

## Policy-making and the income and substitution effects

So, here's the situation: you're down to your last £10. And you just can't decide how to spend it. There's that CD you've wanted for ages, so you could get that. But then again, all your mates are going to the cinema on Friday night, and that would cover your ticket AND some popcorn on the side. So what do you do?

Well, imagine I told you that the price of the CD you wanted has just gone up. Instead of £7.99, it's now £9.99! So you could still afford to buy it, but suddenly, it looks like a rather less appealing option, doesn't it? And that's for two reasons:

- 1) The *income effect*: you feel poorer because you can afford to buy fewer CDs for a given amount of income.
- 2) The *substitution effect*: the CD now appears relatively more expensive than the cinema ticket, so you're likely to substitute the purchase of cinema tickets for the purchase of CDs.

And because CDs are *normal goods* (i.e. demand for them increases as income rises), these two effects both cause you to demand fewer CDs, other things being equal.

Now, the government doesn't spend very much on CDs or cinema tickets (or at least we hope they don't!), but the income and substitution effects also have many other applications that are extremely important for policy-makers.

## *Income tax and labour supply*

What if wages were to rise instead of prices? This can be analysed in exactly the same way if we think of leisure (time spent not working) as a good that can be bought by foregoing wages, i.e. one hour of leisure costs you the wage that you would have received had you gone to work. This means that a wage rise is effectively an increase in the price of leisure: the *opportunity cost* – cost in terms of the next best alternative foregone – of leisure goes up.

The substitution effect means that given an increase in the price of leisure (a wage rise), you are likely to demand less leisure (and therefore more work). In other words, you will substitute work for leisure. The income effect means that you are now better off as a result of working a given number hours, which, assuming leisure is a normal good, will lead you to demand more leisure (and work less).

So, unlike the CD example, the income and substitution effects work in opposite directions. This means that the effect of a wage increase on hours worked is ambiguous: if the substitution effect is greater than the income effect, then demand for leisure will go down (i.e. individuals will work more), while if the income effect is greater than the substitution effect, then demand for leisure will go up (i.e. individuals will work less). Economists usually assume that at lower wages the substitution effect dominates, while at higher wages the income effect may dominate. This gives rise to the rather curious “backward-bending” labour supply curve.

With this knowledge, it becomes clear why it is important for the government to consider income and substitution effects associated with wage changes when setting the rates of income tax and National Insurance contributions.

This is because such taxes on income effectively reduce the hourly wage that individuals can earn (i.e. they are equivalent to a reduction in the price of leisure). If income tax or National Insurance rates rise, the substitution effect will induce individuals to work fewer hours (demand more leisure) because it is now cheaper to do so, while the income effect means that individuals will now need to work a greater number of hours in order to maintain a given level of post-tax income. So, if the government is considering increasing income tax rates, for example, they need to be fairly confident that there won't be a strong substitution effect (a strong increase in the demand for leisure); otherwise, they may risk losing tax revenue instead of raising it!

There are also many other areas of government policy where it is important to consider the implications of the income and substitution effects. One area that has received considerable interest in recent years is family policy, which encompasses things like maternity pay, childcare and flexible working practices. Now, I'm sure most of you won't be the slightest bit interested in policies to do with children at the moment(!), but they are likely to affect many of you in future and will help underline how important it is to think about income and substitution effects in policy-making.

### ***Free nursery education for three and four year olds***

Since April 2004, it has been mandatory for Local Education Authorities (LEAs) to provide free nursery places for all three and four year olds for 12.5 hours a week. As part of their 2005 election manifesto, the Labour party (and, in fact, the Conservatives and the Liberal Democrats as well) pledged to increase the number of hours of free nursery provision from 12.5 to 15 hours per week.

Why is the government interested in doing this? There are two main reasons:

- The government believes that nursery education is beneficial for children, but thinks that the *market equilibrium* level of demand is lower than the *socially optimum* level of demand, perhaps because the price of nursery education is too high. It therefore needs to intervene to make nursery education more affordable.
- It wants to encourage more parents into work (or to work more hours) and believes that a lack of good quality, affordable childcare is one of the barriers that currently prevent parents from doing so.

Let's focus on the first of these motivations and examine how the demand for nursery education is likely to be affected by the policy of increasing free provision from 12.5 to 15 hours per week.

There are three different categories of individuals that we need to consider:

*Children who attend nursery for no more than 12.5 hours per week pre-reform:*

Most children in this category use exactly 12.5 hours of nursery education each week. For this majority, the *marginal price* of consuming an extra hour of nursery education pre-reform (when the government provides 12.5 hours at zero price) is greater than zero. However, post-reform, when entitlement increases to 15 hours per week, the marginal price of an extra hour of nursery education is zero. This means that the substitution effect is likely to increase demand for nursery education, but only up to 15 hours per week (above this level, the marginal price is no longer zero). There is no income effect, as the consumption of a good with zero price has no effect on your income. Thus, the overall effect of this policy is likely to be an increase in the demand for nursery education up to 15 hours a week as a result of the substitution effect, other things being equal.

For those children who use less than 12.5 hours per week pre-reform, both the income and substitution effects of the policy change are zero.

*Children who attend nursery for between 12.5 and 15 hours per week pre-reform:*

This means that, pre-reform, parents pay for *up to* 2.5 hours of additional nursery education for their children. The substitution effect works in the same way as above: while the marginal price of an additional hour under the old system was positive, under the new policy it falls to zero, so demand is likely to increase (but only up to 15 hours per week). In this case, however, there is also an income effect: the nursery education previously paid for is now free, so parents feel richer, which may lead to an increase in demand for nursery education. The income and substitution effects therefore work together to create a rise in demand, potentially above 15 hours per week (as a result of the income effect).

*Children who attend nursery for 15 hours or more per week pre-reform:*

This means that, pre-reform, parents are paying for *at least* 2.5 hours of additional nursery education for their children. The income effect works in the same way as for those using between 12.5 and 15 hours of nursery education per week: the nursery education previously paid for is now free, making parents feel better off and potentially causing an increase in their demand for nursery education. For these individuals, however, the marginal price of an additional hour of nursery education has not changed (it is non-zero both pre- and post-reform), which means that the substitution effect is zero. These children will therefore only receive more nursery education if the income effect is non-zero.

The table below summarises income and substitution effects across the three groups.

<b>Hours demanded prior to policy change</b>	<b>Income effect</b>	<b>Substitution effect</b>	<b>Overall effect</b>
<b>12.5 hours</b>	Zero	Non-negative	Non-negative
<b>Between 12.5 and 15 hours</b>	Non-negative	Non-negative	Non-negative
<b>More than 15 hours</b>	Non-negative	Zero	Non-negative

Understanding the ways in which the income and substitution effects impact upon different groups of people is vital for the government when assessing the potential costs and benefits of new or alternative policies. For example, Labour set an eventual goal of providing 20 hours of free nursery education for all three and four year olds in their election manifesto. Analysis of the kind set out above enables policy-makers to estimate the potential costs to government of implementing such a policy, and also allows them to gain a better understanding of who gains (and by how much) from such reforms.

Similarly, as discussed earlier, it is vital for the government to have an understanding of the income and substitution effects of wage changes when setting income tax and National Insurance contribution rates.

So I know you probably feel like income and substitution effects are just something that you have to learn for your exams and can then forget about! But I hope that this discussion has shown you that they're actually very important when thinking about policies involving a price change.

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