end of their careers when they consider the benefits between employment and further education or retirement.

In the UK there is a complex system of benefits and tax credits in place. These are mostly means tested and aim to provide a safety net against poverty and some, such as working tax credits, provide incentives to provide labour at the same time. Meghir and Phillips (2010) discuss how at the margin, welfare benefits may act as taxes on individuals because amounts received vary with earnings of income in order to limit eligibility to those most in need, this also implies a marginal tax rate on earnings as benefits are withdrawn, the benefit (B) they receive allows for $\frac{B}{P}$ consumption. When the benefit

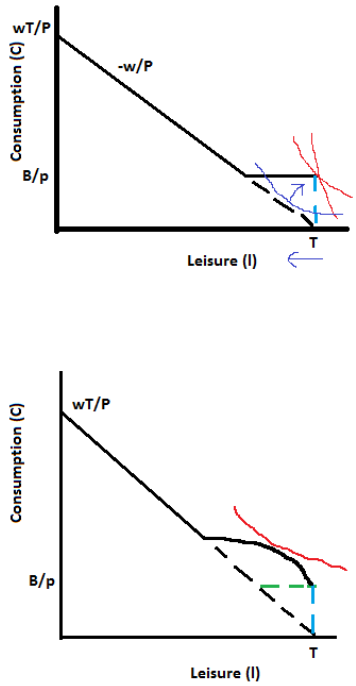

Figure 6: Effect of benefits withdrawn at a 1:1 ratio vs phase out rate (Meghir and Phillips, 2010)

is withdrawn on line with labour income on a 1:1 ratio there is no incentive to supply low levels of labour that would exist in the absence of the benefit. An alternative to help prevent this unintended consequence is the use of a phase out rate such as child tax credit in the UK and Earned Income Tax Credit in the USA, illustrated in Figure 6.

It is essential to consider that income effects will vary between individuals and over groups and the human capital may also need to be considered along with the total compensation package a worker receives.

An alternative to income tax could be to utilise indirect taxes to raise tax revenue such as Value Added Tax (VAT) in the UK. However it can be noted that there is an equivalence between a single rate income tax and a consumption tax, as shown by the following:

$$p_x X + p_y Y = I(1 - 0.2) = 0.8I \tag{3}$$

such that:

$$1.25\{p_x X + p_y Y\} = I \tag{4}$$

When income tax is 20% commodity tax must be 25% across all goods to create equivalence

between the income tax rate and commodity tax rate, £100 becomes £80 of income with a 20% tax rate but a 25% commodity tax rate would need to be applied to equal £100 when taxed the other way around (Mirrlees et al., 2012). This would hold regardless of how many goods are added however, this model is rarely used in reality because leisure is not taken into consideration, it is too difficult to differentiate to tax, for example should train tickets to football match be taxed at a higher rate than train tickets to work? Is a drink with work colleagues work or leisure?

The one exception that seems to be drawn is childcare. It is often agreed that childcare should be subsidised because it is quite clearly a complement to labour supply. Mirrlees et al. (2012) suggests "taxing childcare services (during working hours) less heavily than other goods and services would help to offset the disincentives to work created by other parts of the tax system."

An alternative to direct (income) taxes and commodity taxes that would be unlikely to affect labour supply would be a lump sum tax. Lump sum taxes are actually more efficient than commodity and direct taxes as they do not incur the same level of deadweight loss and utility loss however, they are not very well received. They are regressive taxes and as demonstrated when the Poll tax was implemented in Scotland in 1989 and then in England and Wales in 1990, highly unpopular leading to widespread failure to register and default on payment rendering it uncollectable in the long term (Smith, 1991). It is unclear how to set a lump sum tax and if based on some observable characteristic it is likely to lead to changes in behaviour to avoid the tax.

In conclusion income tax may be considered to discourage work effort if the substitution effect is greater than the income effect. These effects are affected by the elasticity of labour supply which can be influenced by factors such as wage level and gender. Inefficiency of income taxation is higher with elastic supply. It is difficult to assess the impact of indirect taxes because leisure time is missing from the model, the only commodity that is often thought to clearly complement labour supply is childcare. A lump sum tax may be least likely to affect labour supply however they are unpopular and difficult to implement.

References

Cullis, J. and Jones, P. (2009) *Public Finance and Public Choice (3rd ed.).* Oxford: Oxford University Press.

European Commission, (2015). Study on the effects and incidence of labour taxation. Retrieved from https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_56.pdf [Accessed on xx-mmm-yyyy].

James, S. and Nobes, C. (2016). The Economics of Taxation (16th ed.). Birmingham: Fiscal Publications.

Keane, M. (2011). Labour Supply and Taxes: A Survey. *Journal of Economic Literature* , 49 (4), 961-1075.

Meghir, C. and Phillips, D. (2010). "Labour Supply and Taxes." In *Dimensions of Tax Design*, edited by S. Adam, T. Besley, R. Blundell, S. Bond, T. Chote, M. Gammie, P. Johnson, G. Myles, and J. Poterba. Oxford, UK: Oxford University Press.

Mirrlees, J, Adam, S., Besley, T., Blundell, R., Bond, S., Chote, R., Gammie, M., Johnson, P., Myles, G. and Poterba, J. (2012). The Mirrlees Review: A Proposal for Systematic Tax Reform. *National Tax Journal*, 65 (3), 655–84.

Rosen, H. S. and Gayer, T. (2014). *Public Finance. 10th ed.* Maidenhead, UK: McGraw Hill Education.

Piketty, T. and Saez, E. (2013). "Optimal Labor Income Taxation." In *Handbook of Public Econiomics: Volume 5*, edited by A. Auerbach, R. Chetty, M. Feldstein, and E. Saez. Amsterdam, The Netherlands: North Holland.

Smith, P. (1991). Lessons from the British Poll Tax Disaster.*National Tax Journal*, 44, (2), 421-436.

Criterion	Mark
Knowledge and Understanding	90
Cognitive/Intellectual Skills	90
Use of Research Informed Literature	80
Graduate Skills	80
Final Mark	85