Labor Market Equilibrium: Third Lecture

LABOR ECONOMICS (ECON 385)

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Extension: taxes and subsidies

Just like other goods, an excise (per unit) tax can be applied to labor. Payroll taxes to fund social security and Medicare are examples of such a tax.

- Payroll taxes are collected from the employer in reality, but regardless of which party formally pays the tax, the burden of the tax (effective tax payment) is distributed the same.
  - Taxes on labor are not levied per hour, as the following assumes; instead they are per dollar. It seems like a trivial difference, but here is how the two concepts differ mathematically.

Taxes in the profit function

- The firm's usual profit function (with not labor tax) looks like this:

$$\Pi(L, K) = P * q(L, K) - wL - rK.$$

- The short run labor demand is, as before, a downward-sloping rectangular hyperbola, given by:

$$w = P * MP_L.$$

- With a per-hour tax (t) on labor the profit function becomes,

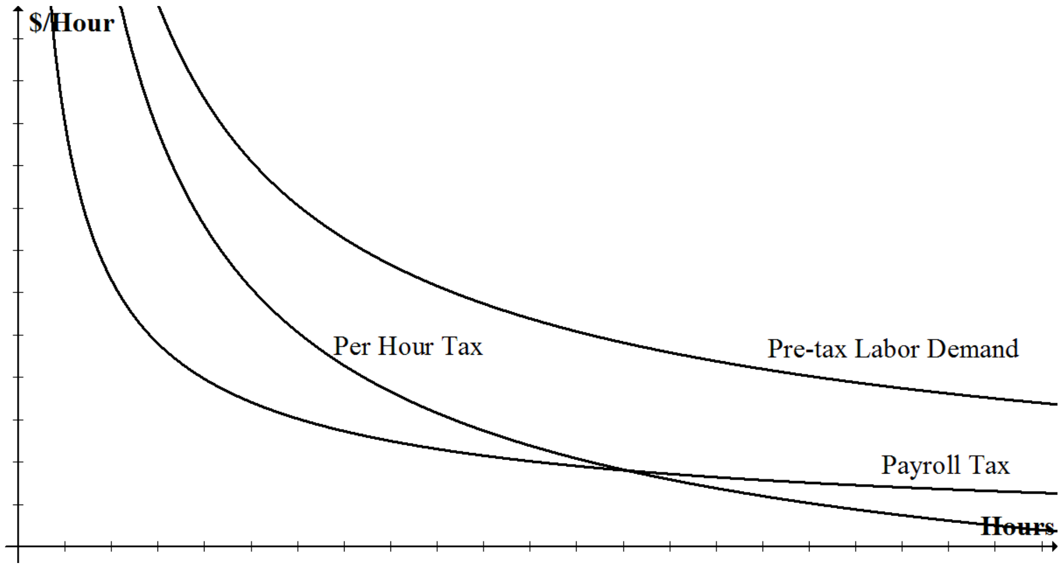
$$\Pi(L, K) = P * q(L, K) - (w + t)L - rK.$$

- Using the partial derivative (with respect to labor) of the profit function set to zero (as before), one obtains,

$$w = P * MP_L - t,$$

the original demand curve—just shifted down by t units.

Taxes in the profit function (continued)



- With a tax (at rate *t*) on *payroll*—as opposed to a per unit tax, the profit function is:

$$\Pi(L,K) = P * q(L,K) - (1+t)wL - rK$$

- Deriving the demand curve from this gives a similar expression,

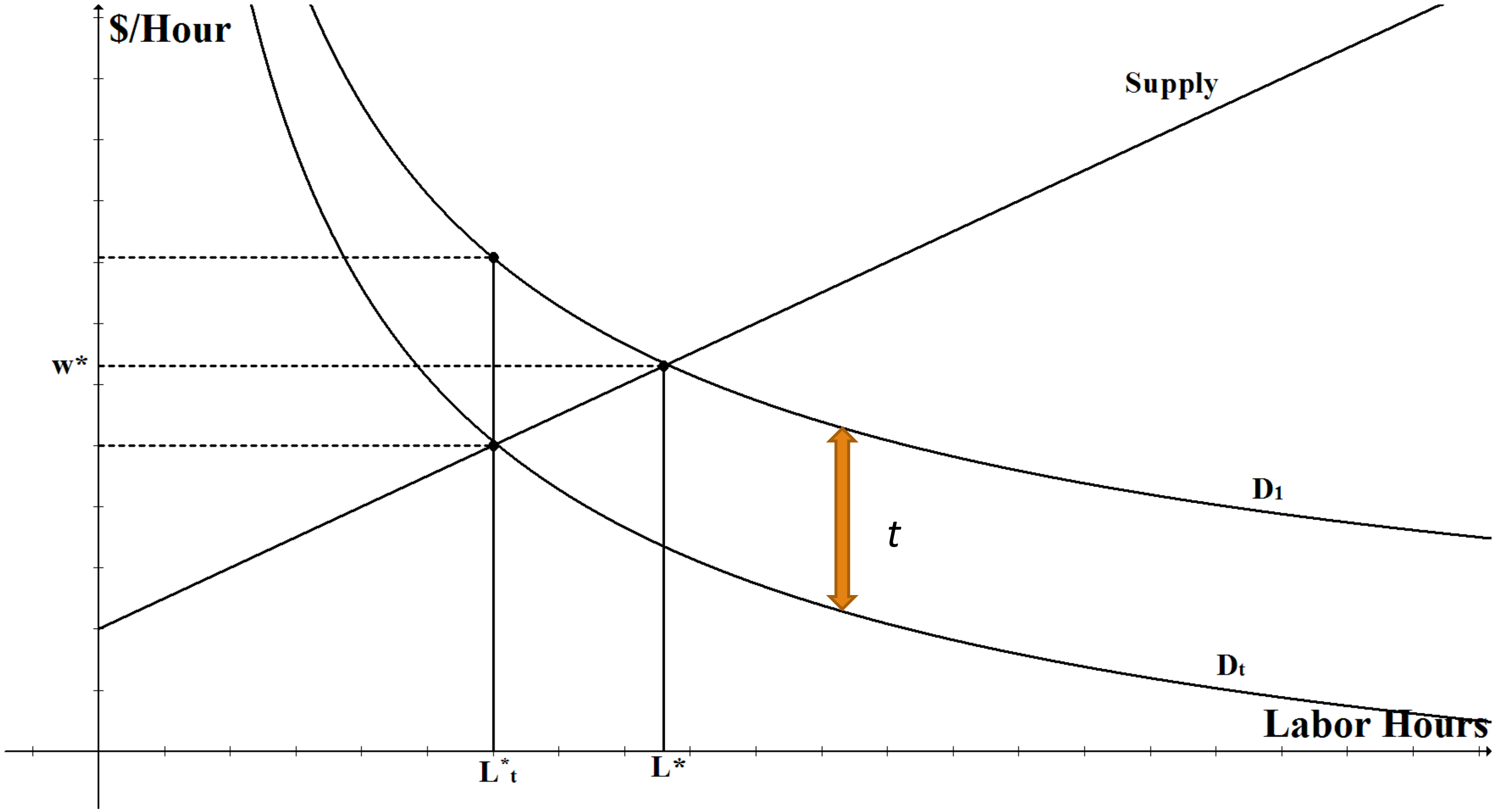
$$w = \left(\frac{1}{1+t}\right) P * MP_L$$

- Instead of shifting the curve down by a constant, it lowers the curve and also makes it flatter.
  - The per unit tax is a little easier to analyze graphically, but the two possibilities can have different implications for the effect of the tax.

Effects of a tax on labor

- Consider a labor market with the non-tax demand curve (D_1) and the with tax version (D_t). Draw a typical labor supply curve.
- The non-tax equilibrium is L^* and w^* where the supply and demand intersect.
- With the tax in effect, the firm effectively pays more for labor, but not all of it is transferred to employees. With the tax deducted from the firms' wage offers, the with-tax curve is the one considered by workers when they decide how many hours to supply. They will supply L_t^* hours, the level where S and D_t intersect.

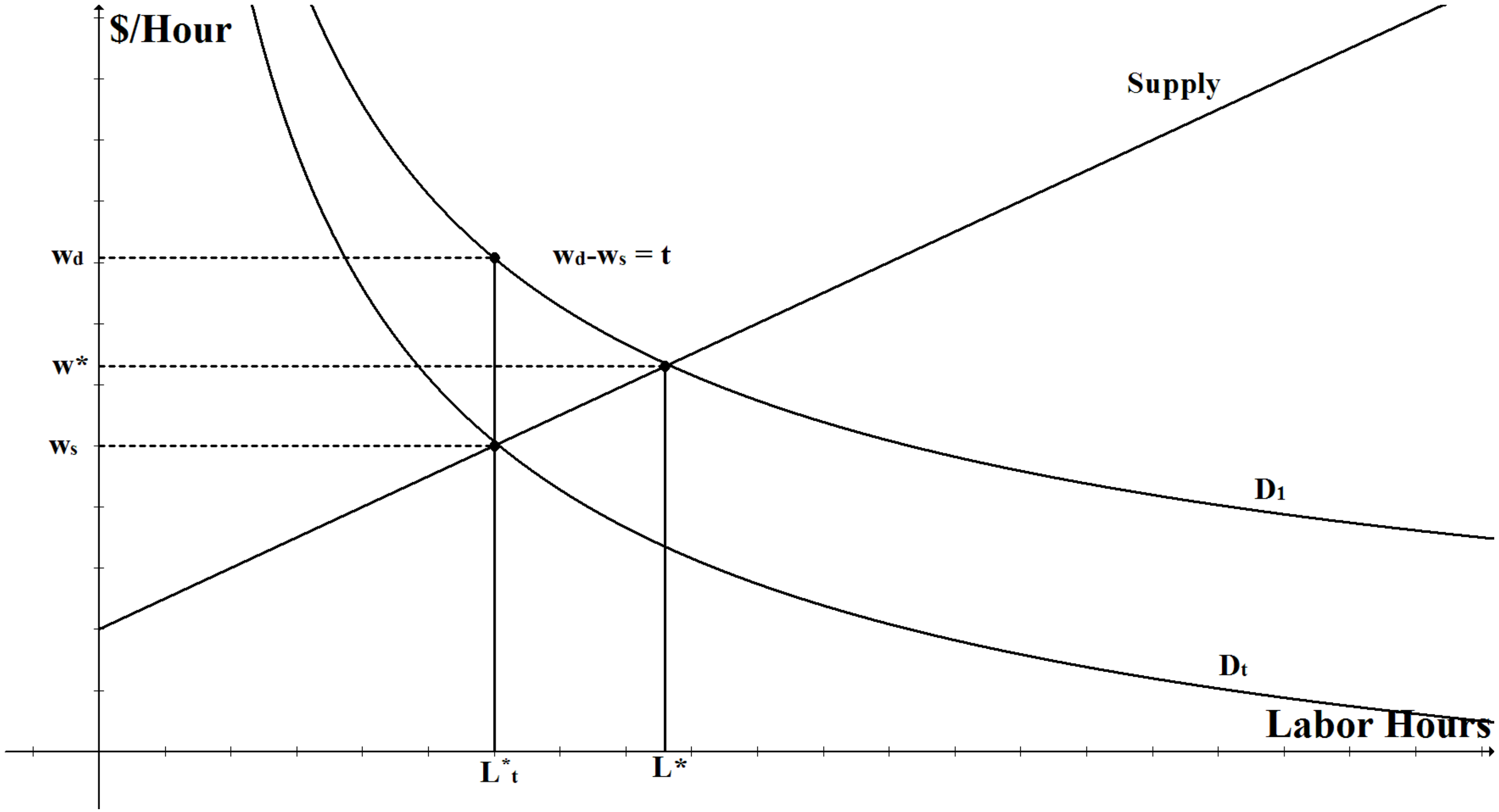
Effects of a tax on labor (continued)



Effects of a tax on labor (continued)

- Note that this is to the left of L^*, indicating lower employment.
- The after tax price of labor (height of D for L_t^* hours) faced by the firm is higher than w^*. This is unsurprising, given that the wage is explicitly being taxed.
- Also the wage received by employees (the vertical coordinate where S and D_t intersect) is lower than w^*. This means that workers also effectively "pay for" the tax even though they are not explicitly giving money to the government.

The tax “wedge”



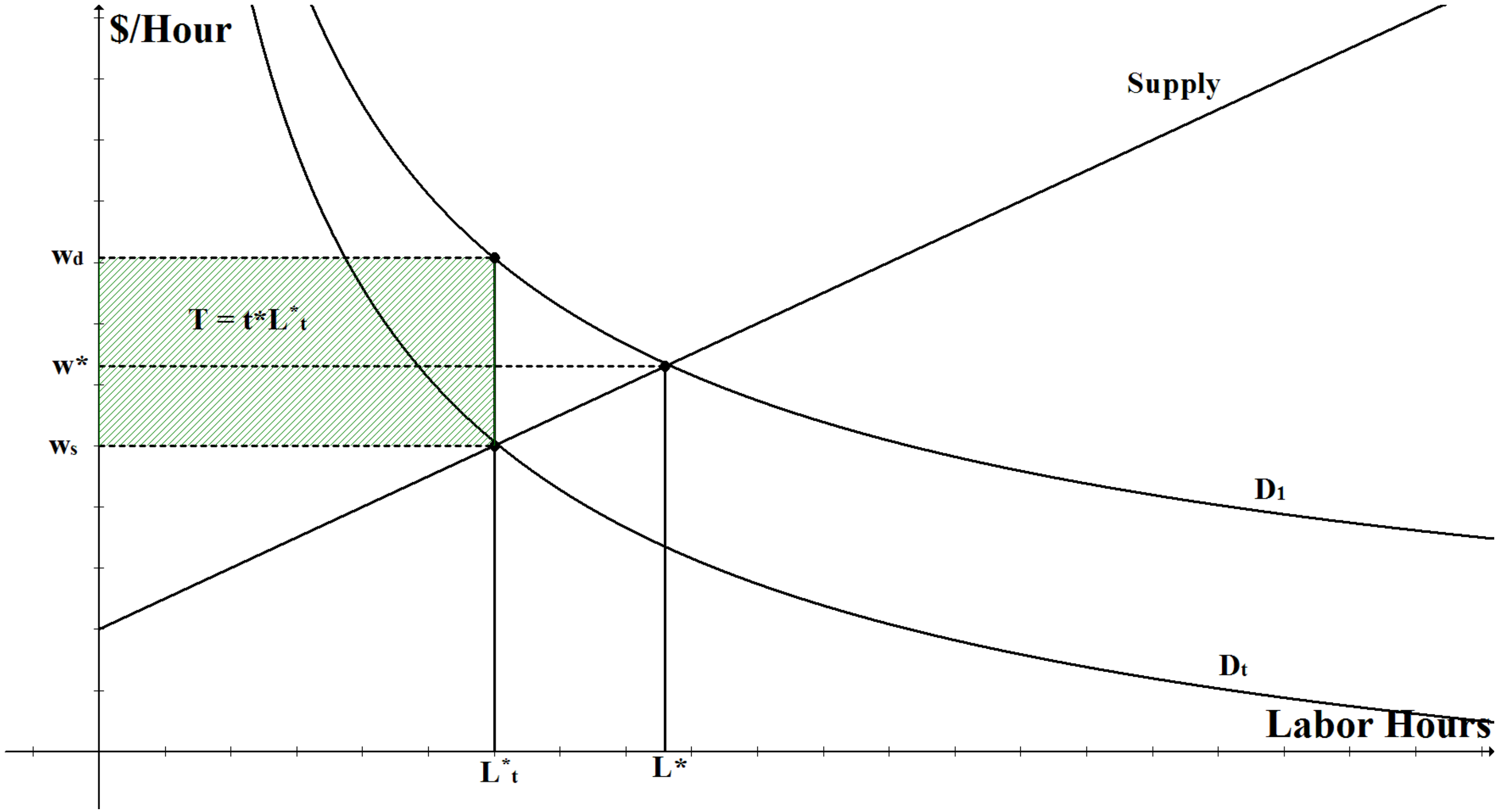
Gains from trade and taxes

- The effect on gains from trade is adverse. Previously the area under the demand curve and above the supply curve represented total gains from trade (contribution to social welfare). With the tax in place, gains from trade has the same depiction, but is now missing the "tip". The area between the two curves that lies on the interval $[L_t^*, L^*]$ represents gains from labor transactions that no longer occur due to the tax! This is called deadweight loss (DWL).
- Call the wage received by workers (after tax) "w_s" and the wage paid by employers (including tax) "w_d". The difference $w_d - w_s$ is the tax collected per unit. It is collected on L_t^* units of labor, so the tax revenue (*T*) is:

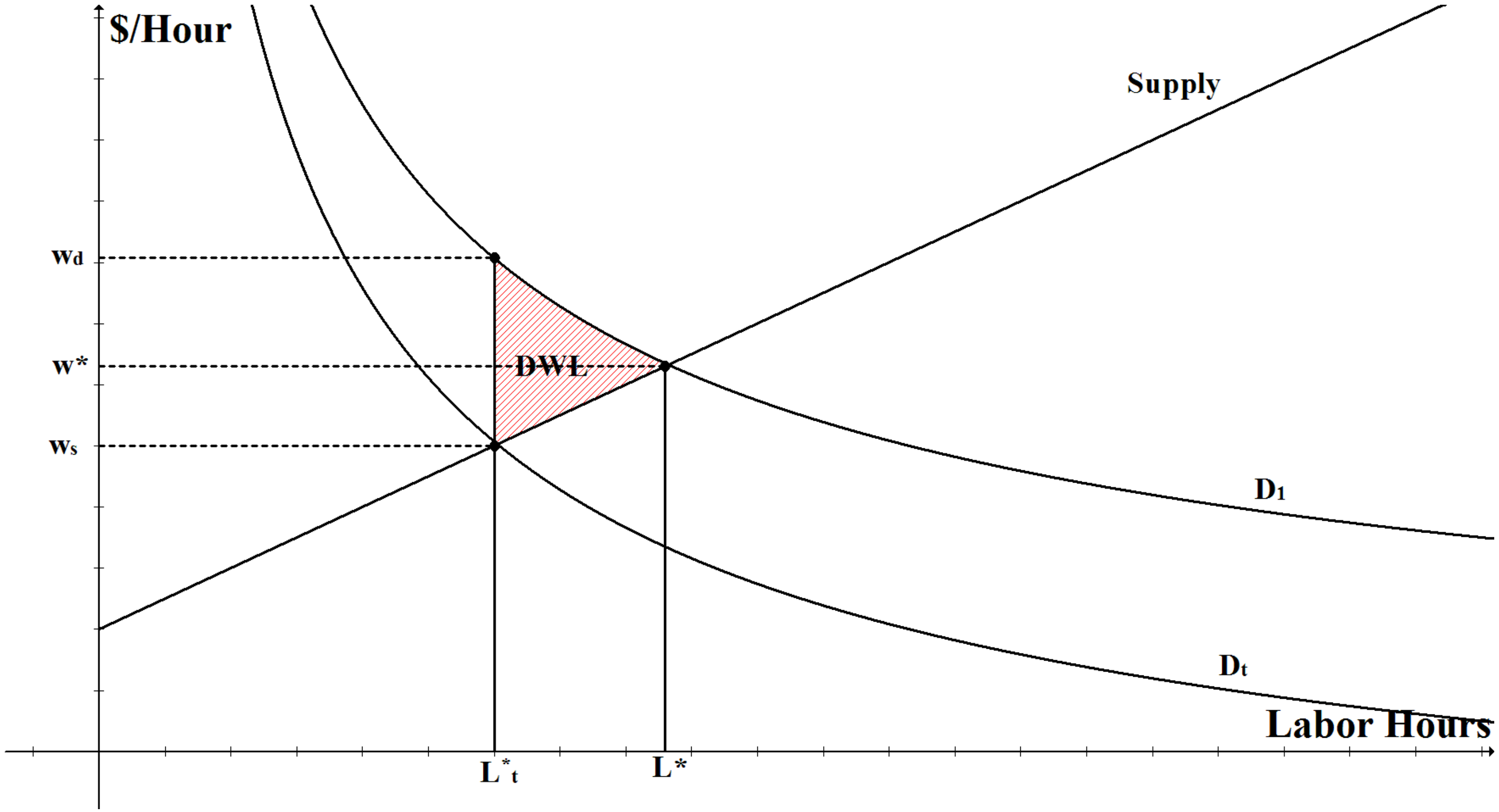
$$T = L_t^*(w_d - w_s)$$

- Worker and firm surplus are defined as before, but now the rectangle representing *T* is removed, so both surpluses are reduced by the tax revenue (hopefully they "get that back" by consuming public goods produced using the revenue) as well as the DWL—which is lost to the universe.

Tax revenue and deadweight loss



Tax revenue and DWL (continued)



Extension: mandated benefits

Some of the motivation for taxes comes from the need to finance public goods—or raise the revenue for subsidies on under-provided goods.

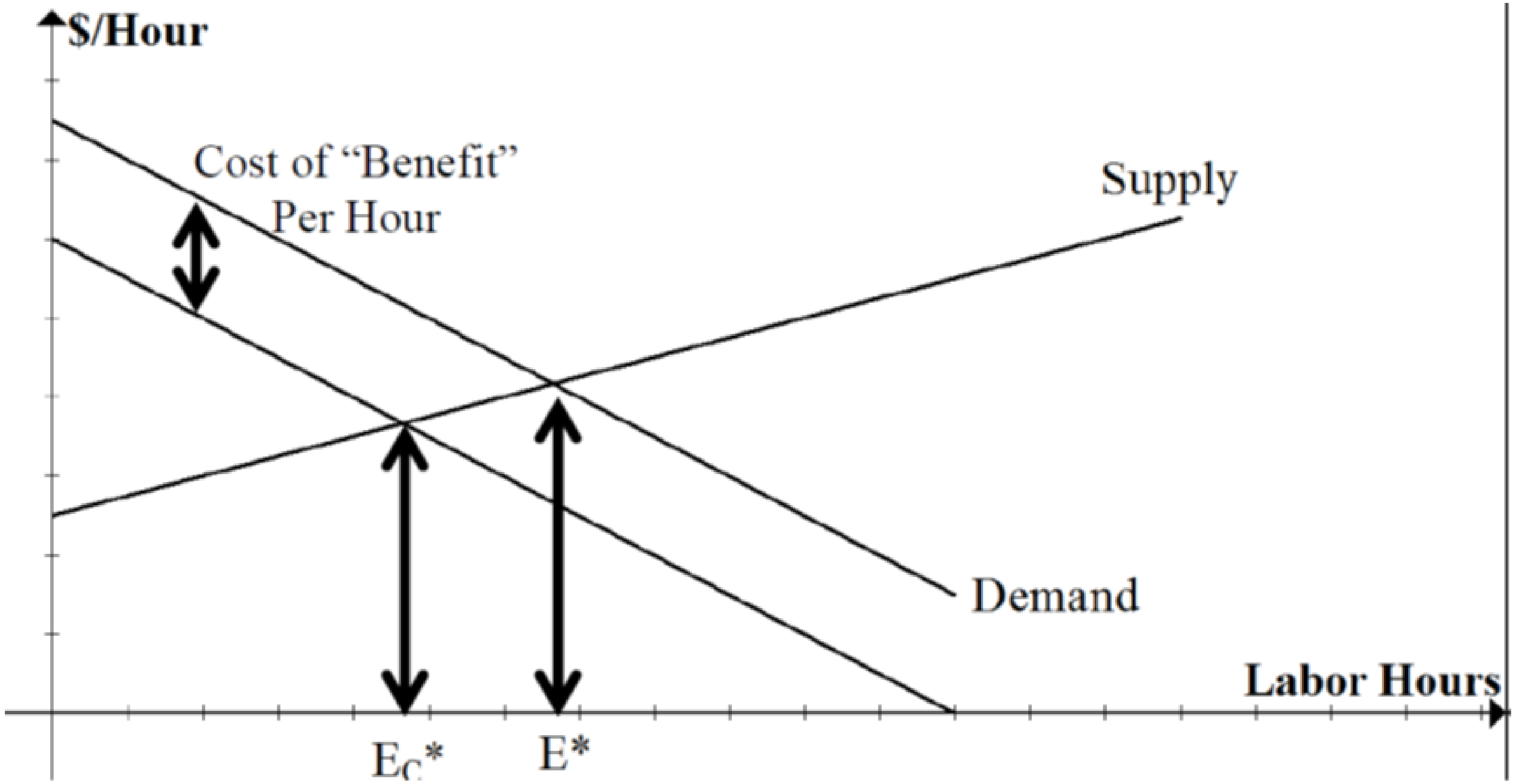
- However when taxes are imposed on labor, the result is lower employment and harmed market efficiency.
  - And there are criticisms of government's productive efficiency, so perhaps there is also efficiency to be gained by producing outside the realm of bureaucracy.
- To the extent that the under-provided goods can be provided by employers, a mandate can be imposed on employers that stipulates the goods be provided as "benefits" of employment (like paid vacation is).

Mandated benefits (continued)

- The effect of a mandated benefit is no worse than a tax, and quite possibly a lot better. Consider the similarity between a labor tax of t dollars per hour and a mandated benefit that costs the employer *t* dollars per hour to produce.

- As an instructive point of departure, consider a mandated benefit that is worthless to employees, e.g., a 6 pack of non-alcoholic beer for each 8 hour shift. Both the tax and the beer shift the effective demand inward by the same amount. Instead of the competitive equilibrium, the lower equilibrium L_C^* is realized.

Mandated benefits (continued)



Mandated benefits (that employees actually value)

If the benefit mandated by law is something that employees value—even a little—the story does not end there.

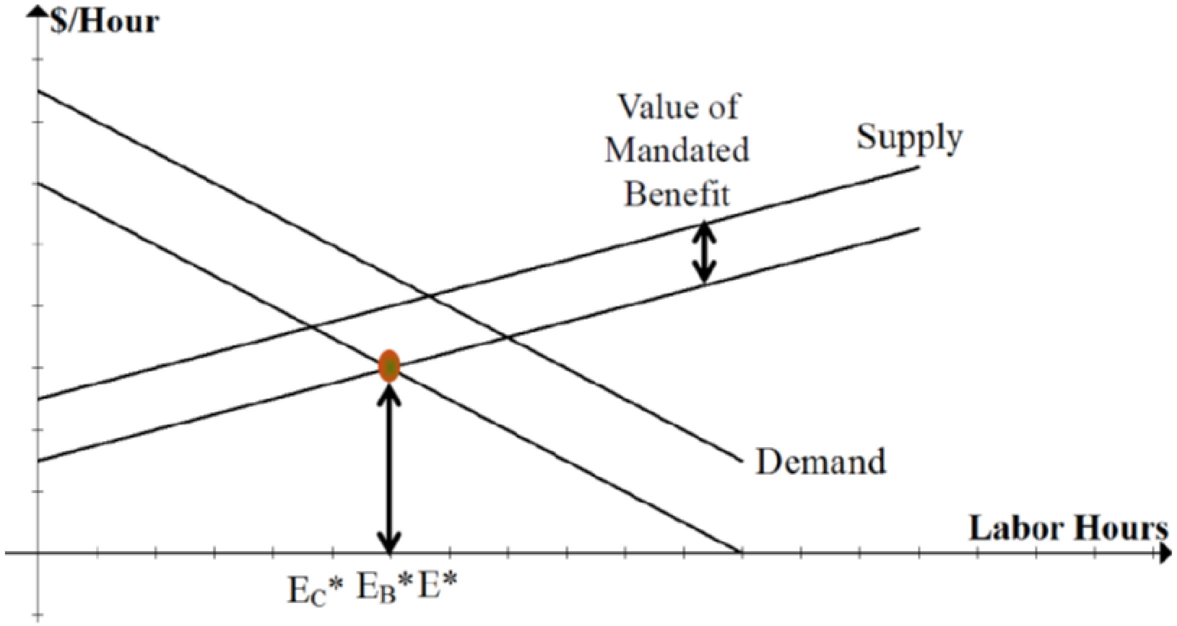
- Employees now gain something they like for each hour they work. And they would be willing to give up some amount of wages (*B*) that depends on how much they value the mandated benefit.
- This shifts labor supply "downward" by the employees' value placed on the benefit. In addition to the costs, the mandate now confers genuine benefits—which offset the costs.
- The new equilibrium is found at the intersection of the two new curves—at L_B^*. Observe the following relationship between the employment levels, depending on the nature of the mandated benefits.

$$L_C^* < L_B^* \leq L^*$$

  - In the unique case where $B = t$, and employees value the benefit exactly at exactly what it costs employers to produce, employment is not reduced at all because Supply and Demand both shift down by the same amount.

$$L_B^* = L^* \text{ if } B = t$$

Employees pay for mandated benefits



- Regardless of how much employees value the mandated benefit, wage is lower after the mandate.
  - The more costly it is to provide and the more employees value it, the more wage decreases.
- Employees pay for mandated benefits with lower wages. This is not well-understood (or maybe forgotten) by supporters of mandated benefits.

Mandated benefits (concluded)

- It would be great if mandated benefits were free, but just because workers aren't directly responsible for paying the costs doesn't mean they get the benefits for free!
- Mandated benefits are paid for, substantially, by lower wages for the workers on which they are conferred.
  - One exception to this is a scenario where workers <u>can't</u> pay for mandated benefits because it would push their wage below the legal minimum. Workers like this won't pay for the benefits because they won't have jobs anymore; their productivity would no longer justify the cost of hiring them.

Conclusion

- Government policies can change the market equilibrium by attaching costs to each unit of labor.
  - Taxes.
  - Mandates to provide benefits.
- Taxes generate revenue, at the expense of market efficiency (DWL).
- The incidence of (who pays for) these costs depends on supply and demand elasticity and the extend to which employees value mandated benefits.
  - Employees implicitly pay for mandated benefits with lower wages.

Optional digression: optimal taxation (assume authority's goal is to maximize revenue)

Note: this analysis is simplified by assuming the long run. Then competitive labor demand is elastic in the LR because of the zero profit condition.

- The tax revenue collected from a given worker is:

$$Taxes \equiv T = \tau\tilde{w} * H(\tau), \text{where } \tau \text{ is the tax rate, and } \tilde{w} \text{ is pre} - \text{tax wage.}$$

- The optimal rate is arrived at by maximizing this with respect to tau (rate).

$$\frac{\partial T}{\partial \tau} = \tilde{w} * H(\tau) + \tau\tilde{w}\frac{\partial H}{\partial \ln(H)}\frac{\partial \ln(H)}{\partial \tau} = 0 \text{ is the first order condition.}$$

- The second term equals:

$$\frac{\partial H}{\partial \ln(H)}\frac{\partial \ln(H)}{\partial \tau} = H * \sigma\frac{-1}{1-\tau}$$

- So the first order condition implies:

$$\tilde{w} * H(\tau) = \tau\tilde{w}H * \sigma\frac{1}{1-\tau} \Leftrightarrow \frac{1-\tau}{\tau} = \sigma \Leftrightarrow \frac{1}{\tau} = \sigma + 1$$

Optimal taxation (continued)

- Solving for tau gets you the optimal tax rate—at which the tax revenue is maximized.

$$\frac{1}{\tau} = \sigma + 1 \rightarrow \tau^* = \frac{1}{\sigma + 1}$$

- The more elastic labor supply is, the lower will be the optimal tax rate. This is one reason policy makers should want accurate measurements of labor supply elasticity.
  - Several papers recently by Immanuel Saez address this subject with respect to taxing high income earners.