If an individual who solves

s.t.

Assuming that is concave, then solving this maximization problem is equivalent to

If we include a standard tax/transfer scheme, then we consider an individual who solves

s.t.

Now this maximization problem is equivalent to

Suppose that the government’s budget is balanced, , this system of equations simplify to

This means that the solution is a function of :

**Example:** . In this case,

The solution is

If we calculate the tax elasticity of labor supply, then

Applying this formulation to our problem gives,

Note that implies that and implies that .

Now let us consider Rogerson’s preferences:

In this case,

which implies

Unfortunately, there is no closed-form solution to this equation.

(Simplified Implicit Function Theorem: Assume that is function which solves

for at any value of Then,

Let us apply this mathematical tool to our problem to see

This gives us

This is known as the “Marshallian (uncompensated) elasticity”.

Another concept of elasticity is “Frisch Elasticity” where is assumed to be a constant. In this case, the budget constraint in is omitted to obtain:

In Rogerson’s model, this implies

A common measure of elasticity is “net-of-tax-rate” elasticity of labor supply:

To calculate this expression, first note that

which ensures that

is the net-of-taxes Frisch elasticity of labor supply.

Another approach to calculate the elasticity is to take into account the fact that

Now take the logarithm of both sides to see

Therefore,

Now let us approach to our problem from a more general perspective and assume that we want to solve:

In this case, we can still use IFT to calculate the derivatives of with respect to

First of all,

Moreover,

Therefore,

By the Cramer’s Rule:

assuming

Now let us go back to the original canonical utility maximization problem:

s.t.

s.t.