

# Capital-Based Macroeconomics

## Austrian Macroeconomics



Adapted from *Time and Money:  
The Macroeconomics of Capital Structure*  
by Roger W. Garrison  
London: Routledge, 2001

Sustainable and Unsustainable Growth  
The Macroeconomics of Boom and Bust

# **Capital-Based Macroeconomics in Perspective**

## **The Elements of Capital-Based Macroeconomics**

The Production Possibilities Frontier

The Loanable-Funds Market

The Structure of Production

Stage-Specific Labor Markets

## **Applications of Capital-Based Macroeconomics**

Sustainable Growth (supported by saving)

Unsustainable Growth (triggered by credit creation)

Capital-Based Macroeconomics is an outgrowth of the Austrian theory of the business cycle—a theory set out in 1912 by Ludwig von Mises and developed in the 1930s by Friedrich A. Hayek and others.



**LUDWIG VON MISES**

1881-1973



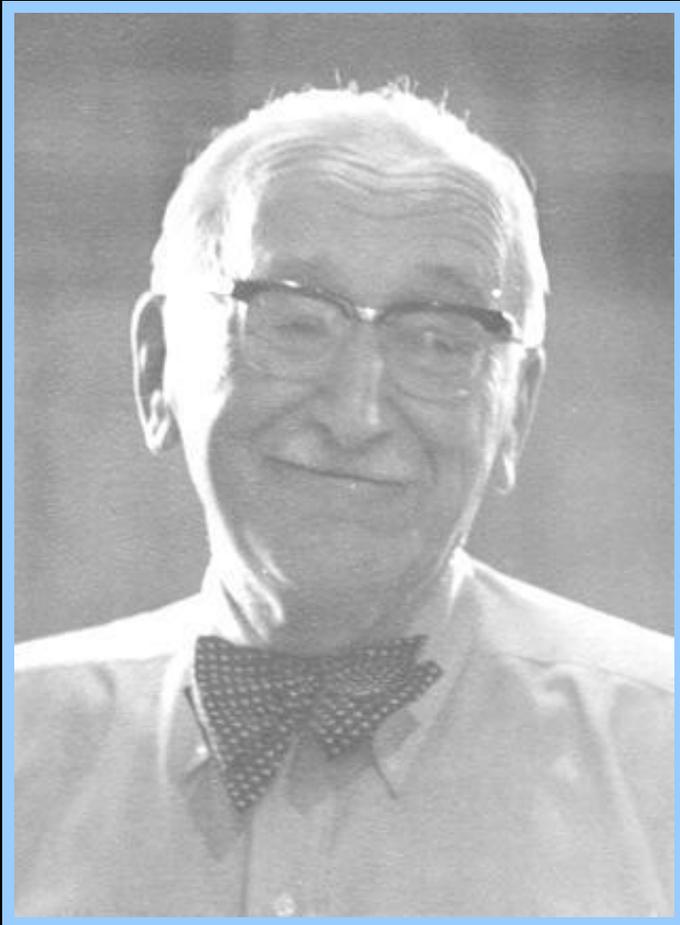
**FRIEDRICH A. HAYEK**

1899-1992

# Sustainable and Unsustainable Growth

## The Macroeconomics of Boom and Bust

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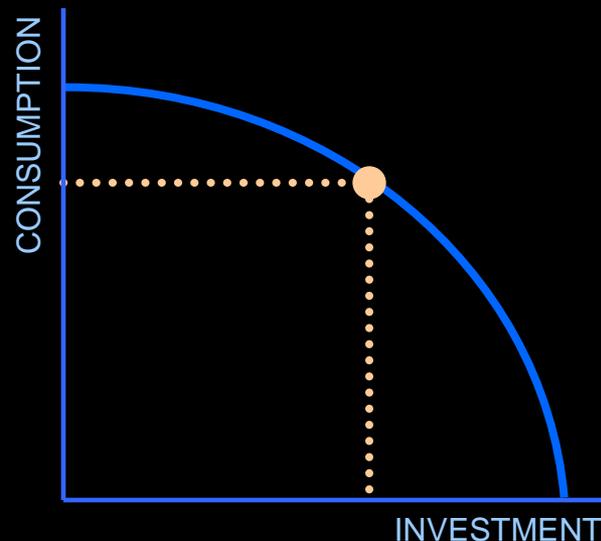
### A Methodological Point:

Before we can even ask how things might go wrong, we must first explain how they could ever go right.

— F. A. Hayek

In capital-based macroeconomics, consumption and investment represent *alternative* uses of the economy's resources.

Under favorable conditions, a fully employed market economy allocates resources to both uses, making the most of the trade-off.



## The Production Possibilities Frontier

The Production Possibilities Frontier (PPF) is often used for emphasizing the concept of scarcity and illustrating the implied trade-off and for expositing theories of capital and interest, economic growth, and international trade. But the PPF rarely appears in macroeconomic constructions.

Featuring the *trade-off* between consumption and investment provides a contrast to Keynesian constructions, in which these two macroeconomic magnitudes are treated as *additive* components of private-sector spending.

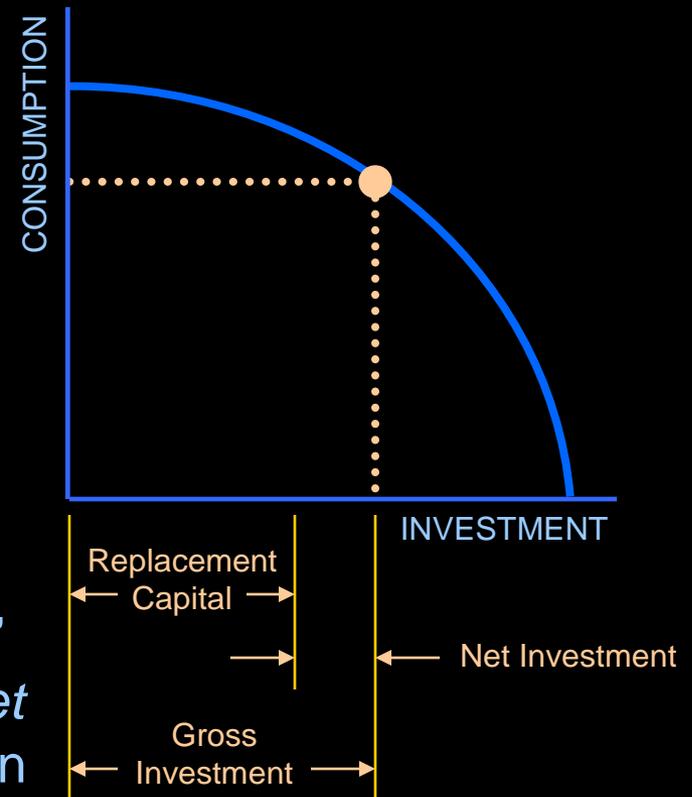
“Investment” in this construction represents *gross* investment, which includes replacement capital.

Typically, the investment needed just to replace worn out or obsolete capital is something less than total, or gross, investment.

The difference between the “replacement” and the “gross” magnitudes constitutes *net* investment, which allows for the expansion of the economy.

Positive net investment means that the economy is growing. The PPF shifts outward from year to year, permitting increasing levels of both consumption and investment.

This outward shifting of the PPF represents *sustainable* economic growth.

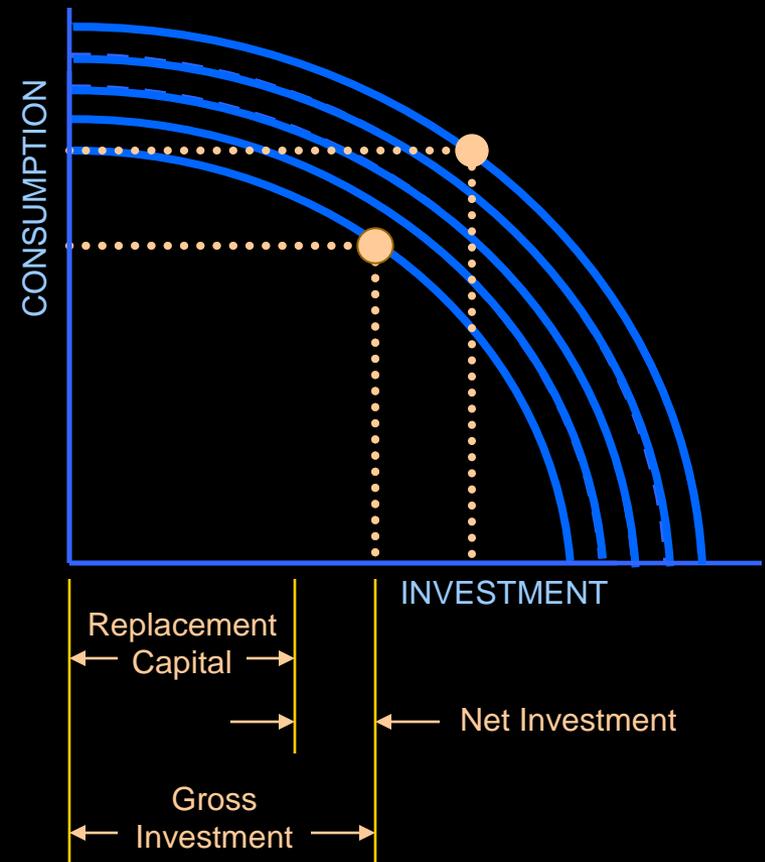


Watch the economy grow.

Four periods of growth are shown—with consumption, as well as saving and investment, increasing in each period.

The actual rate of expansion of the PPF depends upon many factors.

For instance, with economic expansion, capital depreciation increases, too. But increasing incomes are generally accompanied by further increases in saving and investment.



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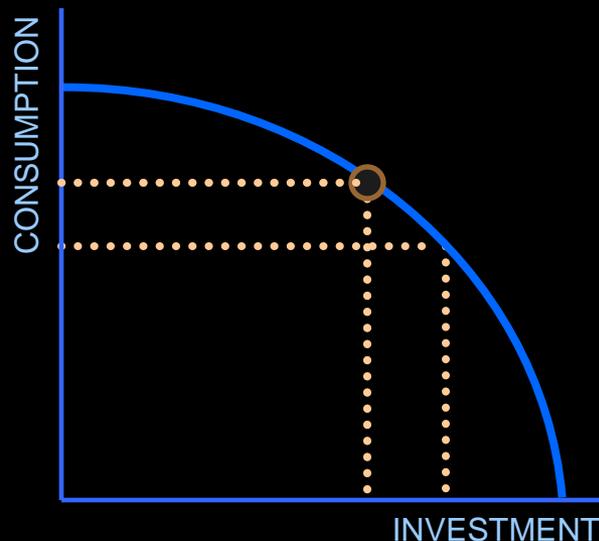
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For instance, with economic expansion, capital depreciation increases, too. But increasing incomes are generally accompanied by further increases in saving and investment.

Importantly, a change in saving preferences, which provokes a movement *along* the initial PPF, affects the rate at which the PPF expands outward.

Suppose people become more thrifty, more future oriented. They reduce their current consumption and save instead.

With the increased saving (and investment), the economy grows at a faster rate.

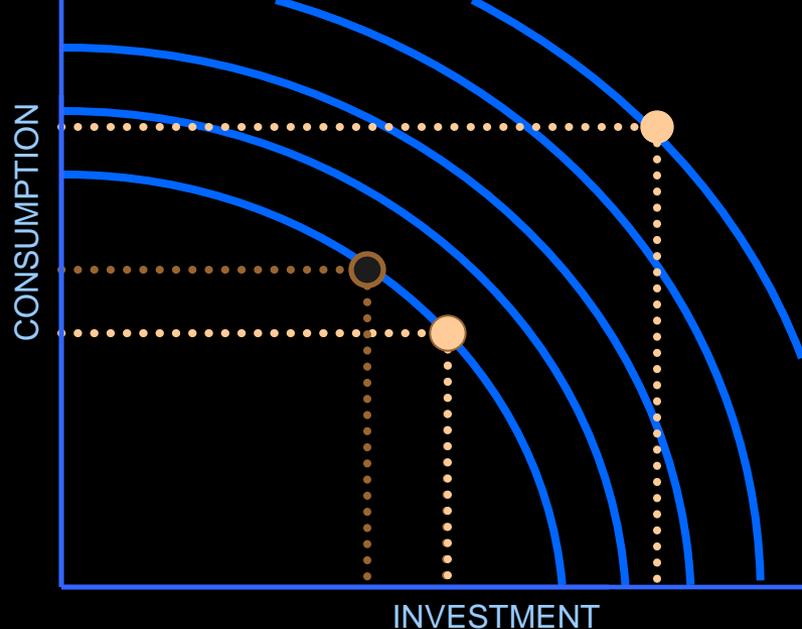


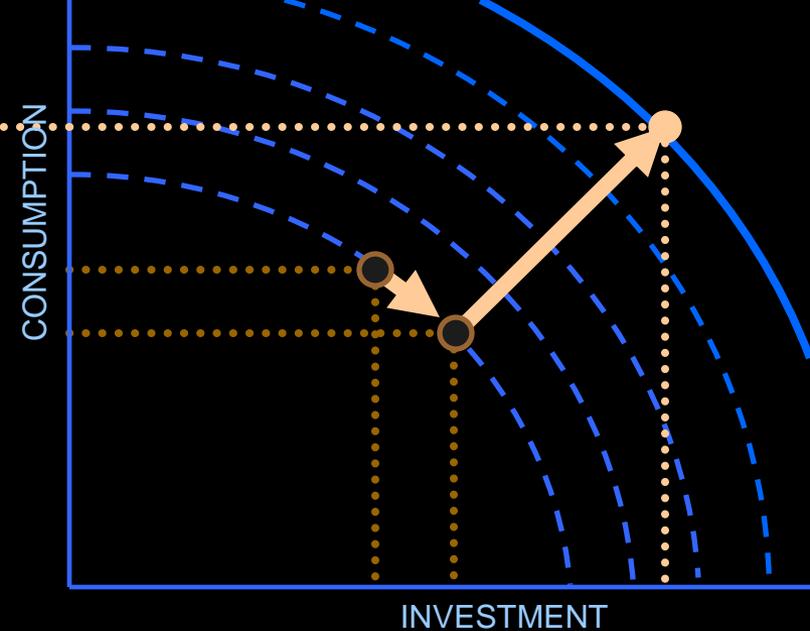
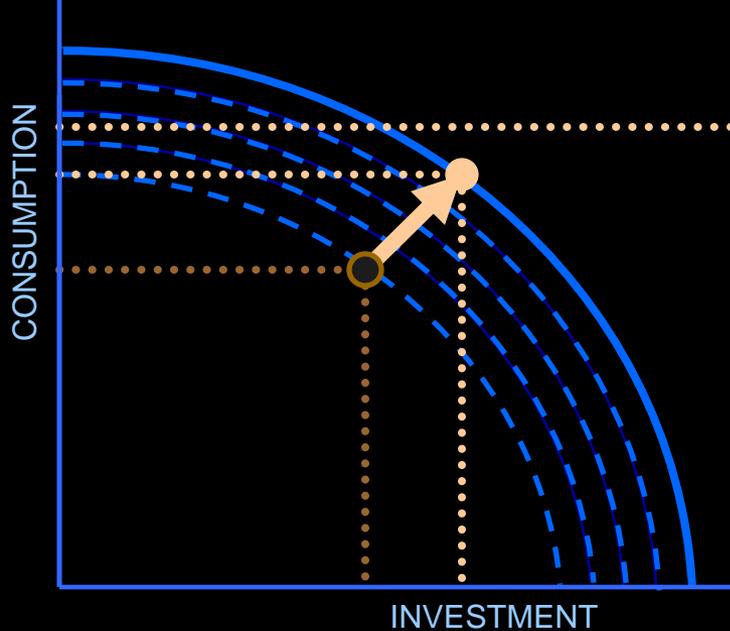
Watch the movement *along* the PPF.

Now watch the economy grow.

Increased thriftiness makes the difference.

Let's compare the high-growth economy with the original low-growth economy.





Note the difference that an initial increase in saving makes in the pattern of consumption and investment.

*Without* an initial increase in saving, consumption and investment increase modestly from period to period.

*With* an initial increase in saving, investment increases *at the expense of consumption*, after which both consumption and investment increase dramatically from period to period.

Starting with the fourth period, the initial saving pays off as a higher level of consumption than would otherwise have been possible.

# The Market for Loanable Funds

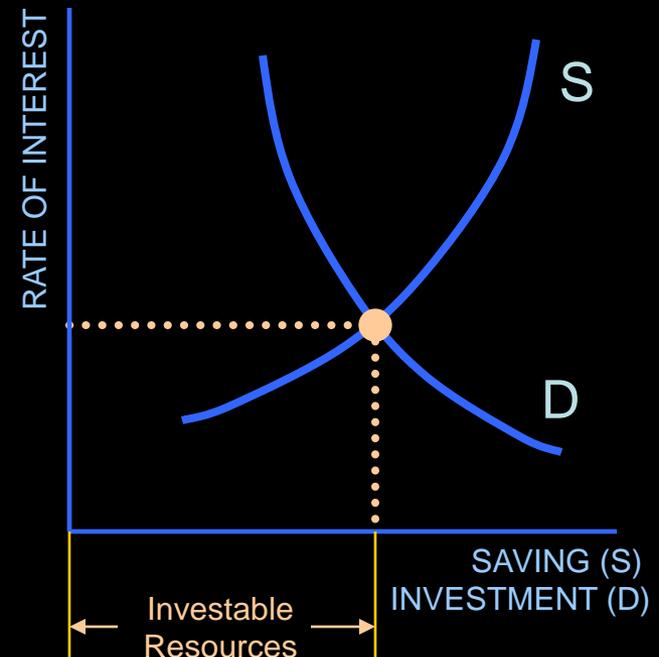
Loanable-funds theory was a staple in pre-Keynesian macroeconomics.

Saving constitutes the supply of loanable funds.

Demand reflects the business community's willingness to borrow and undertake investment projects.

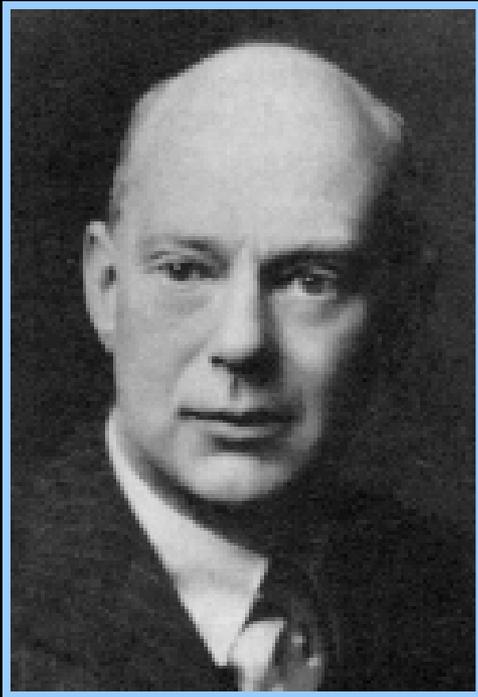
With the interest rate serving as the price, loanable-funds theory is a straightforward application of Alfred Marshall's supply-and-demand analysis.

Both Eugen von Böhm-Bawerk and John Maynard Keynes recognized that the relevant interest rate should be a broadly conceived one and that the correspondingly broad market being equilibrated is the market for investable resources.

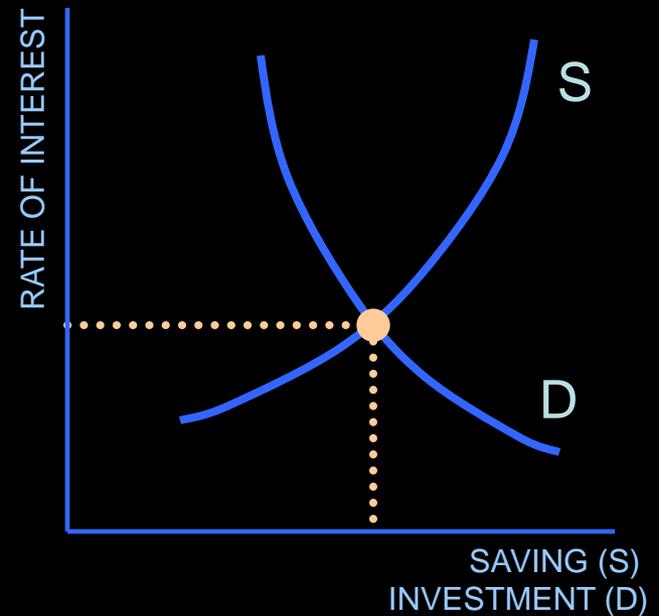


# The Market for Loanable Funds

Loanable-Funds theory was most closely identified with Dennis Robertson, a contemporary of Keynes and a critic of Keynes's alternative theory—his liquidity-preference theory of interest.



Sir Dennis H. Robertson (1890 —1963)

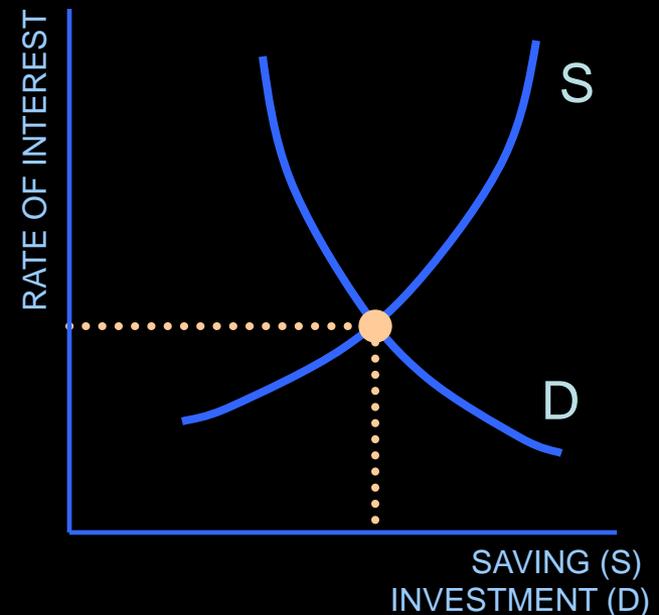


# The Market for Loanable Funds

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On the suggestion of Roy Harrod, who was a sympathetic expositor of the Keynesian system, Keynes included in his *General Theory* (p. 180) a graphical rendering of the loanable-funds market.

This is the only diagram to appear in his book. Keynes's purpose was to show explicitly just what about pre-Keynesian thought was being discarded—namely, its loanable-funds theory.



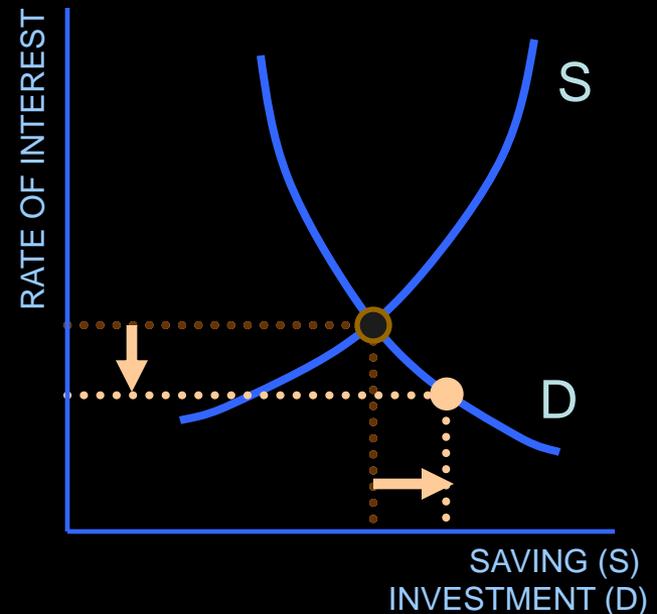
# The Market for Loanable Funds

The Austrian economists based much of their theorizing about saving, investment, and the interest rate on the loanable-funds framework, though they rarely included a graphical rendering of it.

If people become more future-oriented, they increase their saving, causing the interest rate to fall and thereby encouraging the business community to undertake more investment projects.

With a given technology, saving and investment are prerequisite to genuine (sustainable) economic growth.

Watch the saving curve shift rightward.

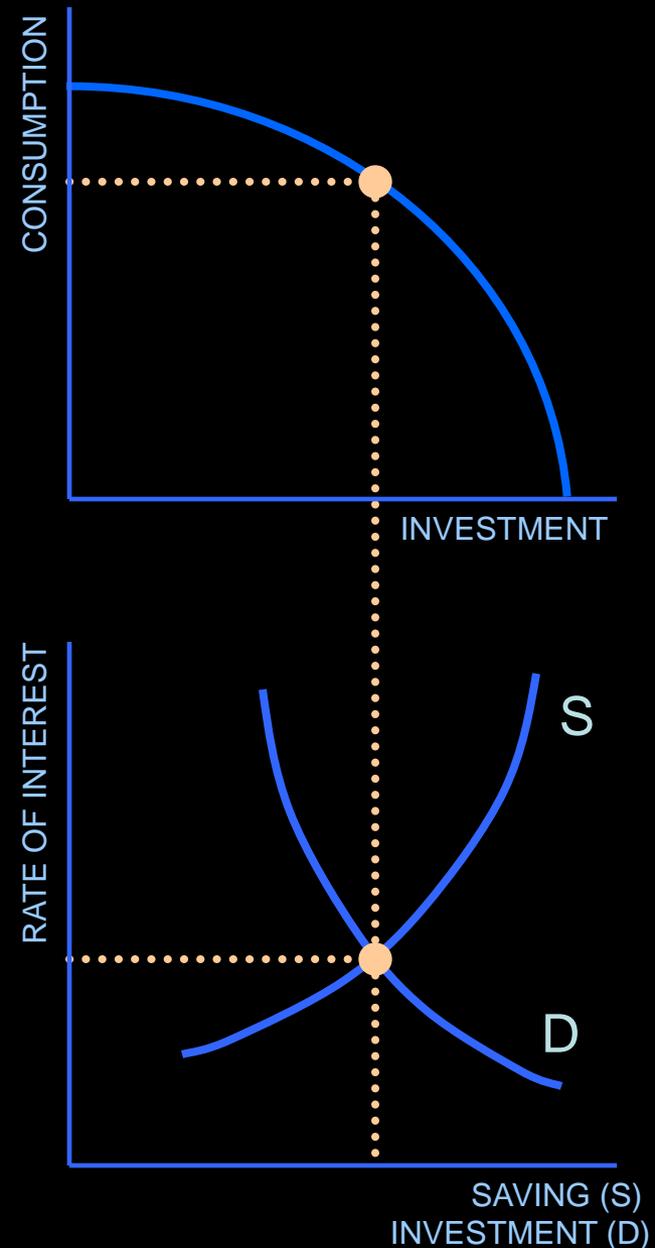


The loanable-funds market and the production possibilities frontier tell mutually reinforcing stories.

The loanable-funds market shows how the interest rate brings saving and investment in line with one another.

The production possibilities frontier shows how the tradeoff is struck between consumption and investment.

Market adjustments in output prices, wage rates, and other input prices keep the economy functioning on its PPF.

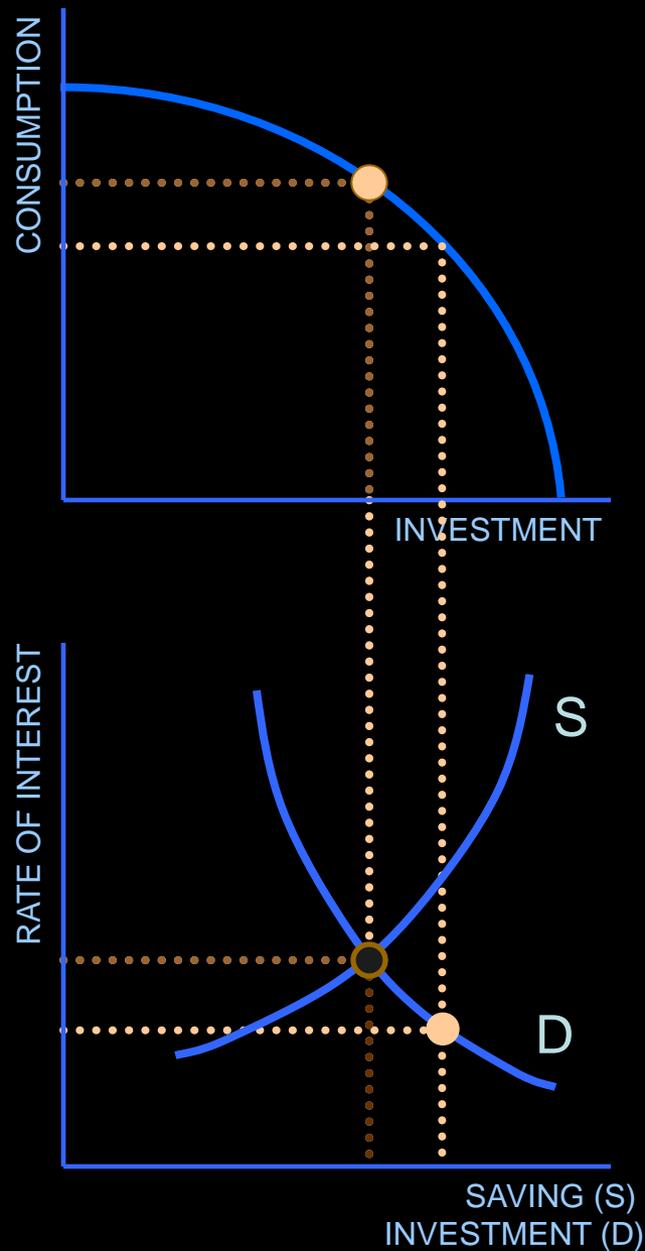


These two elements of capital-based macroeconomics show the pattern of movements in consumption, saving, investment, and the interest rate that are consistent with a change in intertemporal preferences.

As before, we let people become more future-oriented. They save more, which transmits a signal (a *lower* interest rate) to the business community.

Watch the saving-induced decrease in the interest rate and the corresponding movement along the PPF.

The lower interest rate establishes a new equilibrium in the loanable-funds market, as the economy moves *along* the PPF in the direction of more investment and less (current) consumption.



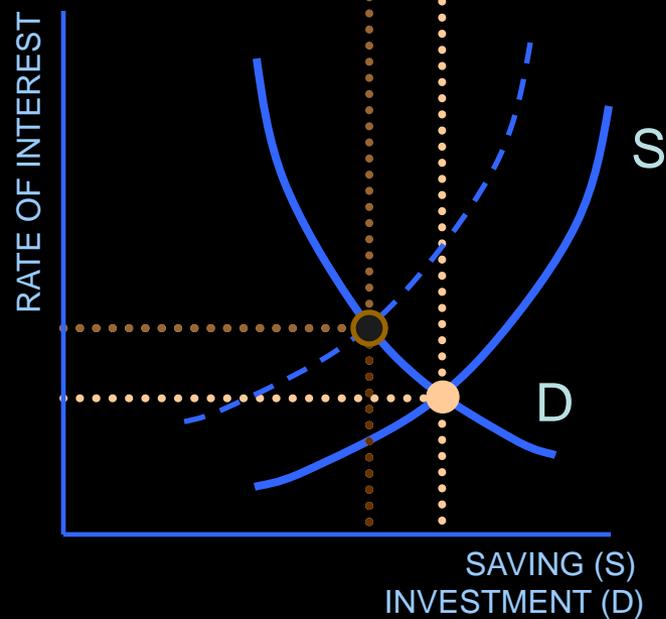
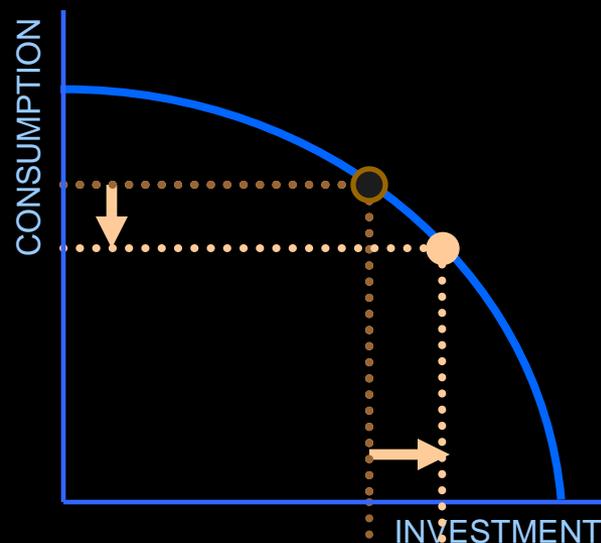
Even the possibility that a market economy could work in this way is at odds with Keynesian theory.

Note that *more* investment is undertaken as consumption *falls*.

This is only to recognize, of course, that movements *along* the PPF necessarily entail *opposing* movements of consumption and investment.

According to Keynes, however, any reduction in consumer spending would result in excess inventories, which in turn would cause production cutbacks, worker layoffs, and a spiraling downward of income and expenditures. The economy would go into recession, and the business community would commit itself to *less*, not more, investment.

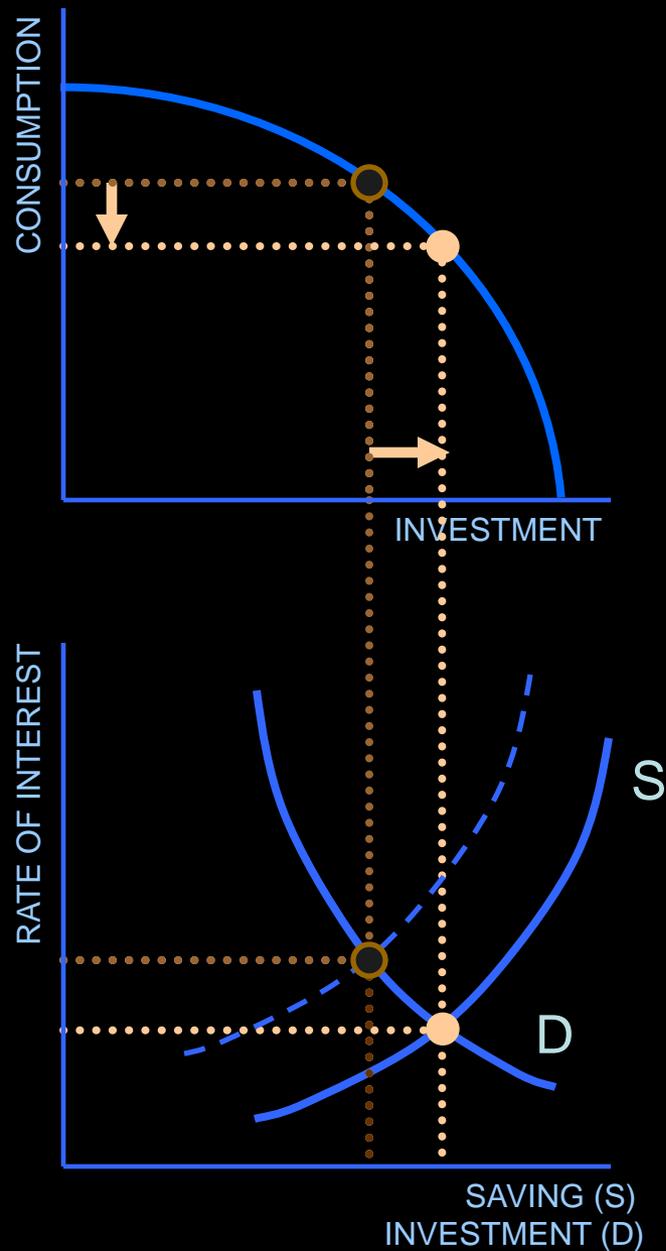
This is Keynes's "Paradox of Thrift."



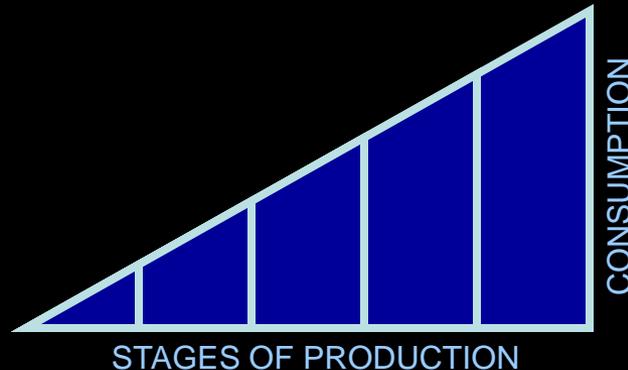
If retail inventories were a “*representative*” investment, then Keynes would be right. Here, the derived-demand effect dominates. Reduced consumer spending means reduced inventory replacement. In general, late-stage investments move *with* consumer spending.

However, the interest-rate effect dominates in long-term, or early-stage, investments. A lower interest rate can stimulate industrial construction, for instance, or product development.

To keep track of changes in the general *pattern* of investment activity, we need to consider the structure of production and stage-specific labor markets.



# The Structure of Production



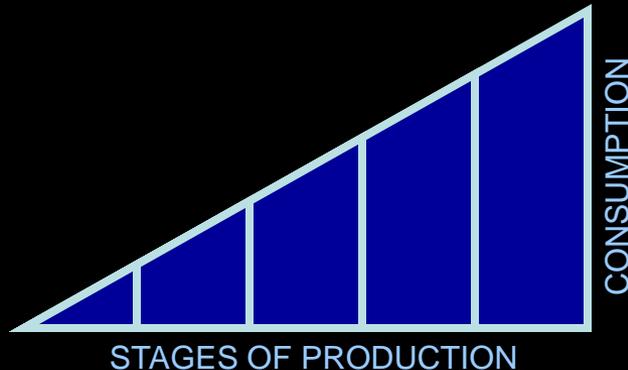
Late-stage investment activity is exemplified by inventory management.

Capital-based macroeconomics disaggregates capital intertemporally. Consumable output is produced by a *sequence* of stages of production, the output of one stage feeding in as input to the next.

The temporally defined stages are arrayed graphically from left to right, the output of the final stage constituting consumable output.

Early-stage investment activity is exemplified by product development.

# The Structure of Production

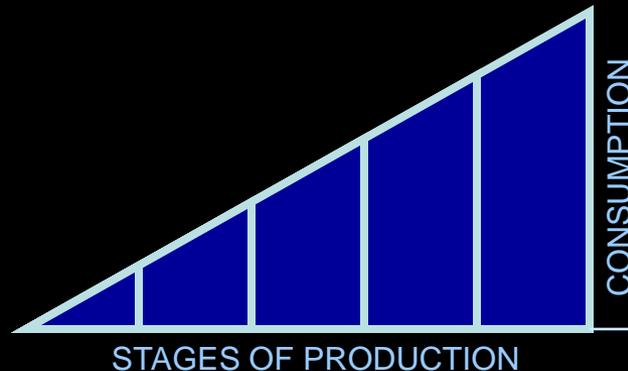


For pedagogical convenience, the initial capital structure is shown as having five stages. With growth, the number of stages will increase.

Although all five of these stages are in operation during each time period, resources can be tracked through the structure of production over time.

Watch the resources, or “goods in process,” move through the stages.

# The Structure of Production

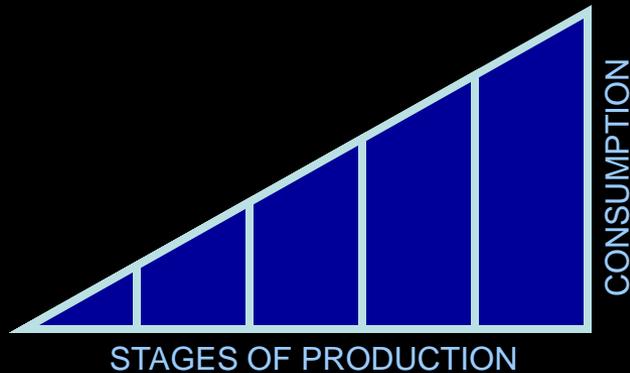


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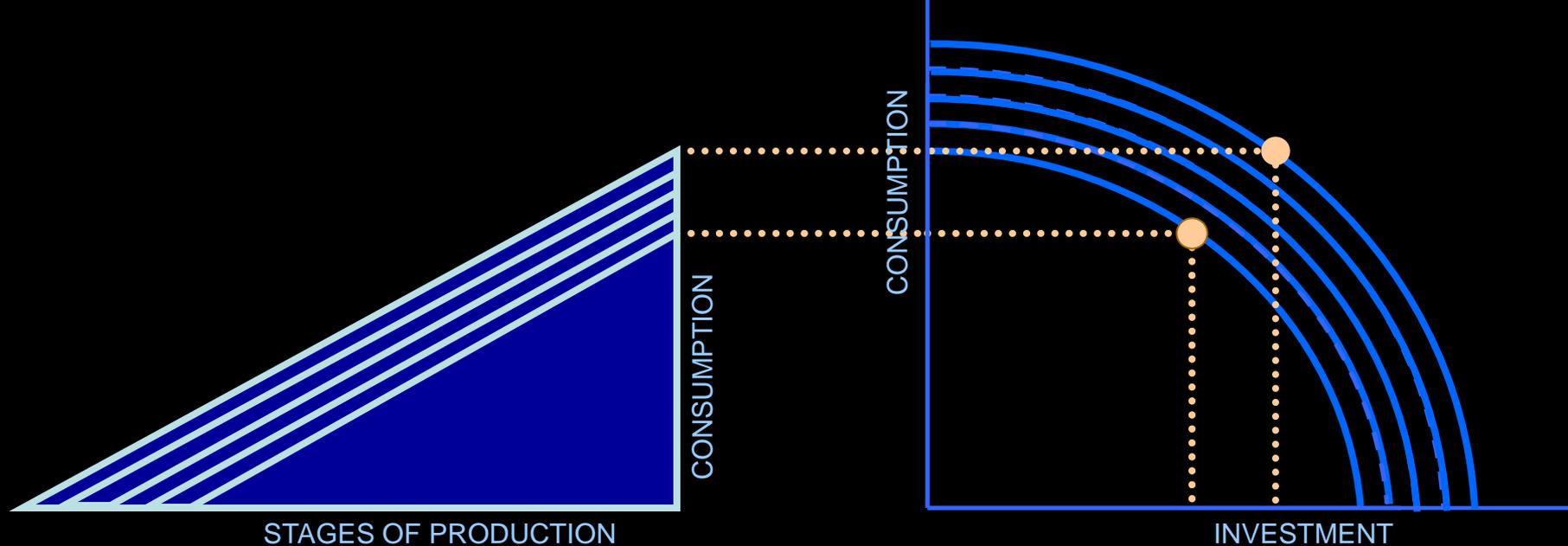
Watch the resources, or “goods in process,” move through the stages.

NOTE: Hayek introduced his triangle in 1931, when Henry Ford was still producing the Model A. If only Hayek had had PowerPoint, he could have shown how the abstract triangle aligns with real-world output.



Together, the sequence of stages form a Hayekian triangle, a summary depiction of the economy's intertemporal structure of production.

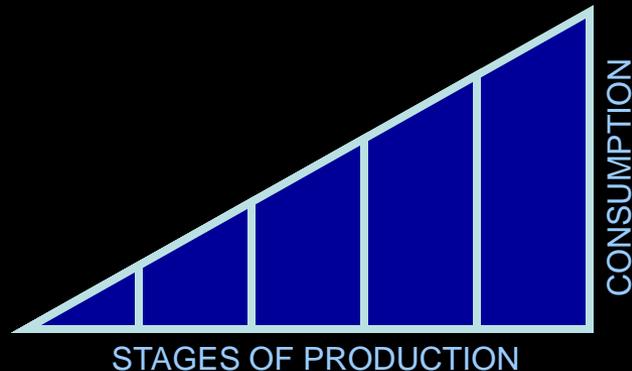
In a growing economy, the triangle increases in *size* along with the outward expansion of the production possibilities frontier.



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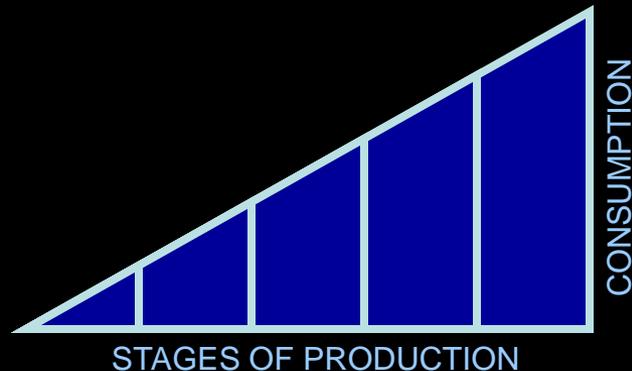
In a growing economy, the triangle increases in *size* along with the outward expansion of the production possibilities frontier.

Watch the PPF and the Structure of Production expand together.



When people choose to save more, they send two seemingly conflicting signals to the market:

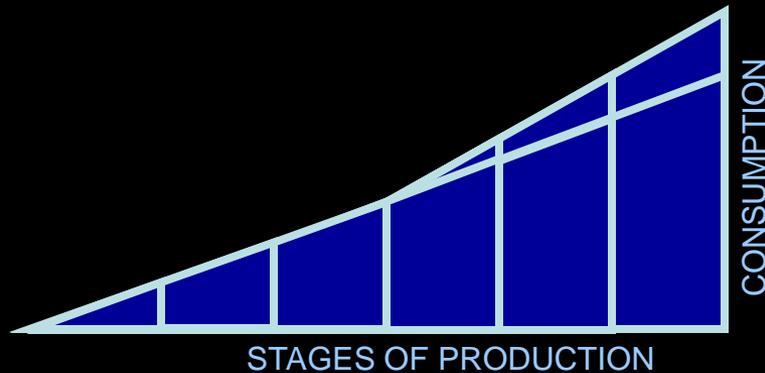
1. Decreased consumption *dampens* the demand for the investment goods that are in close temporal proximity with consumable output. This is the *derived demand* effect.
2. A reduced interest rate, which means lower borrowing costs, *stimulates* the demand for investment goods that are temporally remote from consumable output. This is the *time-discount*, or *interest-rate*, effect.



*Derived demand* and *time discount* are in conflict only if “investment” is conceived as a simple aggregate—as it is in Keynes’s  $C + I + G$ .

In capital-based macroeconomics, capital—and hence investment—is conceived as a structure. Changes in the demand for investment, then, can add differentially to (and/or subtract differentially from) the several stages of production that make up the structure.

Keynes’s theorizing in terms of an aggregate rather than in terms of a structure underlies Hayek’s claim that “Mr. Keynes’s aggregates conceal the most fundamental mechanisms of change.”

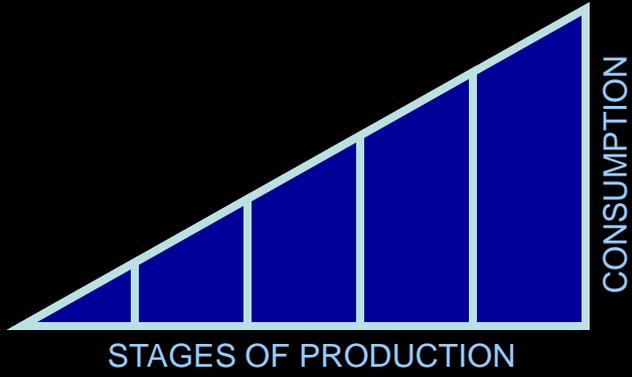


Watch the structure of production respond to an increase in saving.

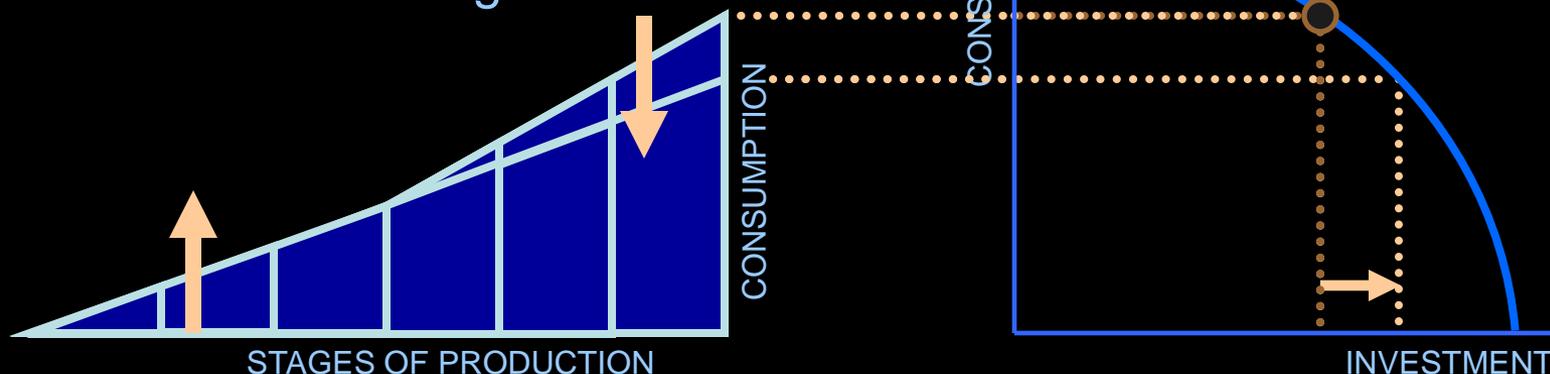
Note the emergence of a sixth stage of production.

Increased saving results in a reallocation of resources among the stages of production. The two effects (derived demand and time discount) have their separate and complementary effects on the capital structure:

1. Derived demand effect: A decreased demand for consumption goods *dampens* investment activities in the *late* states of production, reducing the height of the Hayekian triangle.
2. Time-discount effect: A reduced rate of interest *stimulates* investment activities in the *early stages* of production, increasing the base of the Hayekian triangle.



Watch the economy respond to an increase in saving.

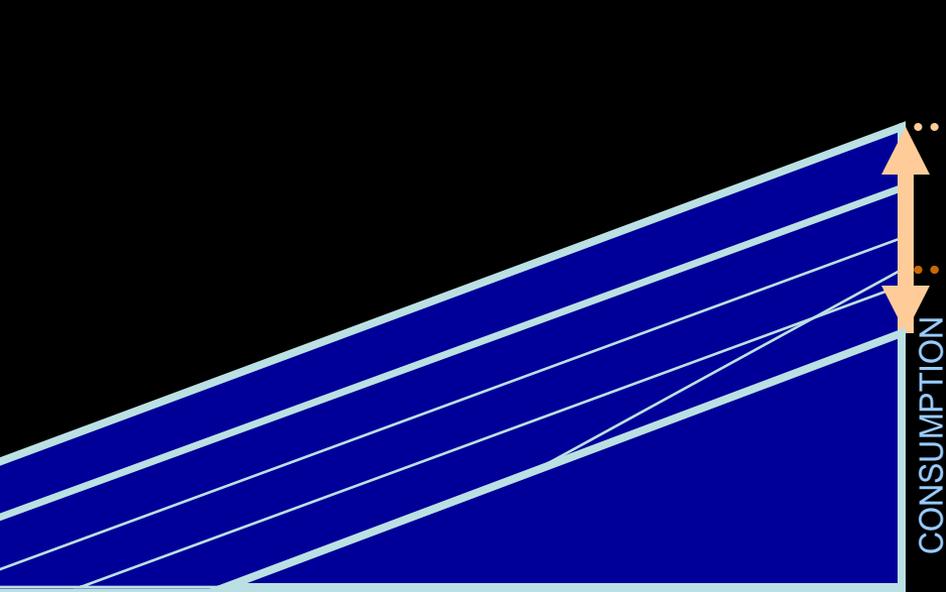


Increased saving, then, has an effect on both the magnitude of the investment aggregate and the temporal pattern of capital creation.

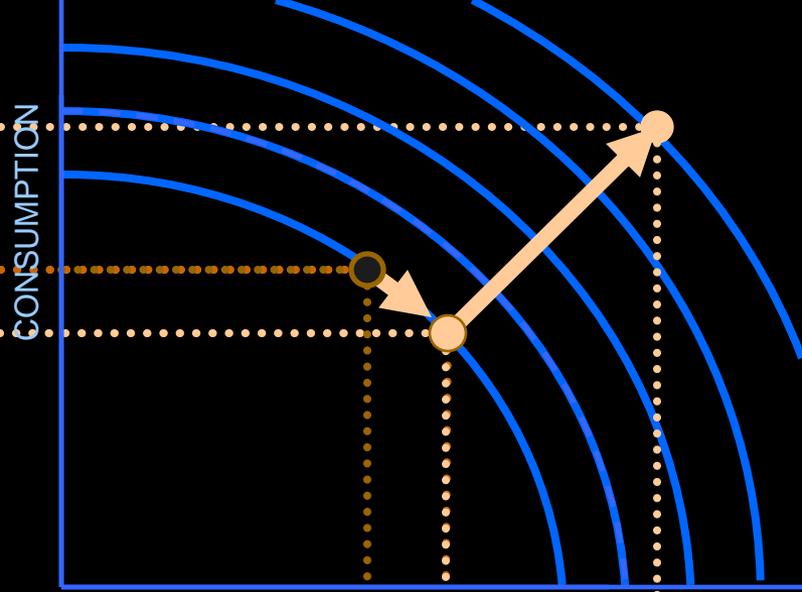
The PPF shows that more saving permits more investment.

The Hayekian triangle shows that capital creation in the late stages (such as retail inventories) is decreased while capital creation in the early stages (such as product development) is increased.

The structure of production is given more of a future-orientation, which is consistent with the saving that made the restructuring possible. That is, people are saving now in order to increase their future spending power.



STAGES OF PRODUCTION



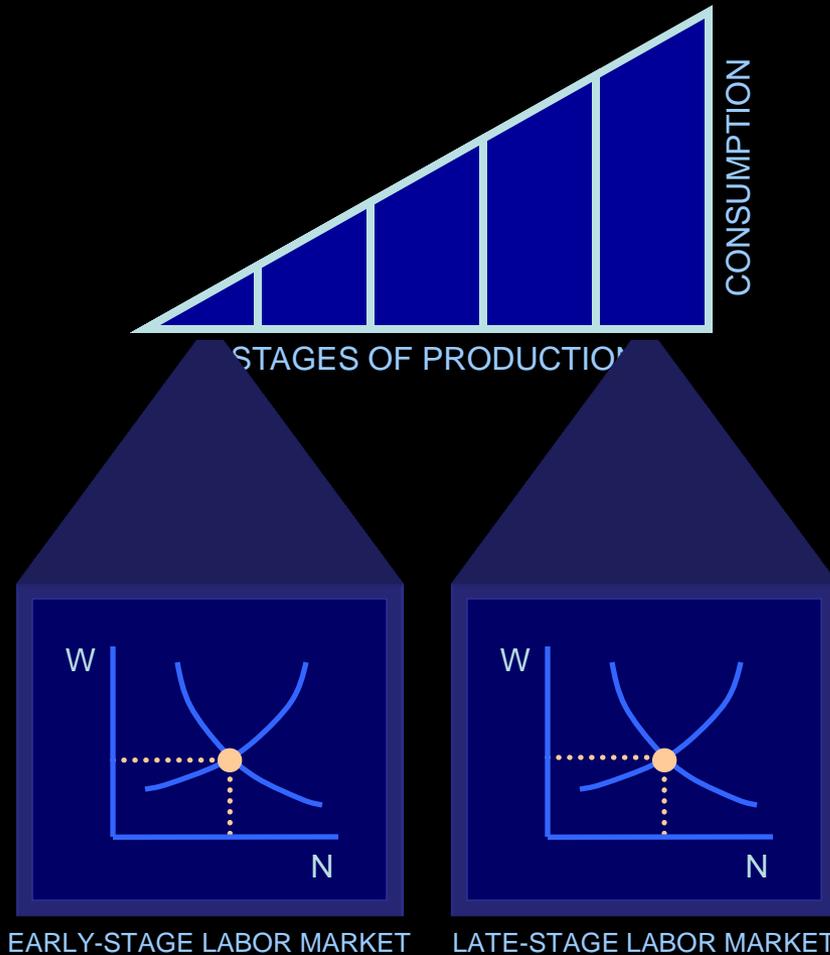
INVESTMENT

Watch the economy grow more rapidly.



As tracked by both the PPF and the Hayekian triangle, consumption is seen to fall as the economy is adapting to a higher growth rate, after which consumption rises more rapidly than before... and eventually surpasses the old projected growth path.

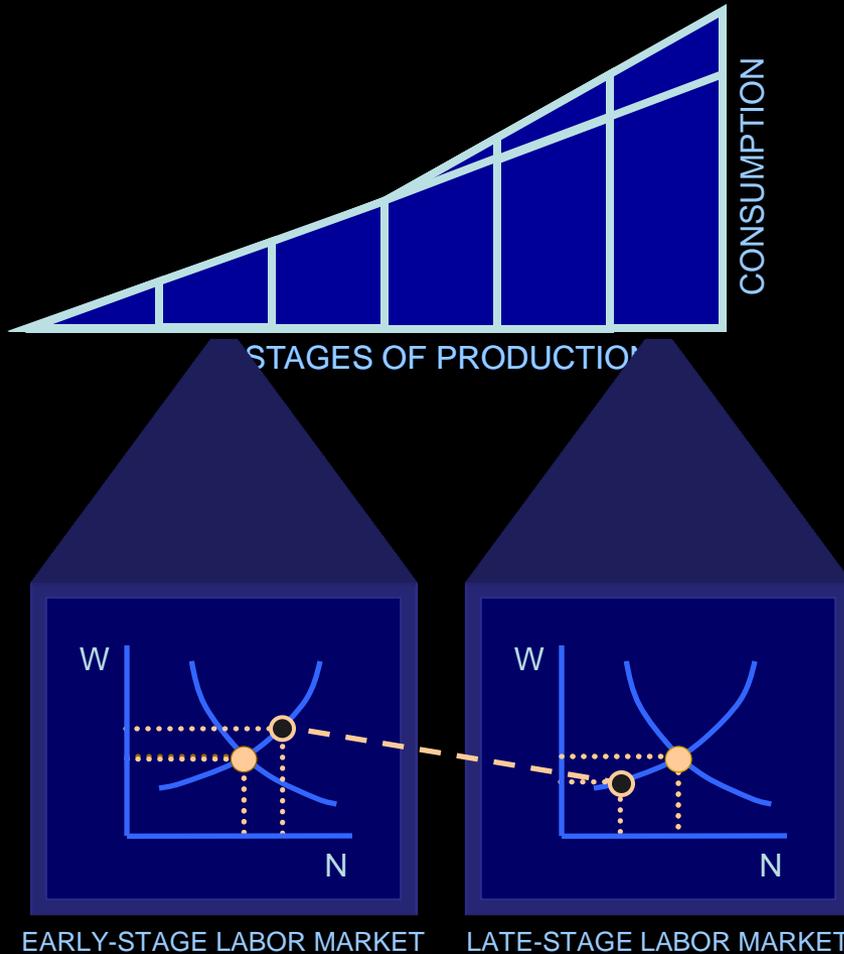
# Stage-Specific Labor Markets



While most macroeconomic theories deal with *THE* labor market and *THE* wage rate, capital-based macroeconomics allows for stage-specific labor markets. With a change in the interest rate, stage-specific wage rates change *in a pattern* rather than change *uniformly*.

Although a labor market for each stage could be depicted, the pattern of changes (the wage-rate gradient, as Hayek called it) is revealed by distinguishing between early-stage and late-stage labor markets.

# Stage-Specific Labor Markets

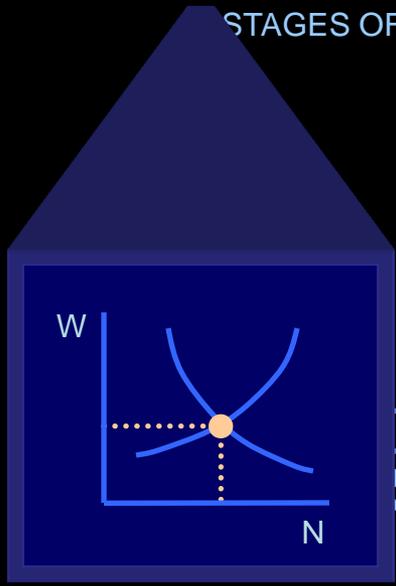
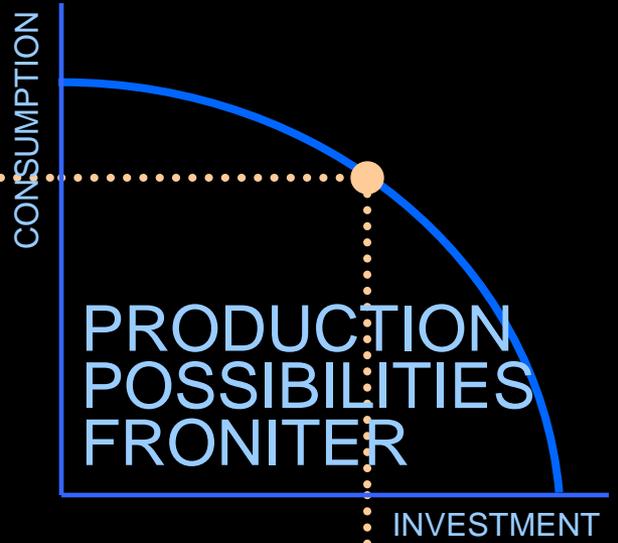
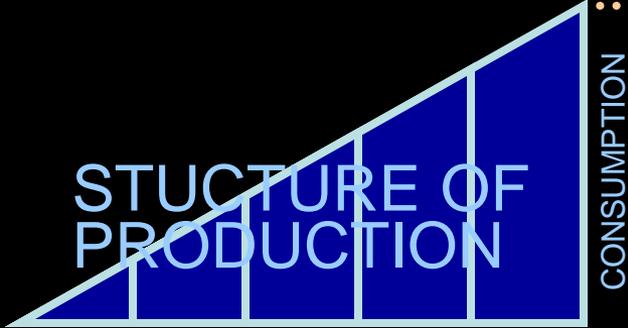


An increase in saving has differential effects on the demand for labor in the early and late stages.

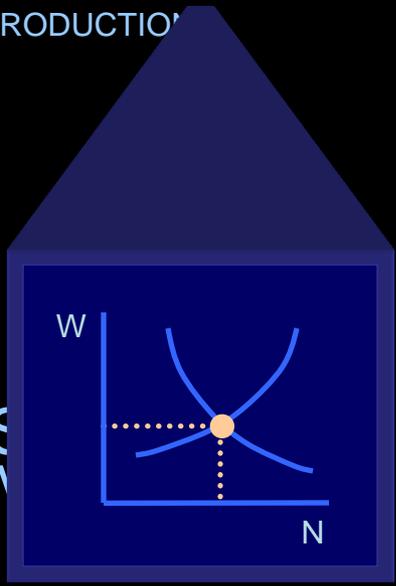
In the late stages, the derived-demand effect (labor demand moves with consumption) dominates the interest-rate effect.

In the early stages, the interest-rate effect (favorable credit conditions) dominates the derived-demand effect.

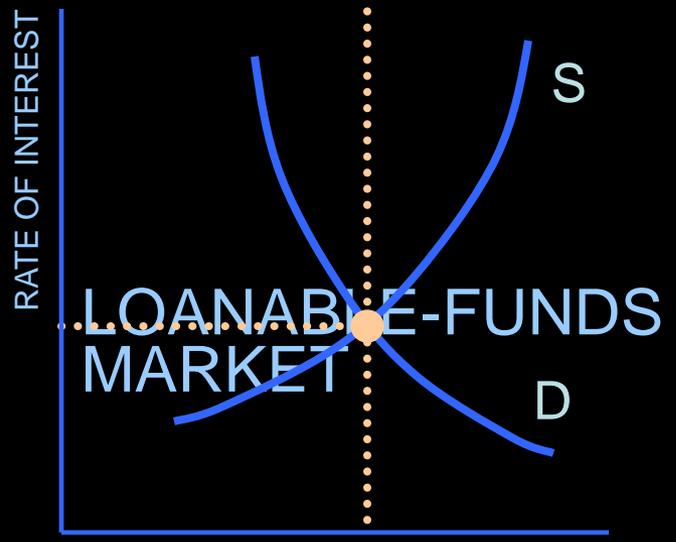
What differentiates shifting of labor demand is a rise to a “wage-rate gradient.”



EARLY-STAGE LABOR MARKET

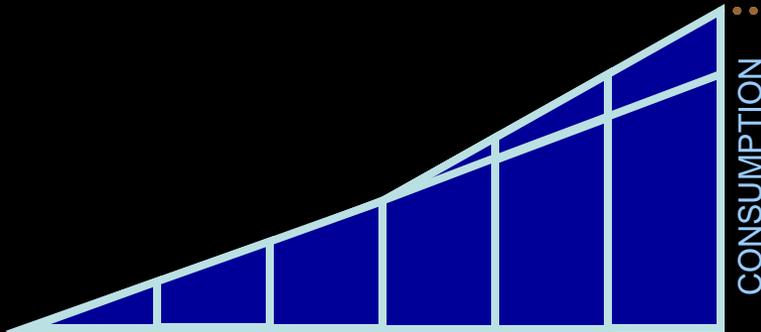


LATE-STAGE LABOR MARKET

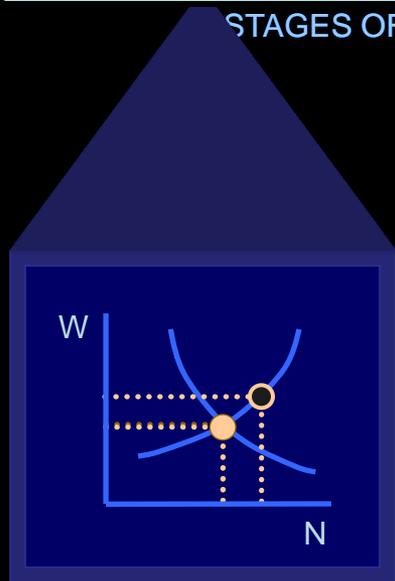


SAVING (S)  
INVESTMENT (D)

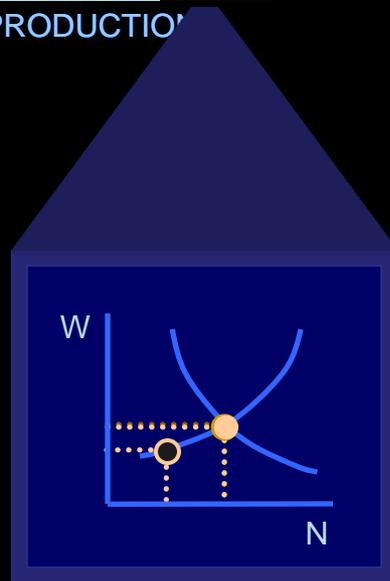
Watch the economy respond to an increase in saving.



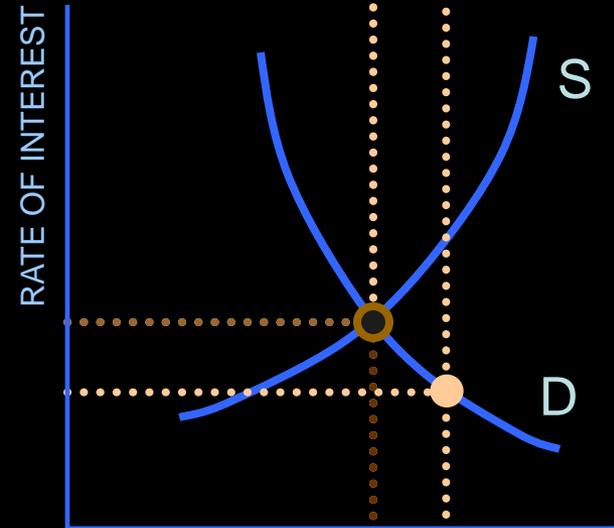
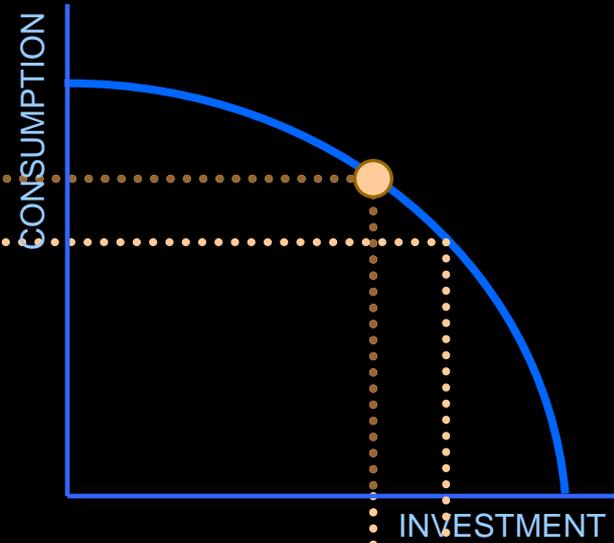
STAGES OF PRODUCTION



EARLY-STAGE LABOR MARKET



LATE-STAGE LABOR MARKET

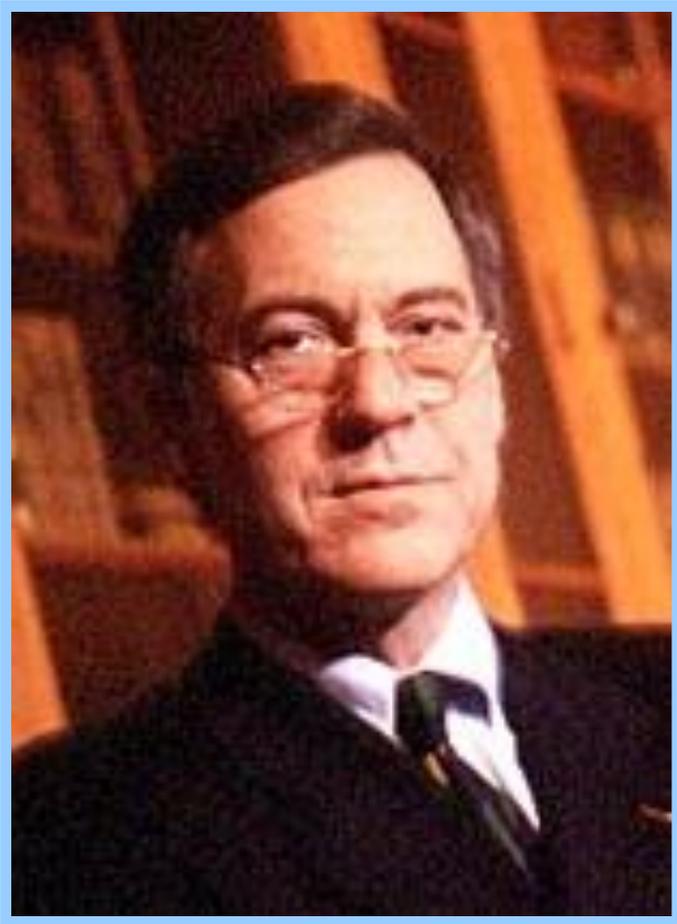


SAVING (S)  
INVESTMENT (D)

# Sustainable and Unsustainable Growth

## The Macroeconomics of Boom and Bust

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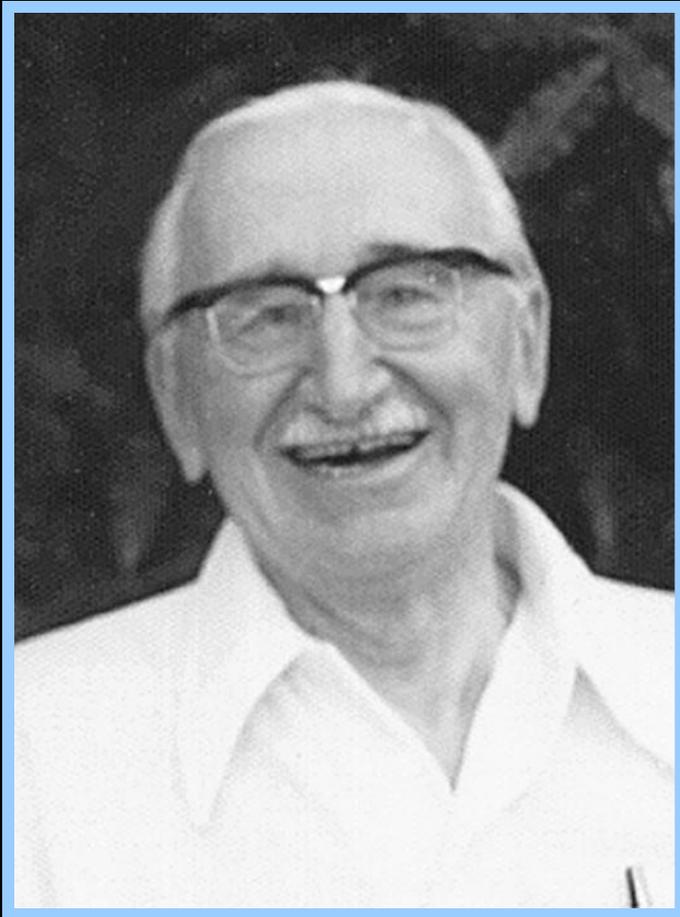
With interest rates artificially low, consumers reduce savings in favor of consumption, and entrepreneurs increase their rate of investment spending. And then you have an imbalance between savings and investment. You have an economy on an unsustainable growth path. This, in a nutshell, is the lesson of the Austrian critique of central banking developed in the 1920s and 1930s.

---from Steve H. Hanke's "[Panic Time at the Fed](#),"  
Forbes, May 2008.

# Sustainable and Unsustainable Growth

## The Macroeconomics of Boom and Bust

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“Booms have always appeared with a great increase in investment, a large part of which proved to be erroneous, mistaken. That, of course, suggests that a supply of capital was made apparent which wasn’t actually existing. The whole combination of a stimulus to invest on a large scale followed by a period of acute scarcity of capital is consistent with the idea that there has been a misdirection due to monetary influences. And that general schema, I still believe, is correct.”

--from an interview conducted by Jack High as part of the UCLA Oral History Program (1978).

# Credit Expansion

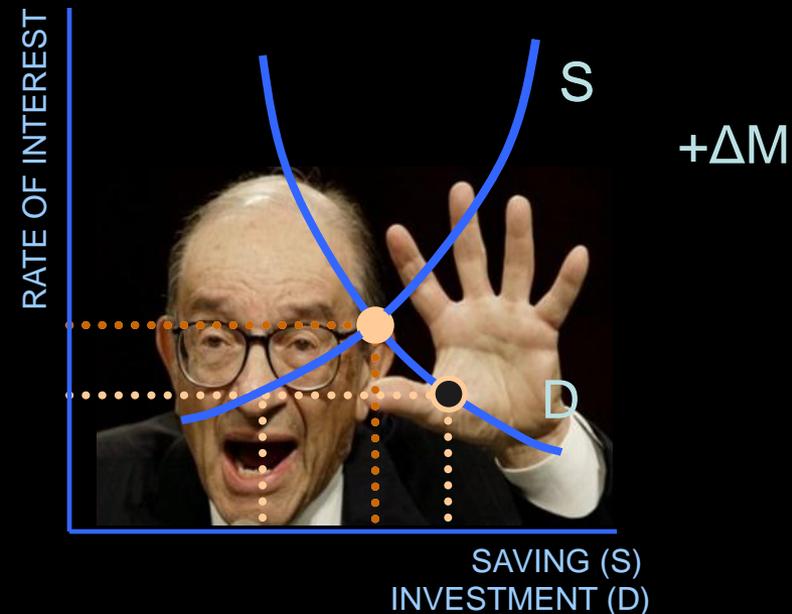
Increases in the money supply enter the economy through credit markets. The central bank literally lends money into existence.

The new money masquerades as saving. That is, the *supply of loanable funds* shifts rightward—but without there being any increase in *saving*.

Watch the opposing movements of saving and investment as the central bank adds money ( $\Delta M$ ) to the supply side of the market for loanable funds.

Responding to a lower interest rate, people actually save less and consume more.

The result is not a new sustainable equilibrium but rather a disequilibrium that, for a time, is masked by the infusion of loanable funds.



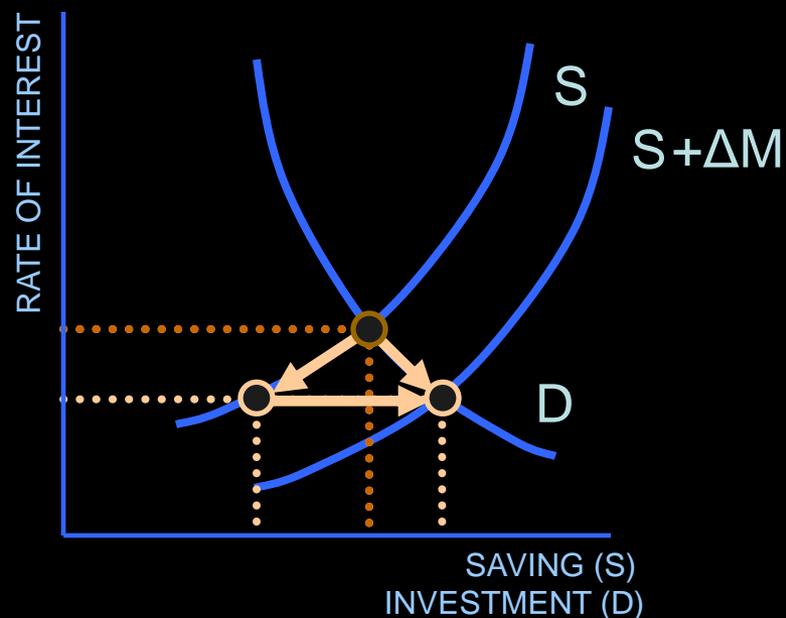
Pumping new money through credit markets drives a wedge between saving and investment.

Investors move down along their demand curves, taking advantage of the lower borrowing costs.

Savers move down along their unshifted saving curves in response to the weakened incentive to save.

The discrepancy between saving and investment is papered over with newly created money, which itself represents no investable resources.

Much of Hayek's writings on money is aimed at shifting the focus away from the bedrock relationship between money and the general level of prices and toward the intertemporal discoordination that is caused by credit expansion.

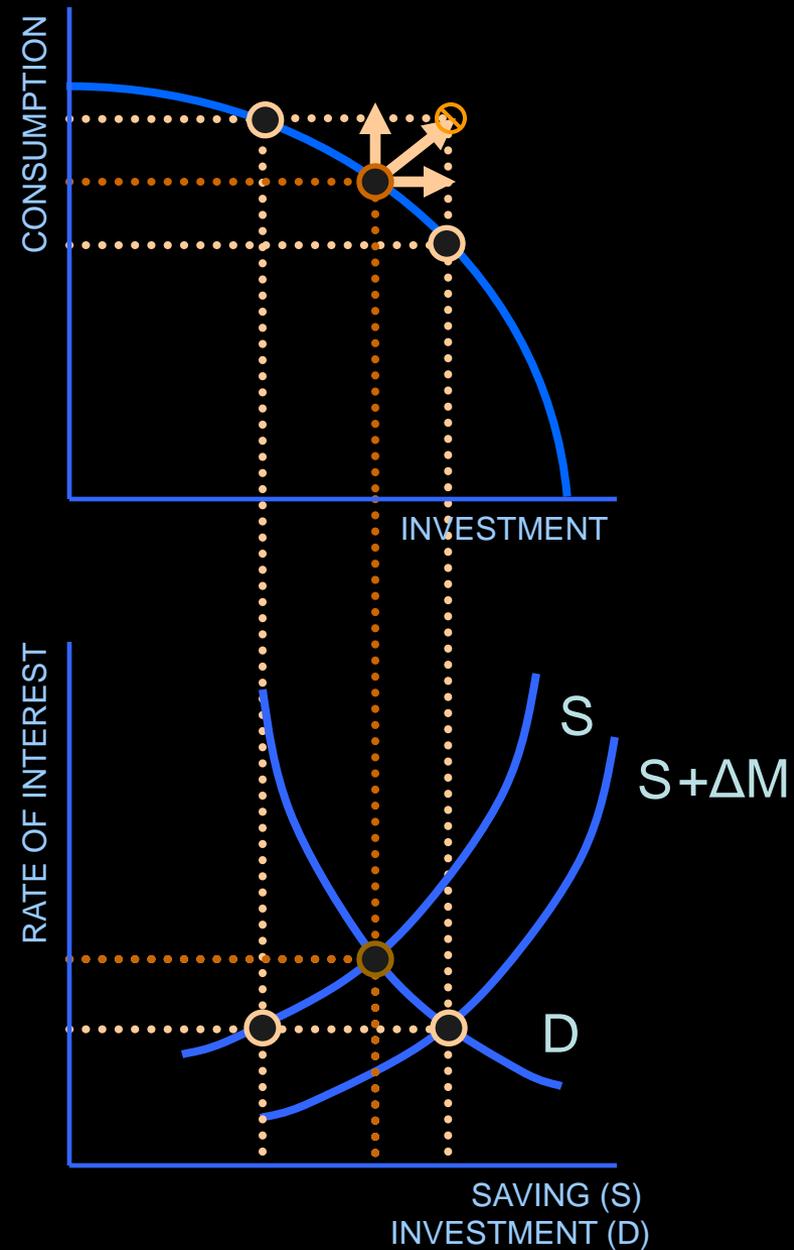


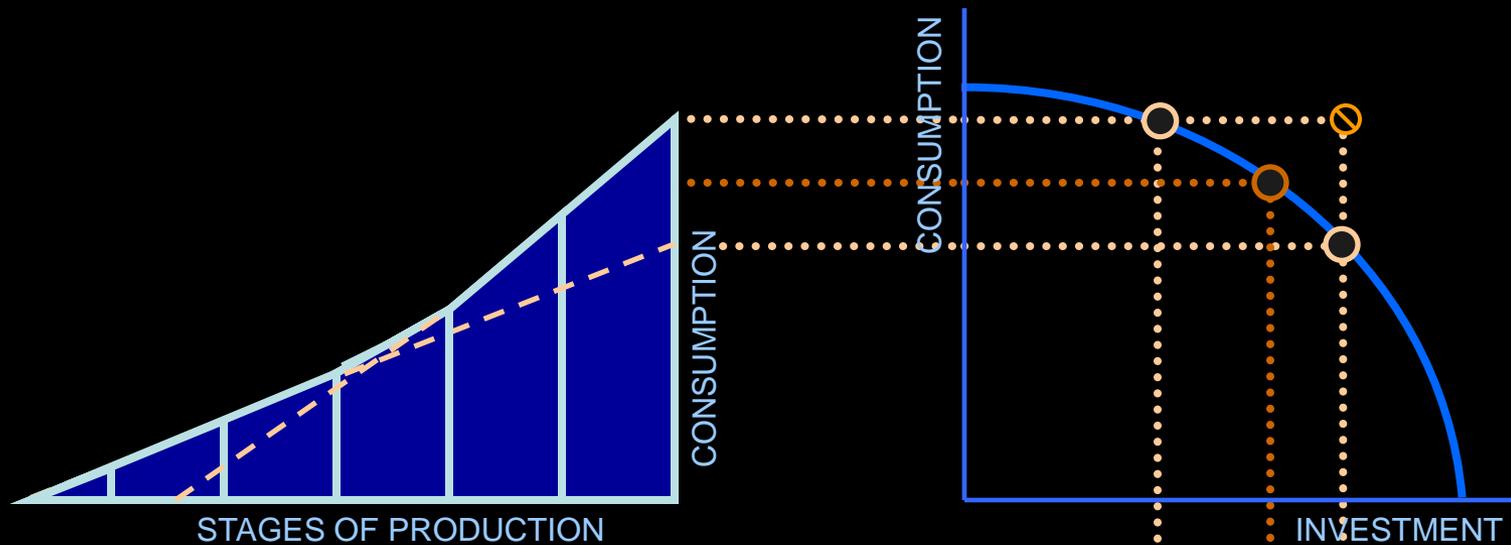
Favorable credit conditions spur on investment activity, which suggests a *clockwise* movement along the PPF in the direction of *investment*.

But income-earners are actually saving less (and hence consuming more), which suggests a *counterclockwise* movement along the PPF in the direction of *consumption*.

The *wedge* between saving and investment translates into a *tug-of-war* between consumers and investors.

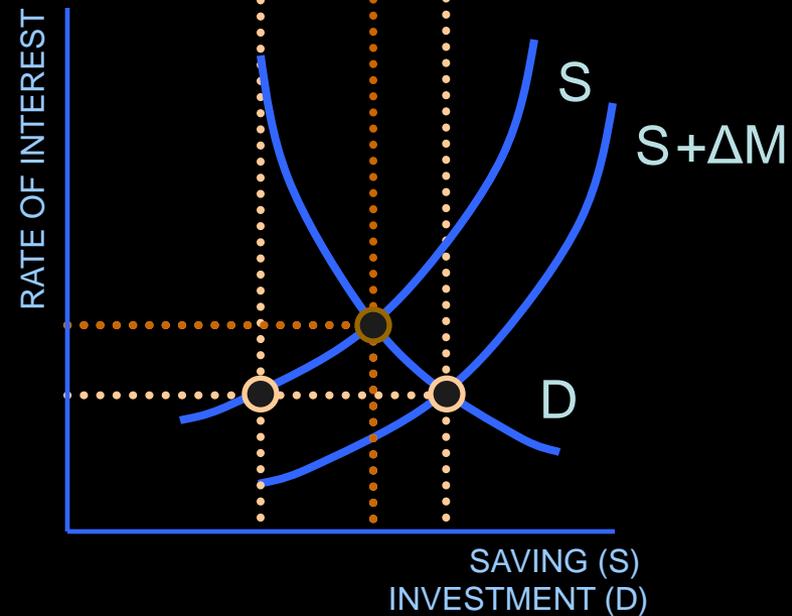
Noting the investment dimension of the clockwise movement and the consumption dimension of the counterclockwise movement, we see that credit expansion pushes the economy toward a point that lies *beyond* the PPF.

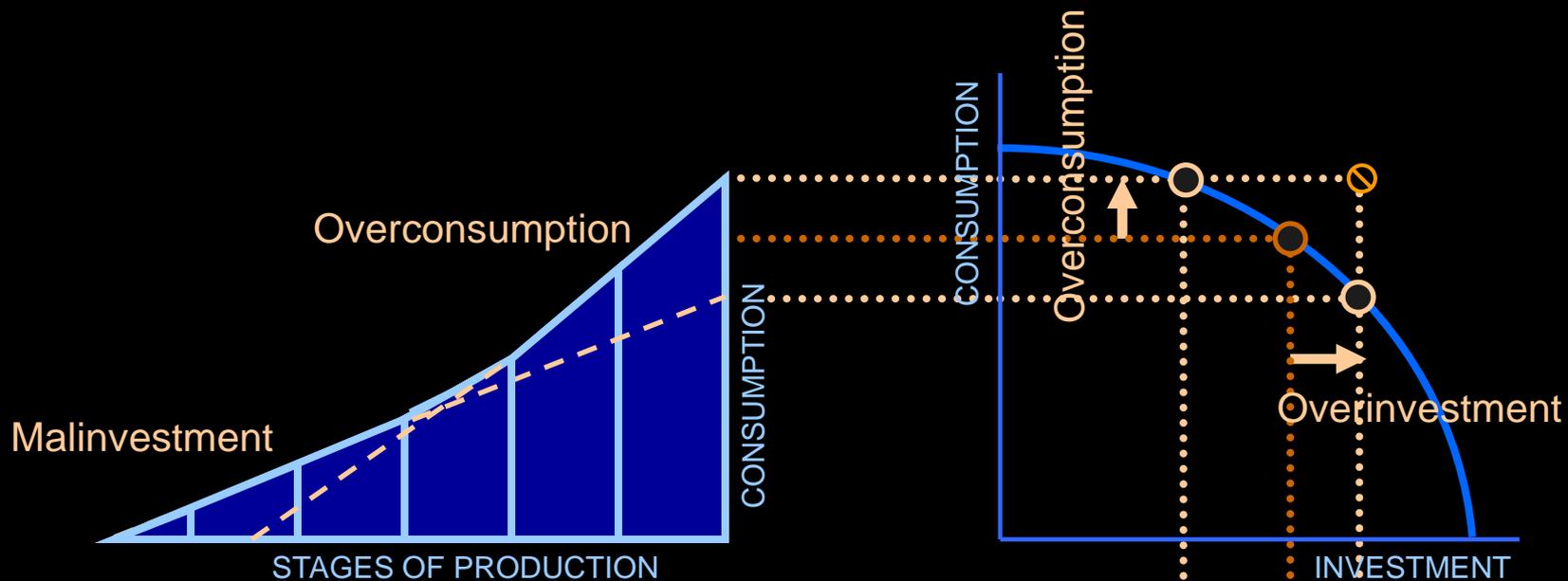




The low interest rate, consistent with a future orientation, stimulates investment activities in the early stages. But without sufficient resources being freed up elsewhere, many of these investment projects will never be completed.

In fact, increased consumer demand draws some resources toward the late stages, further reducing the prospects for completing a new capital structure.

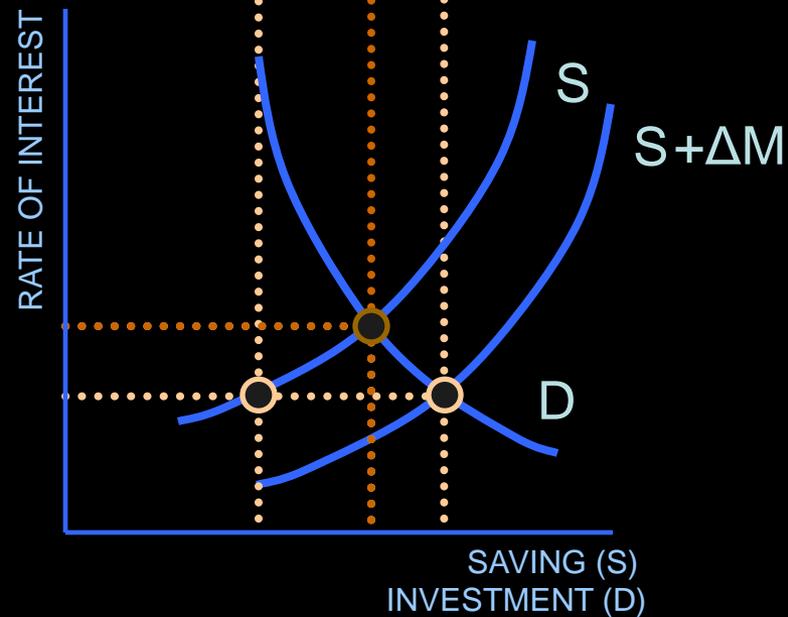


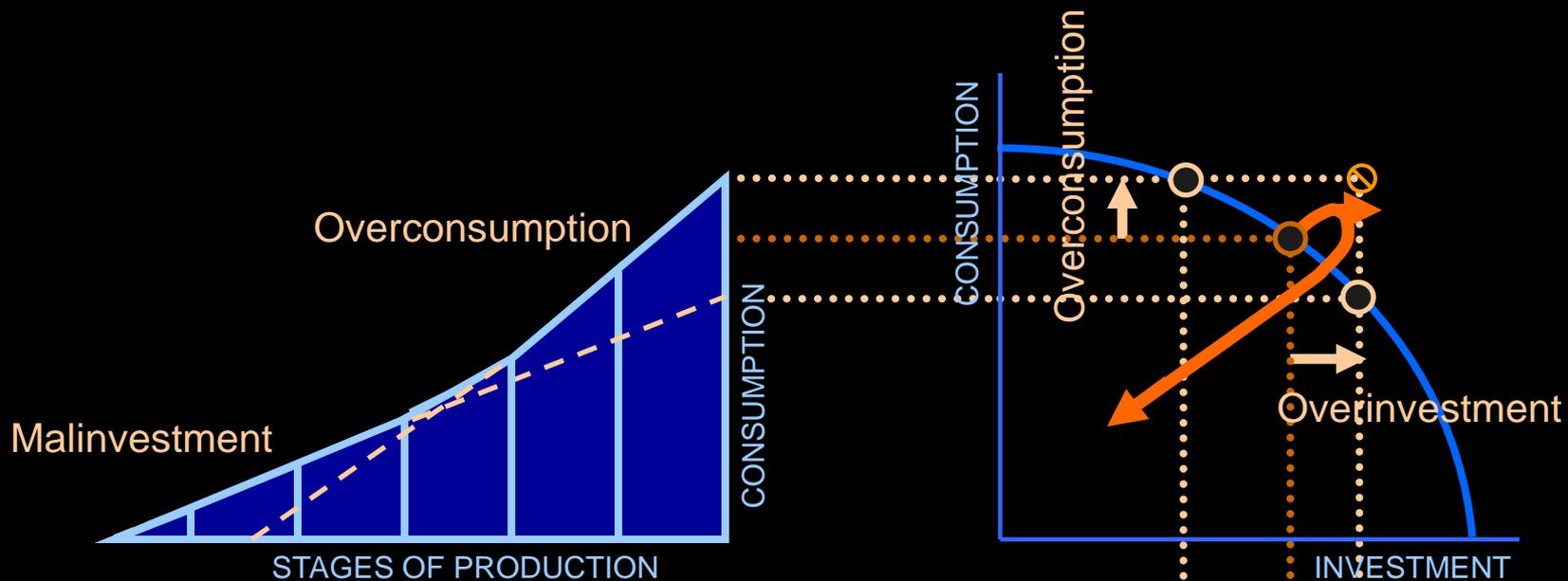


The dynamics of boom and bust entail both overinvestment (as shown in the PPF diagram) and malinvestment (an unsustainable lengthening of the Hayekian triangle).

These distortions are compounded by overconsumption (as shown in both the PPF and the Hayekian triangle).

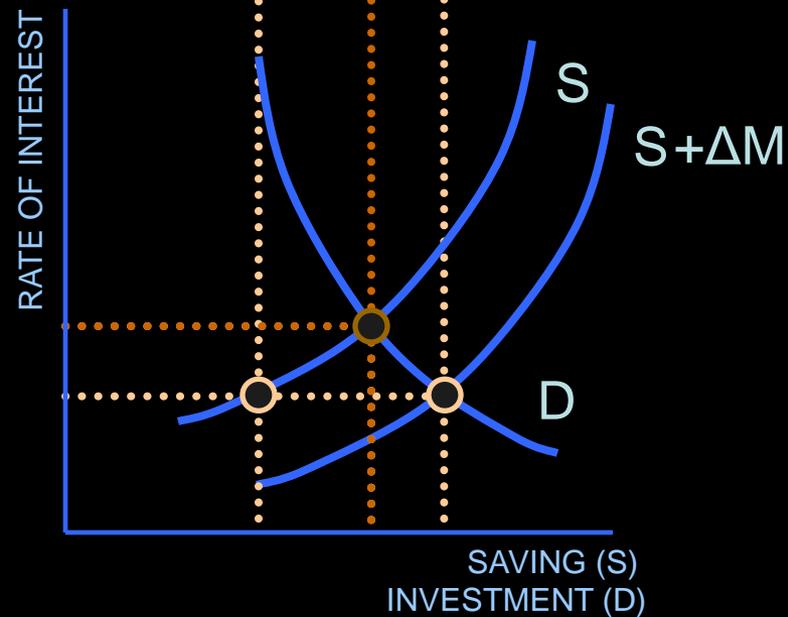
Mises repeatedly used the phrase “malinvestment and overconsumption.”

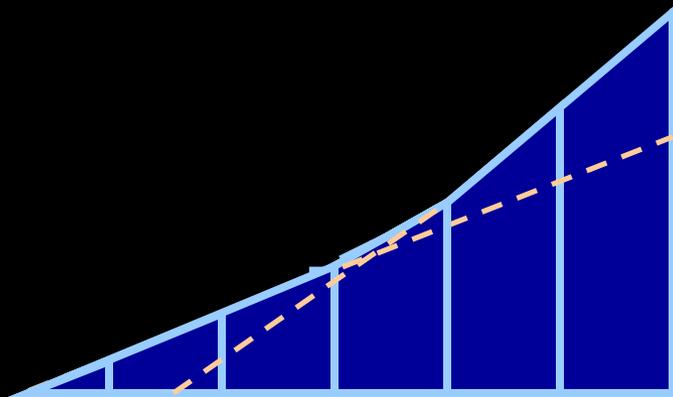




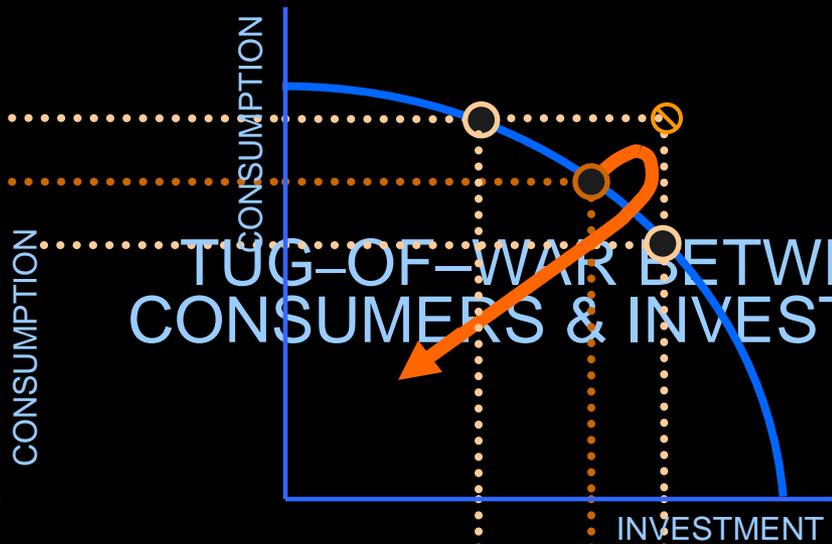
The tug-of-war that pits consumers against investors pushes the economy beyond the PPF. The low interest rate favors investment, and increasingly binding resource constraints keep the economy from reaching the extra-PPF point.

The temporally conflicted structure of production (dueling triangles) eventually turns boom into bust, and the economy goes into recession—and possibly into deep depression.

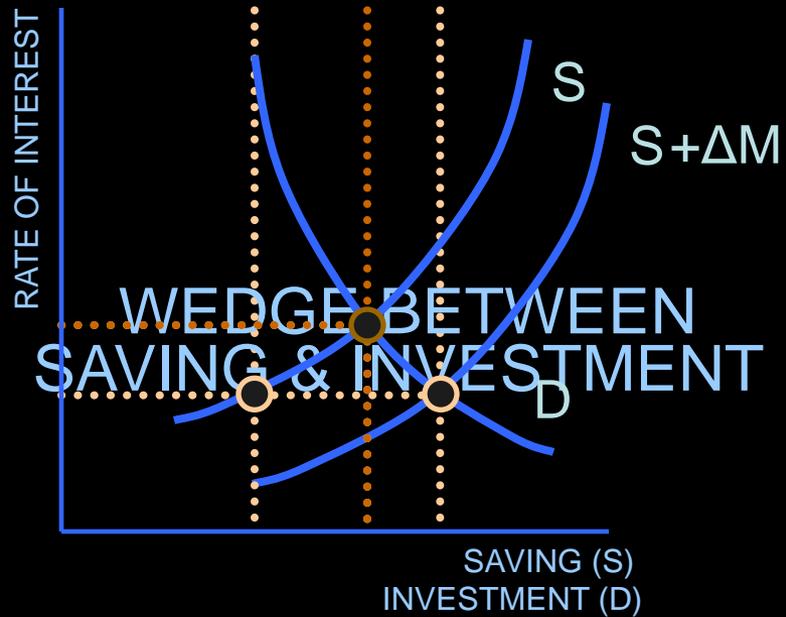




STAGES OF PRODUCTION

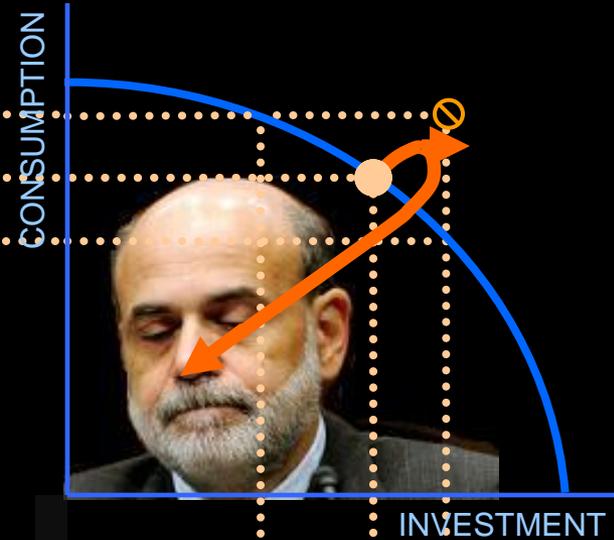
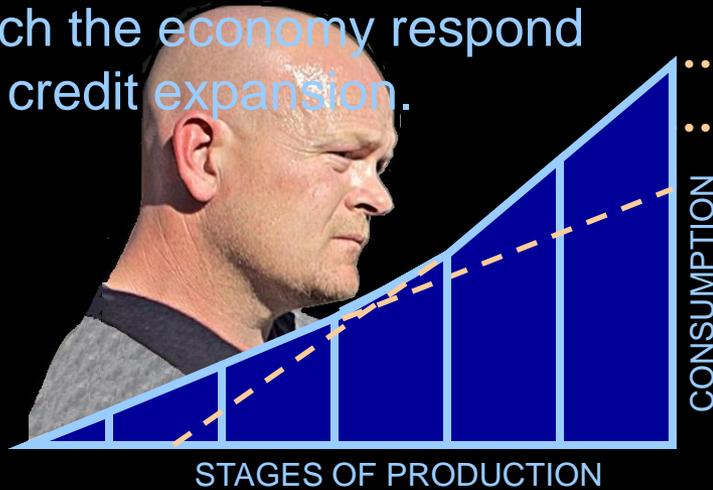


TUG-OF-WAR BETWEEN CONSUMERS & INVESTORS



WEDGE BETWEEN SAVING & INVESTMENT

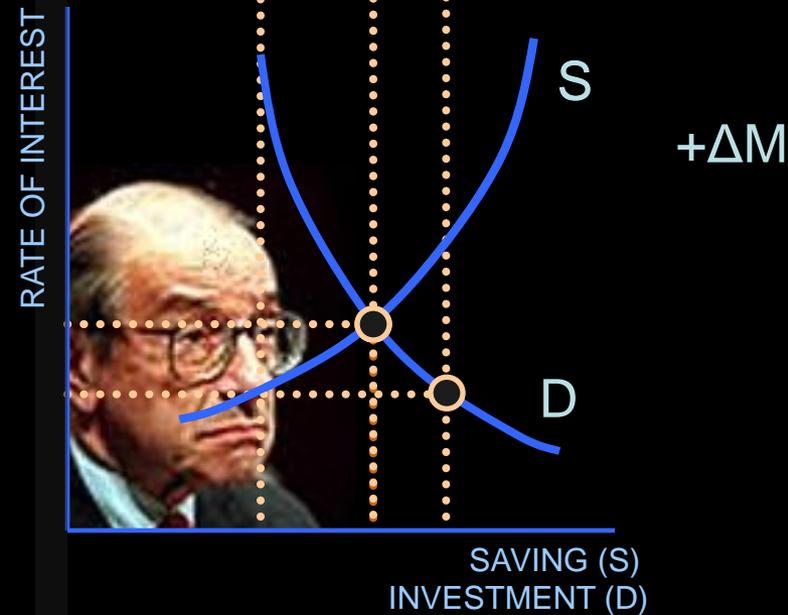
Watch the economy respond to a credit expansion.

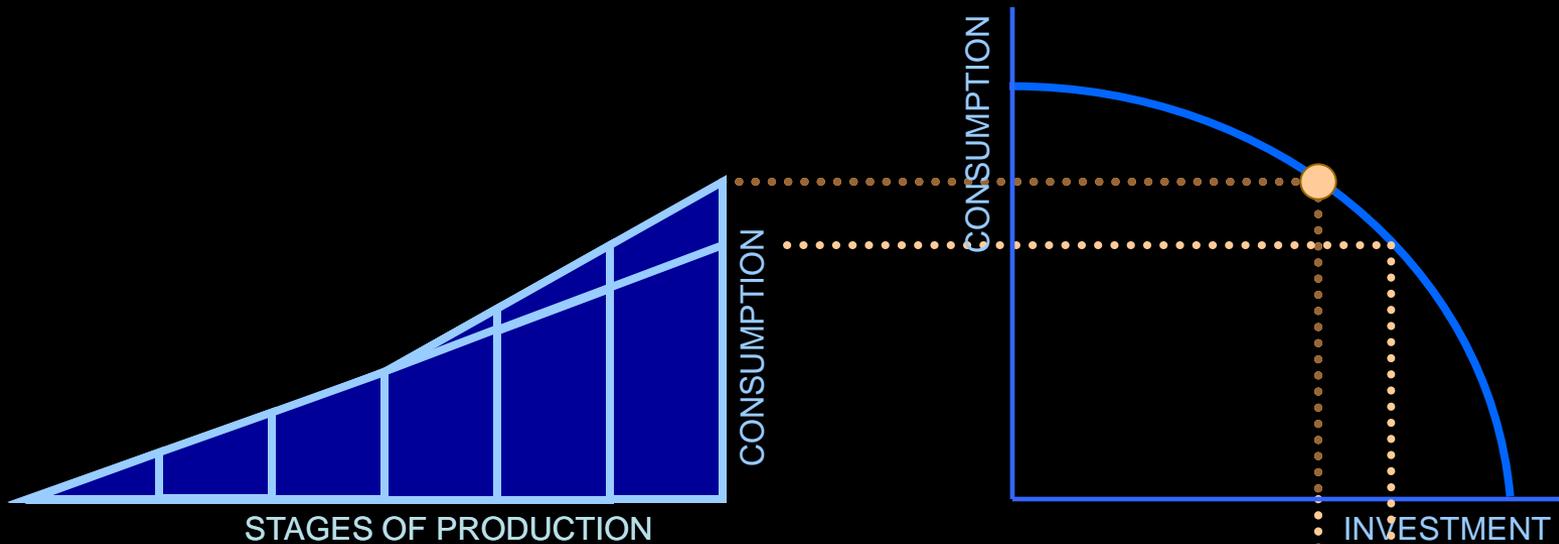


Padding the supply of loanable funds with new money drives a wedge between saving and investment.

Papering over the difference between saving and investment gives play to the tug-of-war between consumers and investors.

Pitting early-stages against late-stages distorts the Hayekian triangle in both directions, the temporal discoordination eventually turning boom into bust.

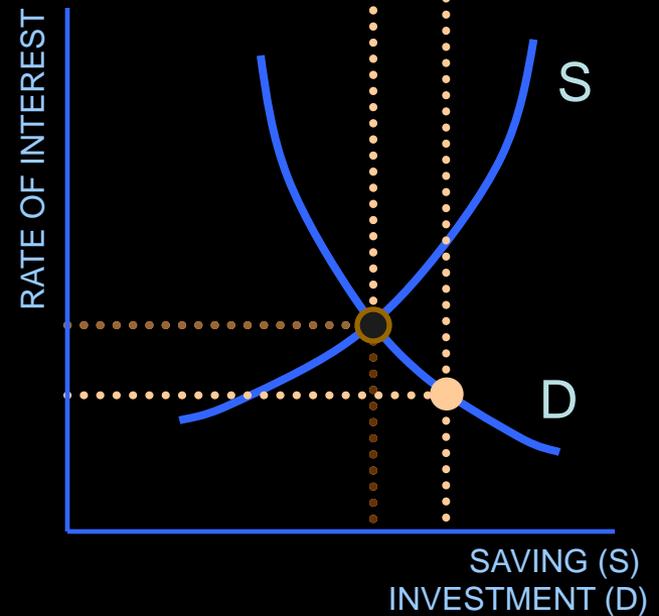


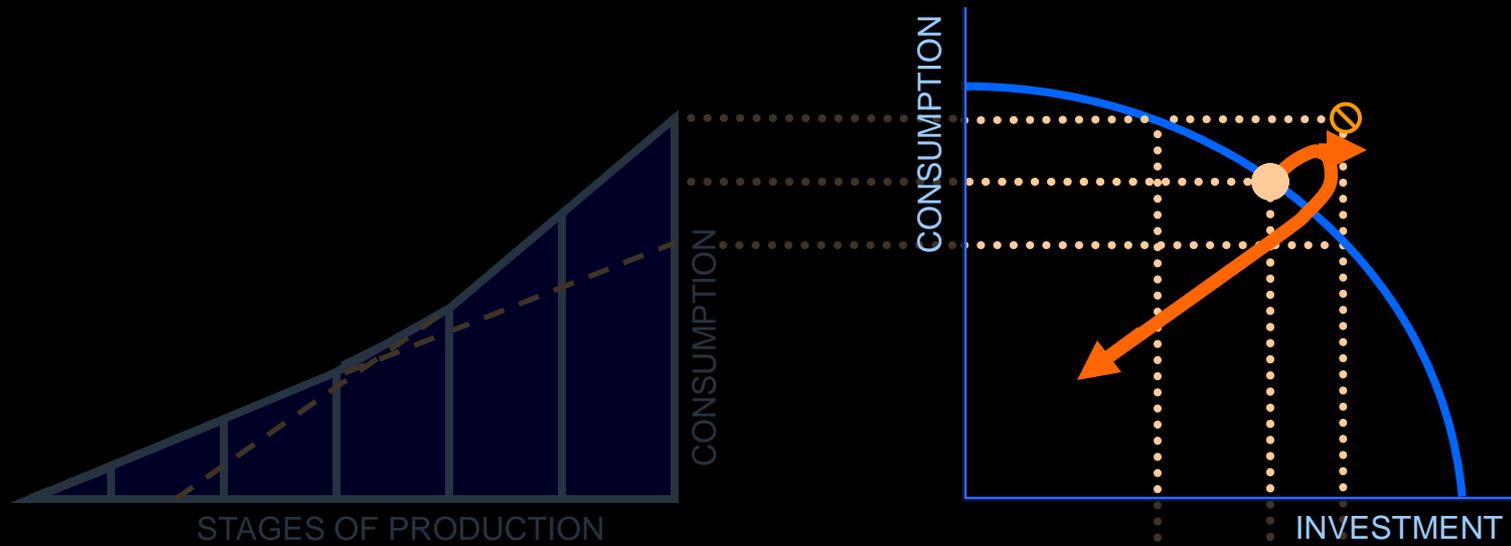


## Increased Saving vs. Credit Expansion: A summary Comparison

Saving supports genuine growth.

Watch.

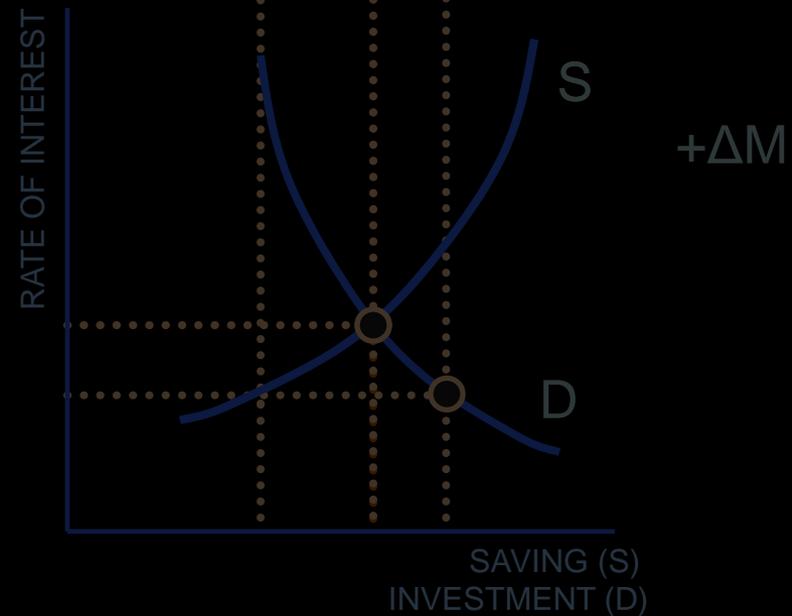




## Increased Saving vs. Credit Expansion: A summary Comparison

Credit expansion triggers boom and bust.

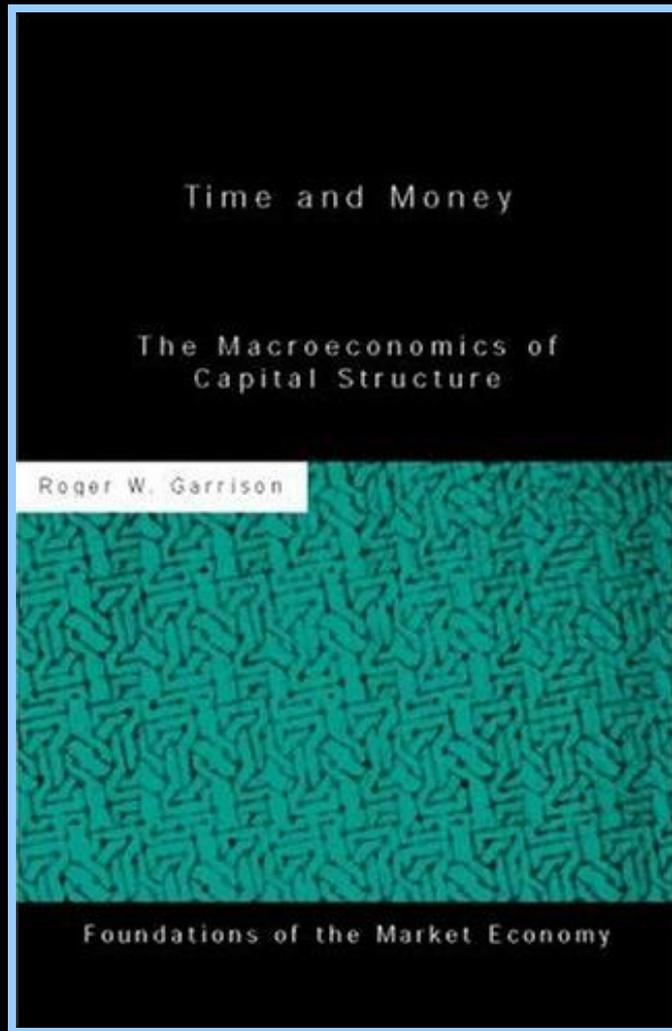
Watch.



# Sustainable and Unsustainable Growth

## The Macroeconomics of Boom and Bust

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Roger W. Garrison, *Time and Money: The Macroeconomics of Capital Structure*  
London: Routledge, 2001.

*Time and Money* develops and defends this capital-based macroeconomic framework and compares it to the alternative frameworks associated with Keynesianism and Monetarism.

Going beyond the issues of growth and cyclical variation, the book also deals with deficit spending, credit controls, tax reform, and more.

Excerpts from the book plus some supplementary material can be found at <http://www.auburn.edu/~garriro>

# Capital-Based Macroeconomics

Adapted from *Time and Money:  
The Macroeconomics of Capital Structure*  
by Roger W. Garrison  
London: Routledge, 2001

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