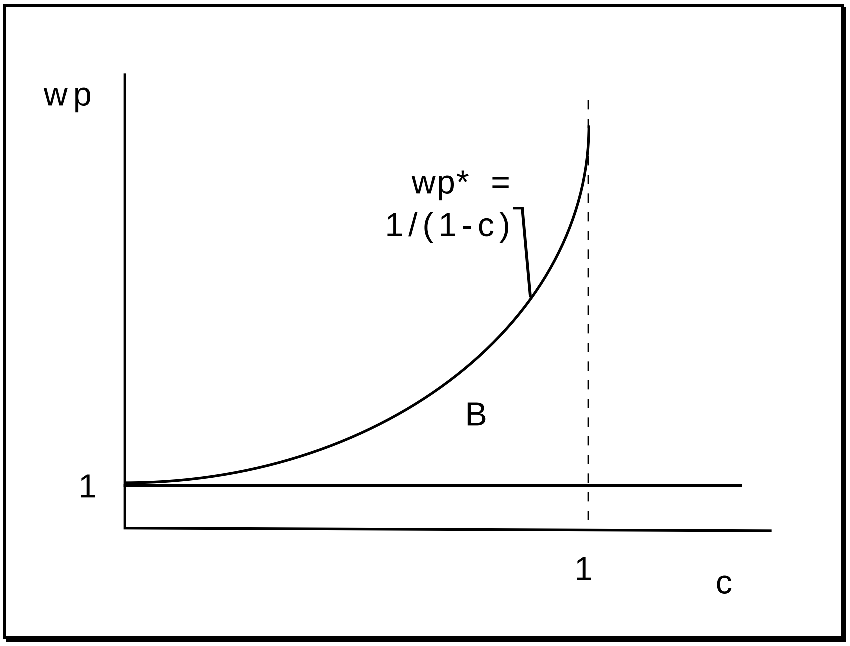
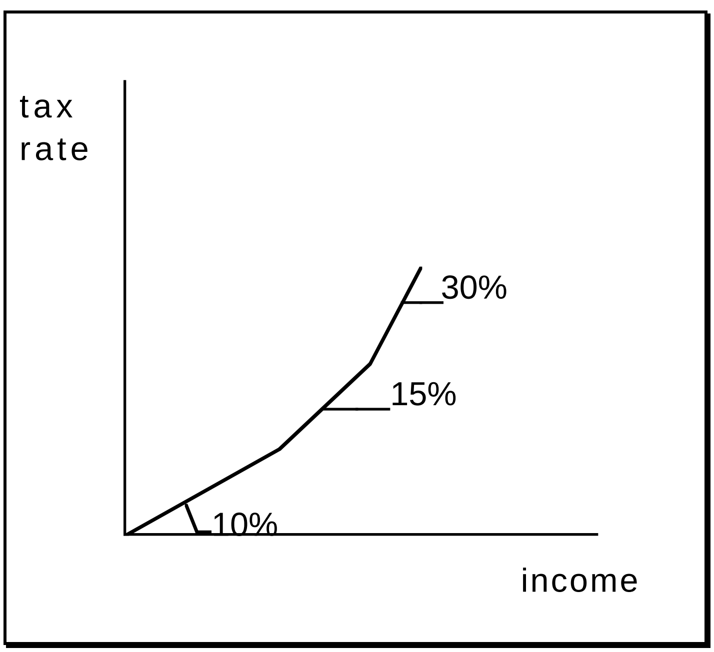
Okun's leaky bucket



if wp-hat (the weight used in the program we're considering) is smaller than wp*, then it's more efficient than our baseline and we should choose our program. (Falls in area B).

How do we get the weights?
We have implied weights in the progressive income tax code.

What does the income tax look like in the US?



What does this tax schedule imply about the weights we place on different groups of people?

30¢ to high income folks = 15¢ to middle income folks = 10¢ to low income folks.

What do these tax rates say about the weights we place on these groups?

Income	Marginal Tax Rate	W_i
0 to 15,000	10%	3
15000 to 30000	15%	2
30000+	30%	1

Note that you might want to adjust for the size of the relative groups to determine the real impact (that's a slight complication that we don't do generally)

Problems with using the tax rate:

- The marginal tax rate is not set by the person who's receiving the income, so it may not accurately reflect the value of those dollars to him/her (for instance, 30K to a family of five is worth more in a sense than 30K to a single person).
- marginal tax rates are set in the political system, in which the non-poor tend to have greater influence in holding down their share.

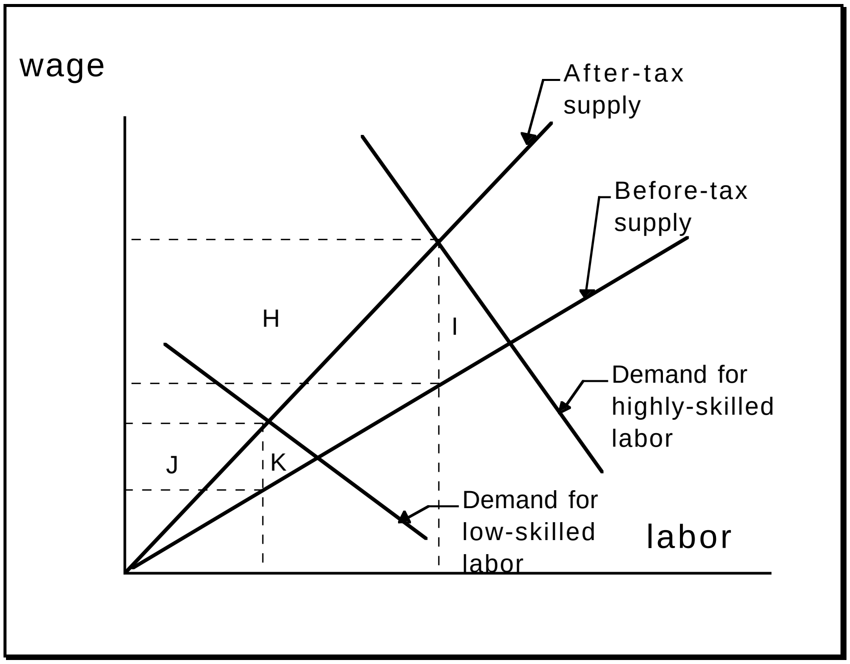
Why does the bucket leak?

- transaction costs (for instance, paying for IRS administration). In this country, these administrative costs are not the source of a huge leak; we have a pretty strong enforcement mechanism and a pretty strong tradition of paying up without a struggle.
- Main problem: when you interfere with the free functioning of an otherwise good market, you distort people's choices and introduce deadweight losses into the system.
    - income taxes distort relative decisions between work and leisure. (assume away the incentive to cheat). Think about the pizza tax example we did earlier in the term.

how much does it leak?

Deciding whether to impose a transfer program involves benefit-cost analysis: what are the relative benefits and costs of such a program? We know that deadweight loss will make the costs larger than the benefits, but now it's the size of the difference that counts: if it's only a little, the extra weight we place on the poor will be relatively less and will fall somewhere in Region B.

How do we calculate the leaky bucket?
Examine the labor market.



If people don't change their labor supply in response to tax impositions (in other words, elasticity is small), this doesn't work very well.

Note that we're assuming that work effort per hour is constant.

t = tax rate.
The equation for the before-tax supply function:

$$w = aL$$

The equation for the after-tax supply function:

$$w(1-t) = aL \text{ or } w = aL/(1-t)$$

The assumptions we use here:

- all employers are non-poor people
- low-skill people are poor; high-skill people are non-poor
- the total tax revenues are returned 50-50 to poor and non-poor income people (this assumes that the demand curve slopes are the exact inverse of the original supply curve).

What are all the effects of imposing this tax?

- $PS_{\text{low wage workers}} = -0.5(J+K)$
- $Cs_{\text{low wage employers}} = -0.5(J+K)$
- $Ps_{\text{high wage workers}} = -0.5(H+I)$
- $Cs_{\text{high wage employers}} = -0.5(H+I)$
- Tax Revenue = +(H+J)

What goes to whom?
Poor gain +1/2(H+J)

Non-poor gain +1/2(H+J)
0 >ΔYn, ΔYp > 0

The net results:
The leaky bucket formula: (1-c) = -ΔYp/ΔYn
ΔYp = 1/2(H+J)-1/2(J+K)
ΔYn = 1/2(H+J)-1/2(J+K)-(H+I) = -1/2H-1/2K-I
so
(1-c) = -[1/2(H+J)-1/2(J+K)]/[1/2(H+J)-1/2(J+K)-(H+I)]
(1-c) = [H-K]/[K+H+2I]

z = ratio of I to H, which is also the ratio of K to J = ratio of deadweight loss to tax revenue within labor markets
x = J/H = ratio of low-skill market tax revenues to high-skill market tax revenues
Large values of both of these should make the leaky bucket coefficient larger.
(1-c) = [1-J/H*K/J]/[K/J*J/H+I+2(I/H)]
(1-c) = (1-zx)/(1+zx+2z)
Playing with the size of x and z confirms that larger values of these make the leaky bucket coefficient larger.

How do these play out in terms of our ABC graph?

x	z	(1-c)	c	wp* = 1/(1-c)
0.1	0	1	0	1
0.1	0.2	.69	.31	1.45
0.1	0.4	.52	.48	1.92
0.2	0.2	.57	.33	1.52
0.2	0.4	.49	.51	2.04

Points:
- If there were no deadweight loss, there would be no leak in the bucket. (in this model there aren't administrative costs, and in any case we assume that factor would be insignificant relative to the inefficiency of a tax).
- Those in the market must change behavior to get deadweight loss. If labor is actually inelastically supplied, there would be no leak because there would be no change in behavior and thus no deadweight loss.

- Usually, the leaky bucket is greater than the sum of the deadweight losses ($c>z$); in low ranges, the leak can be severe. Because c rises with z, c rises with the tax. As the tax grows, the DWL grows, and the bigger c becomes.
- x doesn't matter very much; while x enters the formula the way z does in most of the equation, x is multiplied by z which makes it small, and z is multiplied by 2 in the denominator which makes the effect of z relatively large.
- Easy to get a wp in the neighborhood of 2. This is important because empirical studies estimate the leak in the US at $c = 0.5$, which gives a wp of 2. We compare our programs to a traditional tax & transfer program, which generally renders a wp* of 2. As long as we do better (meaning less than) 2, we should do our program.

Note that we could ditch the assumption of inverse slopes on the supply and demand curves, but then we'd have to figure out which parts of the tax revenues came from which groups (demanders and suppliers); remember that imposing a tax creates two prices in each market and you can divide the incidence of the tax between producers (laborers) and consumers (employers). It's a little more complicated but gives you a better tool. Play with it.