Keynes vs. Classical views of the IS Curve

- \( \text{reset;} \)

- \( \text{assume}(C_0>0): \text{assume}(C_Y>0): \text{assume}(C_Y<1, \_\text{and}): \text{assume}(T>0); \)
- \( \text{assume}(G>0): \text{assume}(I_r<0): \text{assume}(I_o>0): \text{assume}(T_o>0): \text{assume}(T_y>0) : \)

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- \( I_Y:=0.1: \text{Cy}:=0.8; \)

Household consumption
- \( C:=C_0+C_Y\cdot(Y-T_o-T_y\cdot T); \)

\[ C = C_0 - 0.8 \cdot T_o + 0.8 \cdot Y - 0.8 \cdot T \cdot T_y \]

Investment
- \( \text{Inv}:=I_o+I_r\cdot r +I_Y\cdot Y ; \)

\[ I_o + 0.1 \cdot Y + I_r \cdot r \]

Equilibrium
- \( \text{IS}:=Y=C+\text{Inv}+G ; \)

\[ Y = C_0 + G + I_o - 0.8 \cdot T_o + 0.9 \cdot Y - 0.8 \cdot T \cdot T_y + I_r \cdot r \]

Symbolic solution
- \( \text{ans}:=\text{solve}([\text{IS}],\{Y\}); \)

\[ \{[Y = 10.0 \cdot C_0 + 10.0 \cdot G + 10.0 \cdot I_o - 8.0 \cdot T_o - 8.0 \cdot T \cdot T_y + 10.0 \cdot I_r \cdot r] \} \]

- \( \text{assign}(\text{op}(\text{ans}))\cdot Y ; \)

\[ 10.0 \cdot C_0 + 10.0 \cdot G + 10.0 \cdot I_o - 8.0 \cdot T_o - 8.0 \cdot T \cdot T_y + 10.0 \cdot I_r \cdot r \]

Numeric solution

Keynes believed that managers were at times victims of "animal spirits" and might
irrationally
at those time. The investment function can be represented as \( I = I_o + I_r^*r \) where the
irrational behavior
is part of autonomous (\( I_o \)) investment and the rational (predictable) part is given by \( I_r^*r \).
In the
Keynesian work the rational part will be fairly small (\( I_r = -0.5 \)) compared to the classical
view where
the rational part is much more significant (\( I_r = -50 \)).

A Keynesian solution

- \( C_o := 100; \ C_y := 0.9; \ I_r := -0.5; \ G := 100; \ T := 100; \ I_o := 100; \ I_y := 0.1; \ T_y := 0.3; \ T_o := 50; \ r := 10; \)

Warning: protected variable \( T_o \) overwritten

- \( r := 10; \ \ r_is1 := r; \ Y_is1 := Y; \)
  
  10
  
  2310.0

- \( r := 20; \ \ r_is2 := r; \ Y_is2 := Y; \)
  
  20
  
  2260.0

A "classical solution"

- \( C_y := 0.2; \ I_r := -50; \ C_o := 50; \ I_o := 1000; \)
- \( r := 10; \ \ r_is3 := r; \ Y_is3 := Y; \ Inv; \)
  
  10
  
  5860.0
  
  1086.0

- \( r := 20; \ \ r_is4 := r; \ Y_is4 := Y; \ Inv; \)
  
  20
  
  860.0
  
  86.0

- \( p1 := \text{plot::Polygon2d}([[Y_is1, r_is1], [Y_is2, r_is2]], \)
  \ Color=\text{RGB::Red,}
  \ Title="Keynes", \ TitlePosition=[2700,19], \ TitleFont=[\text{RGB::Red}]) \)
Some things to note. A change in interest rates has a much greater effect in the classical view than it does in the Keynesian view. In the Keynesian view an increase in interest rates from $r=10$ to $r=20$ decreased household income by

\[ Y_{is1} - Y_{is2}; \]
while in the classical view the same change in interest rates decreased income by

\[ Y_{is3} - Y_{is4} ; \]

\[ 5000.0 \]