Intermediate Microeconomics

Chapter 5

The Household as Supplier

Labor, leisure and income

- Until now, income was fixed – but it actually depends on the labor provided by the household
- Labor (*l*) is a *bad*, the corresponding good is *leisure* (*n*)
- The budget constraint is now determined by the *time endowment* (*T*) of the individual
- Individual considers the choice of leisure/work versus consumption of all other goods (*c*), given the ongoing *real* wage rate (*w*)
- Real wage = price of consumption is $1

Budget constraint

- Time endowment:

$$T = n + l$$

- Budget constraint:

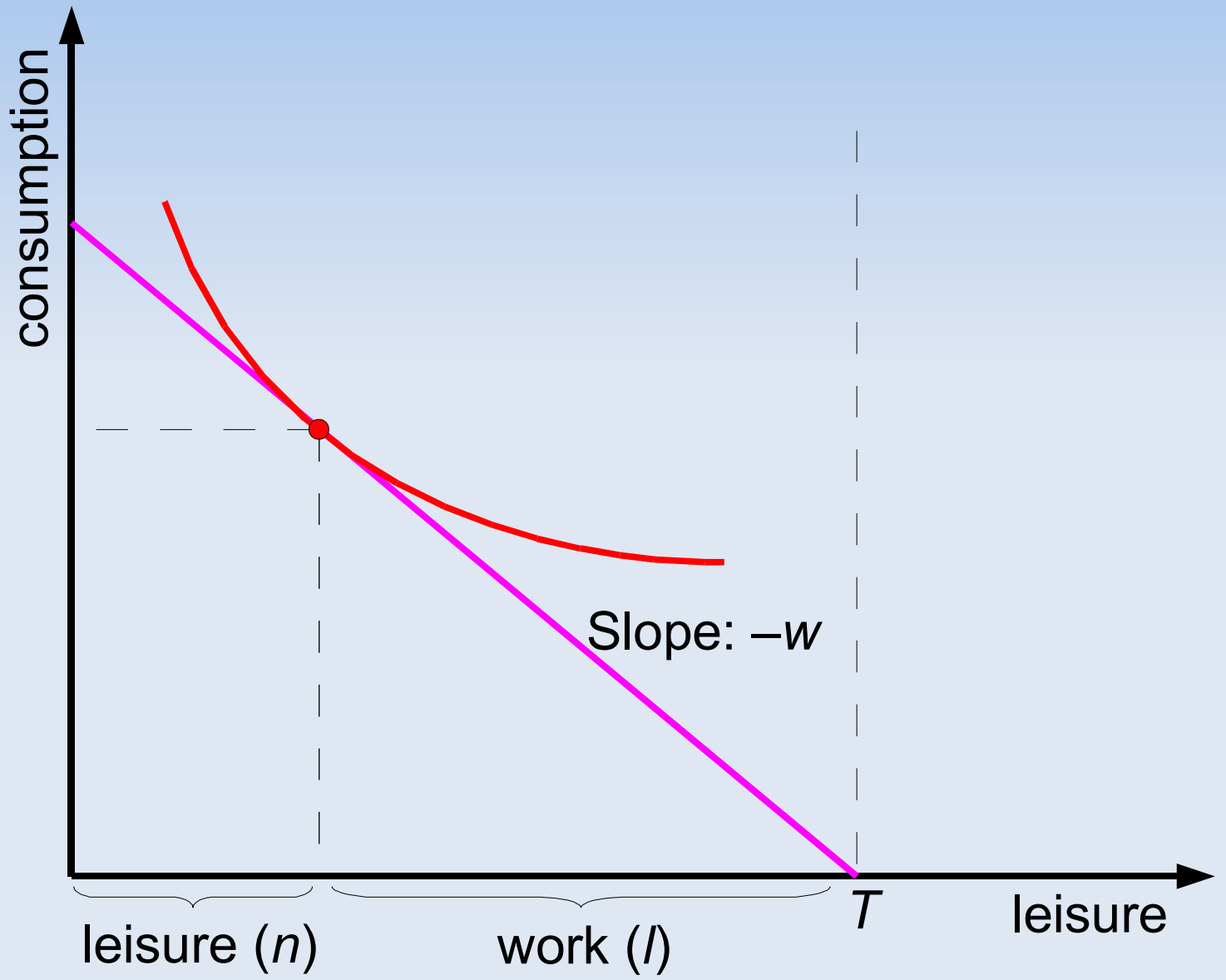
$$c = w \times l = w \times (T - n)$$

or:

$$c + w \times n = w \times T$$

- *Value of time endowment* ($w \times T$) = the amount of money the individual would have if he worked every available hour

Budget constraint



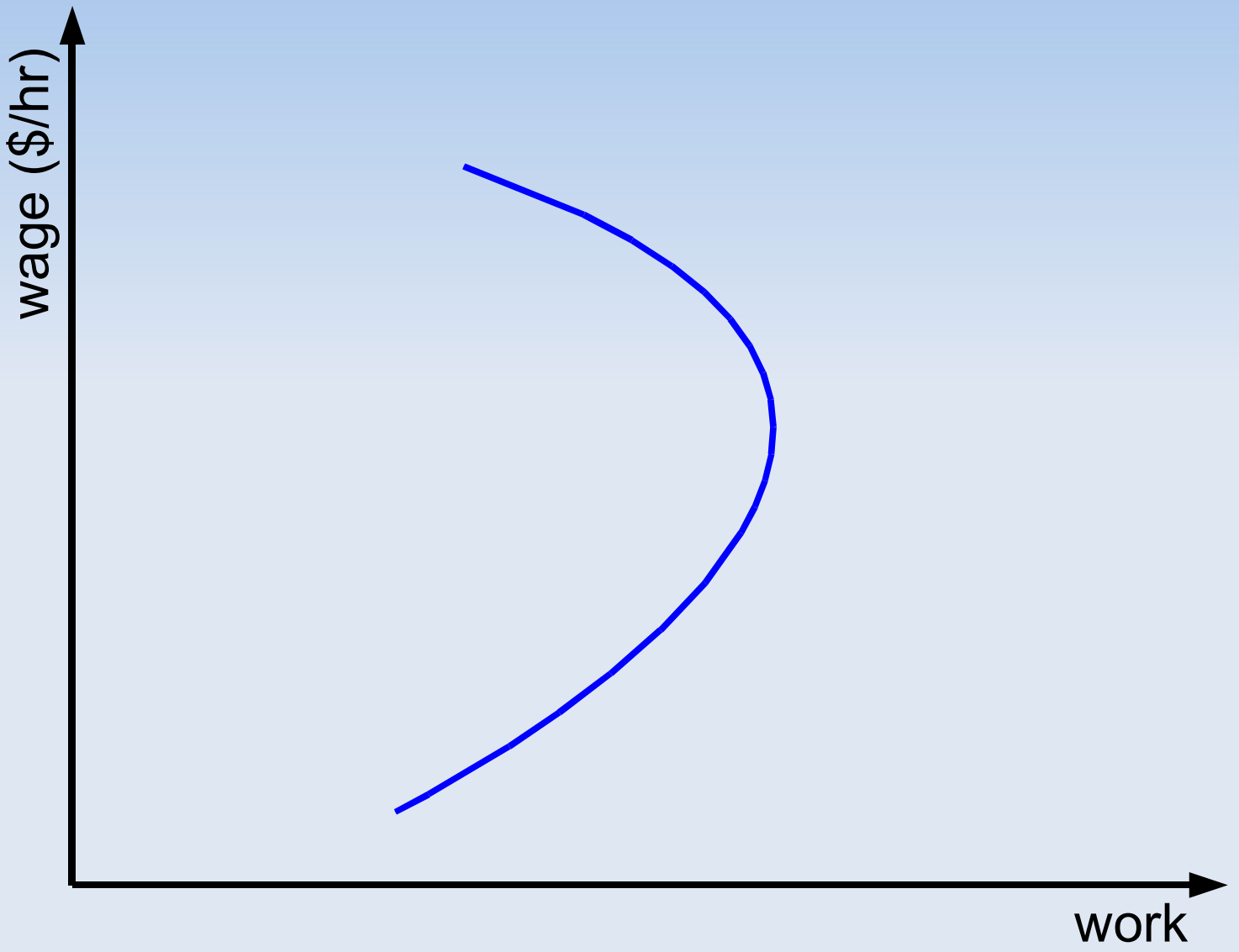
Comparative statics

- When wage rate falls, two effects:
  - substitution effect = leisure is ”less expensive”, so consume more leisure and work less
  - income effect = income is (literally) lower, so need to work more to be able to afford consumption $\Rightarrow$ work more (less leisure)
- If leisure is a normal good, income and substitution effect work in *opposite* directions (compare to chapter 3!) – you ”sell” labor
- Which effect dominates? Theory does not provide a definite answer

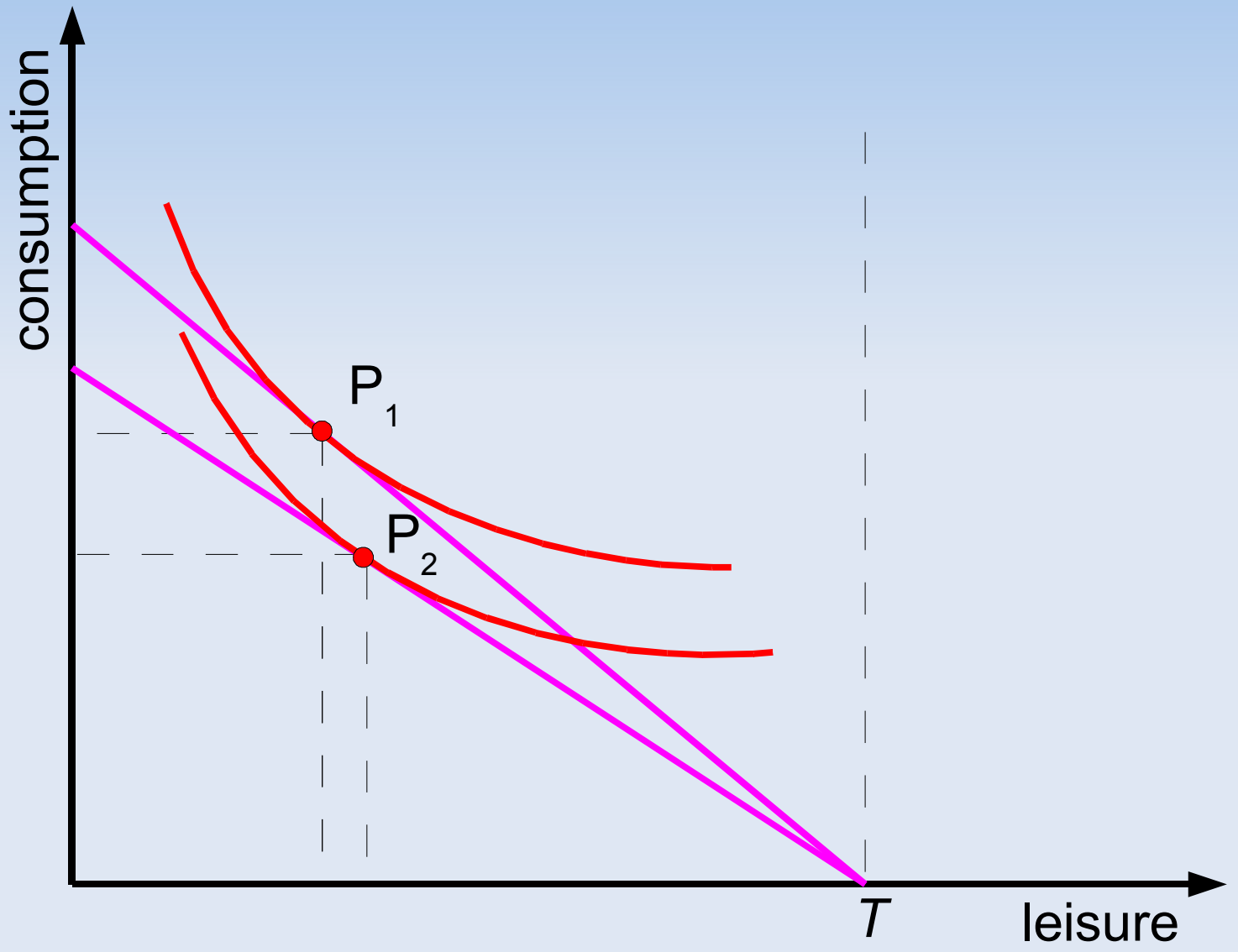
Labor supply

- *Labor supply curve* = schedule showing the relationship between the quantity of labor supplied and the wage rate, *ceteris paribus*
- If substitution effect always dominates income effect, then labor supply slopes upward
- If income effect always dominates substitution effect, then labor supply slopes downward
- More realistic case: labor supply curve bends back (substitution effect dominates at low wage rates and income effect dominates at high wage rates)

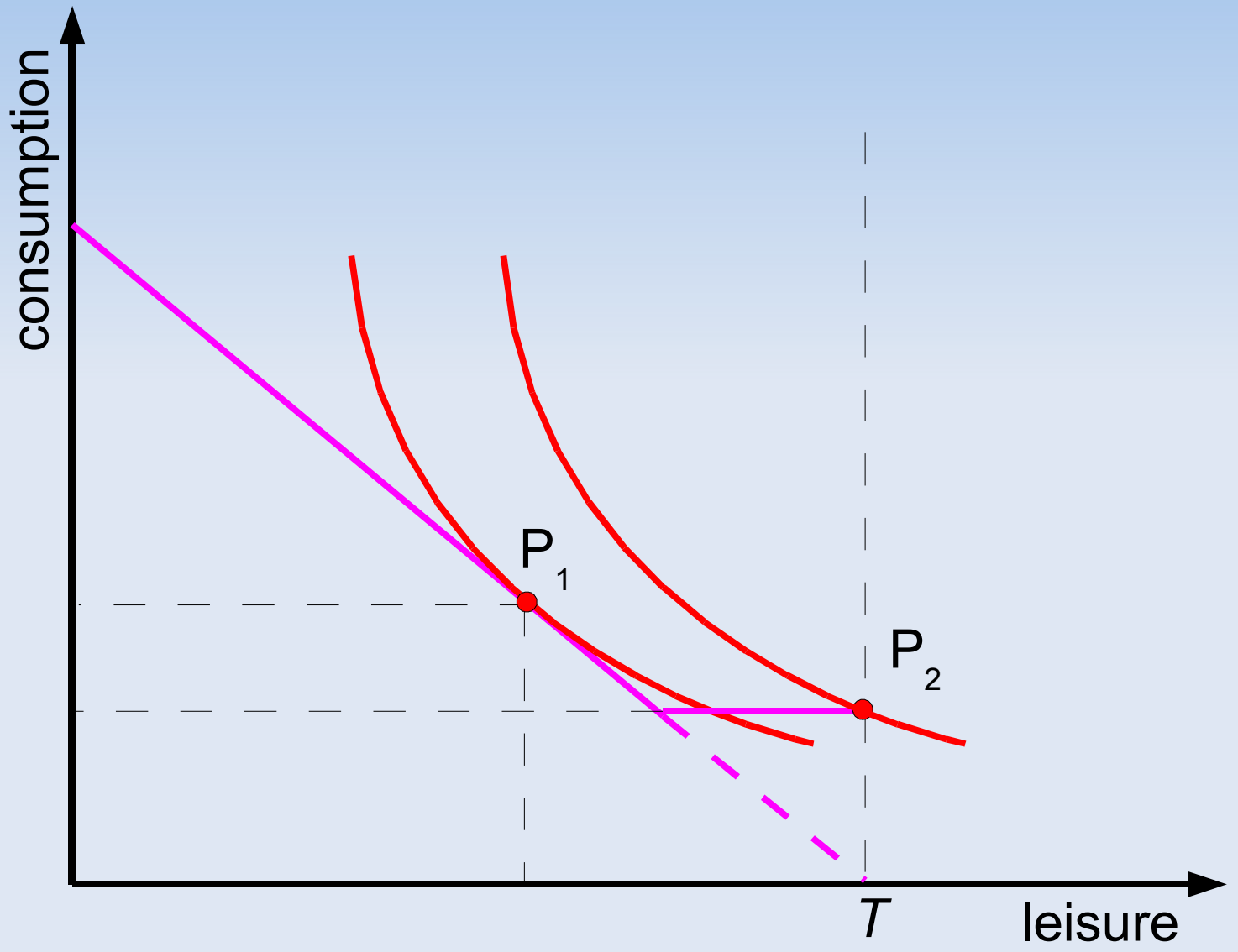
Bending labor supply



Labor supply



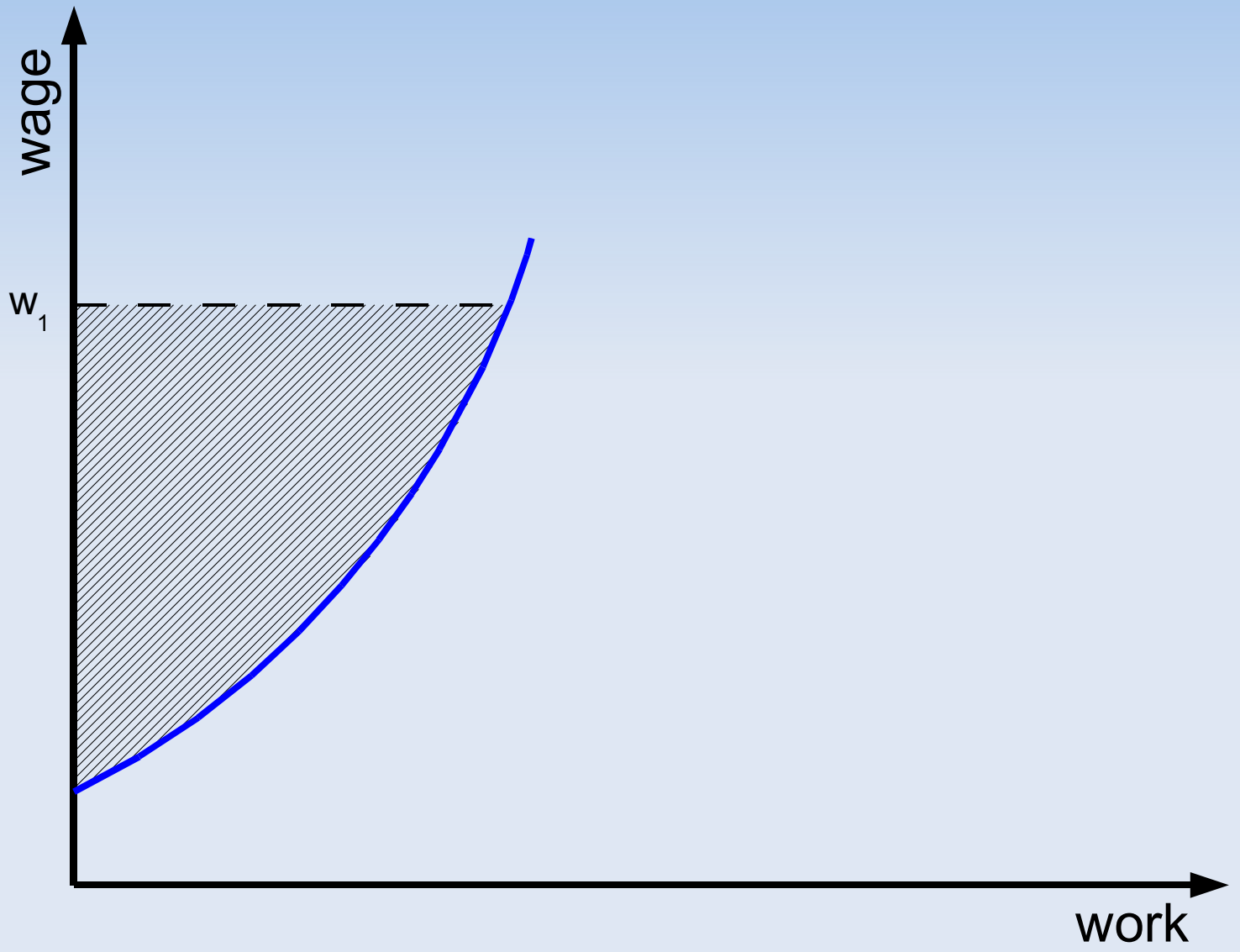
Labor supply decision with AFDC



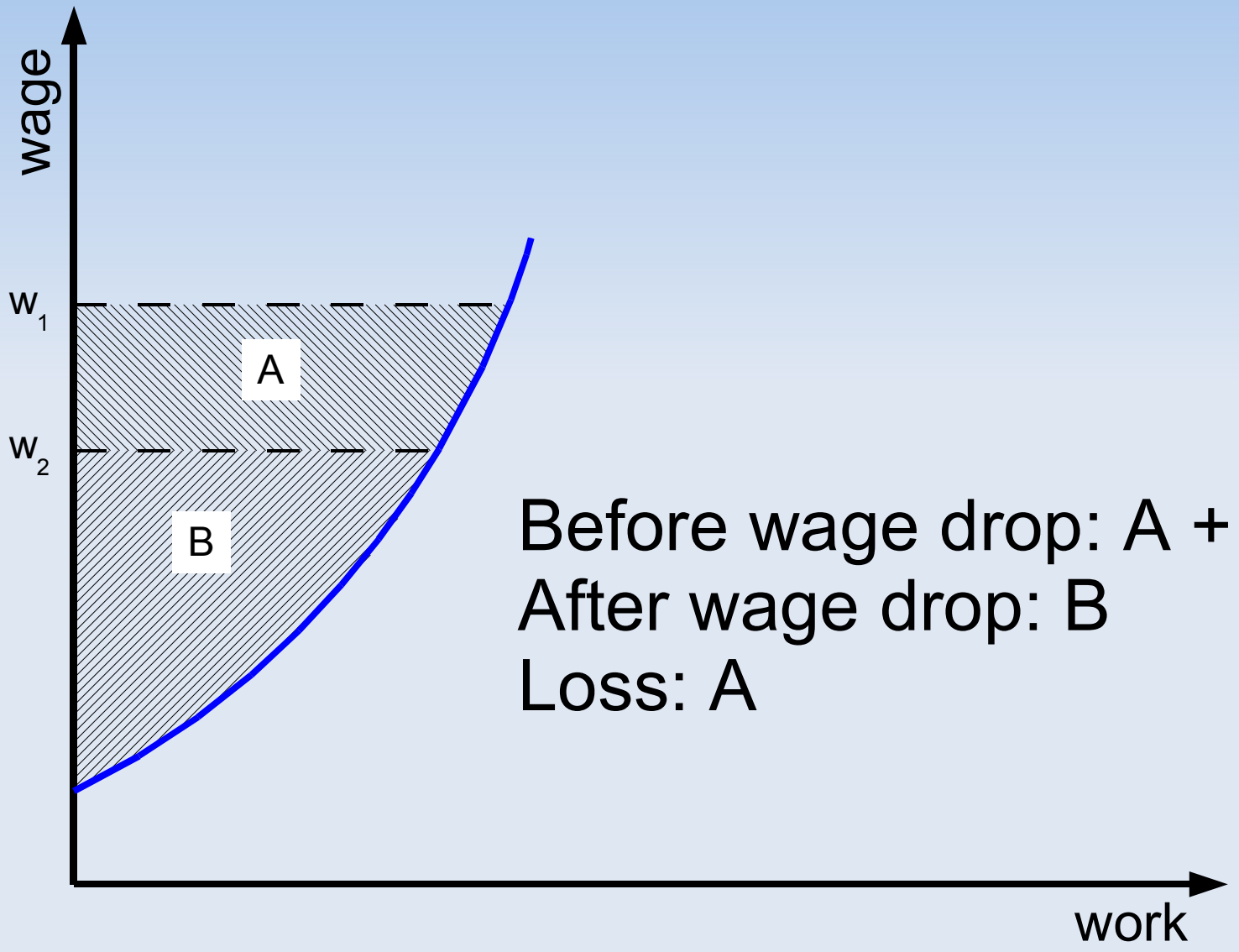
Producer surplus

- *Producer surplus* = amount of income an individual receives in excess of what he would require to supply a given number of units of a factor
- Geometrically, it is the area above the supply curve and below the wage rate

Producer surplus



Producer surplus after wage falls



Before wage drop: A + B
After wage drop: B
Loss: A

Capital

- Firms use two main factors of production: labor and capital
- *Real capital* = physical aids to production (e.g., buildings)
- *Financial capital* = money lent to firms to purchase or rent real capital
- Where does financial capital come from? Why do people save?

A two-period model

- Until now, we assumed people only care about the present
- Now suppose people care about consumption today (c_0) versus tomorrow (c_1)
- *Life-cycle model* = a model where people's decisions at a point in time are made taking into account the economic circumstances over that person's entire lifetime
- Thus, we assume people only live for two periods

Endowment

- *Endowment point* = feasible consumption bundle if the individual makes no trades with the market (or does not save/borrow)
- *Present value of endowment* = maximum level of current consumption that can be obtained, given the endowment
- Hence, the ”income” of the consumer is the present value of her endowment

Present value

- *Present value* = maximum amount of money you would be willing to pay today for the right to receive a given amount at a specified date in the future
- The opposite of ”compounding interest” (interest rate is *i*):
  - if you deposit $*x* today, in *n* years you'll get $x \cdot (1+i)^n$
  - if *n* years from today you get $*y*, how much should you have deposited today?

$$x = \frac{y}{(1+i)^n}$$

More on present value

- *Discount rate* = interest rate used in the calculation of present value
- Payments further into the future have lower value today (because of discounting)
- What if you have annual payments of $\$M_0$, $\$M_1$, $\$M_2$, ..., $\$M_n$ instead of one payment after *n* years?

$$x = M_0 + \frac{M_1}{(1+i)} + \frac{M_2}{(1+i)^2} + \ldots + \frac{M_n}{(1+i)^n}$$

Intertemporal budget constraint

- Suppose individual has income I_0 today and I_1 tomorrow $\Rightarrow$ present value of endowment is

$$PV = I_0 + \frac{I_1}{(1+i)}$$

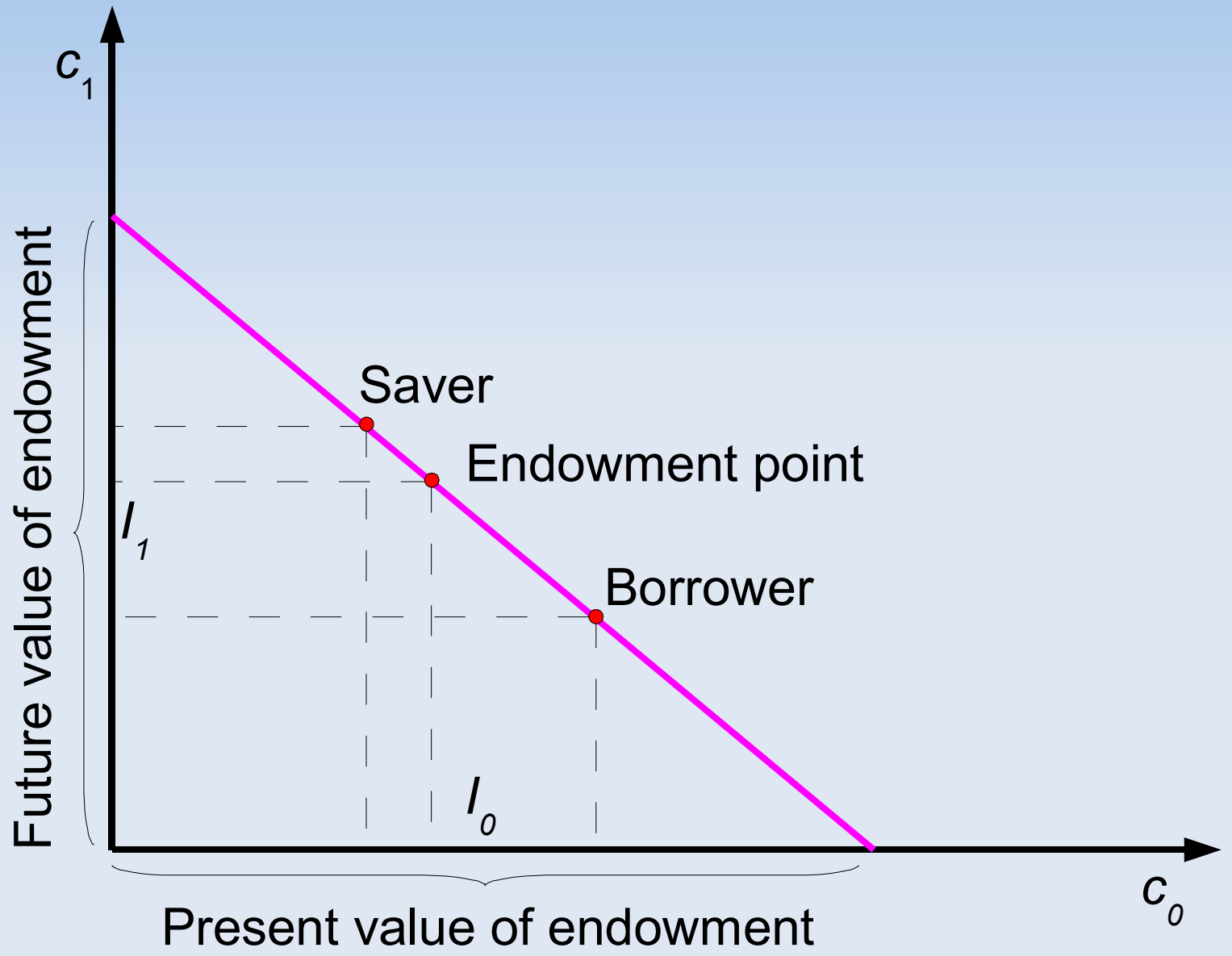
- *Borrower* = individual for whom $c_0 > I_0 \Rightarrow$ loan = $c_0 - I_0$
- *Saver* = individual for whom $c_0 < I_0 \Rightarrow$ savings = $I_0 - c_0$

Intertemporal budget constraint

- Net savings are $S = I_0 - c_0$
  - if S > 0, then individual is saver (lender)
  - if S < 0, then individual is borrower
- ”Today's budget constraint”: $c_0 + S = I_0$
- ”Tomorrow's BC”: $c_1 = I_1 + S \cdot (1 + i)$
- Combine them to get intertemporal budget constraint:

$$c_0 + \frac{c_1}{(1+i)} = I_0 + \frac{I_1}{(1+i)}$$

Intertemporal budget constraint



Indifference maps

- Indifference curves show preference for present consumption versus future consumption
- *Marginal rate of time preference* = marginal rate of substitution between present and future consumption (slope of indifference curve)
- ”Impatient” people have steep indifference curves (– slope > 1) around the 45 degree line
- Optimal consumption choice: tangency point of indifference curves and budget line

Comparative statics

- The ”price” of future consumption is the inverse of the interest rate $\Rightarrow$ an increase in the interest rate is equivalent to a fall in price
  - substitution effect: shift consumption more to the future (save more)
  - income effect:
    - borrower: need to repay more in the future, so it is as if income fell $\Rightarrow$ consume less of *both* goods
    - saver: will get back more in the future, so it is as if income increased $\Rightarrow$ consume more of *both* goods

The effect of a higher interest rate on savings

- Borrower:
  - substitution effect: increase savings
  - income effect: increase savings
- Saver:
  - substitution effect: increase savings
  - income effect: decrease savings