9. The Austrian School

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Mr. Keynes's aggregates conceal the most fundamental mechanisms of change. (Hayek, 1931)

9.1 The Mengerian Vision

The Austrian school is best known for its microeconomics and, in particular, for its role in the marginalist revolution. In the early 1870s, Carl Menger, along with French economist Léon Walras and English economist William Stanley Jevons, reoriented value theory by calling attention to the marginal unit of a good as key to our understanding the determination of the good's market price. With marginality central to the analysis, microeconomics was forever changed. It is less widely recognized, however, that a viable macroeconomic construction also arises quite naturally out of the marginalist revolution in the context of Menger's vision of a capital-using market economy.

Modern macroeconomics makes a distinction between factor markets (inputs) and product markets (outputs). Intermediate inputs and outputs are rarely in play. By contrast, the economics of the Austrian school features a production process—a sequence of activities in which the outputs associated with some activities feed in as inputs to subsequent activities. The eventual yield of consumable output constitutes the end of the sequence. Menger (1981 [1871]) set out the theory in terms of "orders of goods," the first, or lowest, order constituting consumer goods and second, third, and higher orders constituting producers goods increasingly remote in time from

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goods of the lowest order. Eugen von Böhm-Bawerk (1959 [1889]) introduced the similar notion of "maturity classes" to capture this temporal element in the economy's production process. He stressed the point that an increase in the economy's growth rate must entail an increase in activity in the earlier maturity classes relative to (concurrent) activity in the later maturity classes.

Böhm-Bawerk was possibly the first economist to insist that propositions about the macroeconomy have firm microeconomic foundations. In an 1895 essay, he wrote that "One cannot eschew studying the microcosm if one wants to understand properly the macrocosm of a developed economy" (Hennings, 1997, p.74). Ludwig von Mises (1953 [1912]), who is generally credited for using marginal utility analysis to account for the value of money, was also the first to recognize the significance of credit creation in the context of a decentralized, time-consuming production process. The capital theory originated by Menger and the theory of money and credit set out by Mises was developed by Friedrich Hayek (1967 [1935]) into the Austrian theory of the business cycle. Lionel Robbins (1971 [1934]) and Murray Rothbard (1963) applied the theory to the interwar episode of boom and bust. Eventually, the insights of these and other Austrians gave rise to a full-fledged capital-based macroeconomics (Horwitz, 2000 and Garrison, 2001).

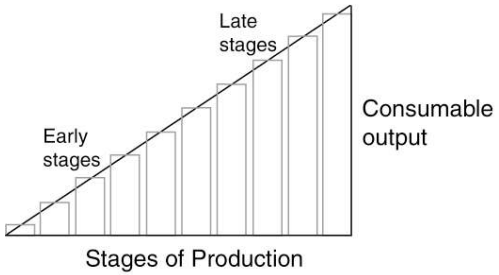
9.2 The Intertemporal Structure of Capital

Hayek greatly simplified the Austrian vision of a capital-using economy by modeling the economy's production activities as a sequence of inputs and a point output. Each element in the sequence is designated a "stage of production," the number of stages posited being largely a matter of pedagogical convenience. This simple construction was first introduced as a bar chart with the individual bars arrayed temporally, their (equal) widths representing increments of production time. The length of the final bar represents the value of consumable output; the attenuated lengths of the preceding bars represent the values of the goods in process at the various stages of production.

Figure 9.1 shows ten stages of production arrayed from left to right. (In the original Hayekian rendition, five stages were arrayed from top to bottom.) The specific number of stages is not intended to quantify any actual, empirically established detail about the economy's production process but rather to capture our general understanding that in many instances the (intermediate) output of one stage is used as an input to a subsequent stage. That is, vertical integration—and, certainly, complete vertical integration—is not the norm. Hayek's "stages" do not translate cleanly into "firms" or "industries." Some vertically integrated activities may be carried out within a single firm. An oil company, for example, may be engaged in exploring, extracting, refining, distributing, and retailing. A paper manufacturer, for another example, may be supplying paper for blueprints and for

greeting cards, thus operating simultaneously in different stages. And there are obvious deviations from the strict one-way temporal sequence: Coal may be used in the production of steel while steel is used in the production of coal. (This is the supposedly telling counter-example offered by Frank Knight in his critical introduction to the English translation of Menger's *Principles*.) Still, as with all simple models, this Austrian model of the capital structure is notable not for its many sins of omission but rather for the essential truths that are captured by its construction.

Means are employed to achieve ends, and those means are temporally prior to the corresponding ends. Production moves forward through time. Valuation, however, emanates in the reverse direction. That is, the anticipated value of an end attaches itself to the means capable of achieving that end. This is Menger's Law. The demand for the factors of production and hence for the outputs of the intermediate stages of production is a derived demand. The direction of valuation is implicit in Menger's designation of consumption goods as "goods of the *first* order." The market values of goods of the second, third, and higher orders are ultimately derived from the anticipated value of the first-order goods. But even with the doctrine of derived demand fully in play, those values entail a systematic time discount consistent with the temporal remoteness of higher-order goods.



-Figure 9.1 The intertemporal structure of production

The Austrian vision puts the entrepreneur in a key role. At a minimum, the entrepreneur operating in some particular stage of production must anticipate the demand for his own output, assessing the profitability of his activities with due attention to the cost of borrowed funds. Longer-run planning may require gauging the strength of demand several stages forward, including ultimately the demand for the consumable output. Speculative activities may consist in part in the movement of resources—in response to a change in credit conditions—from one stage to another and possibly in the creation of new stages of production that are of a higher order than the highest order of the existing stages. The increasing "roundaboutness," to use Bohm-Bawerk's term, and the increasing significance of the time element in the production process are characteristic of developing (and developed) capitalist economies.

The attention to the temporal structure of production suggests that the time element is an important variable in our understanding of how a decentralized

economy works to coordinate production activities with consumer preferences and hence in our understanding of what might go wrong with the coordinating mechanisms. The use of multiple stages of production gives full play to marginalist thinking. Austrian macro is micro-friendly. The pattern of resource allocation can be modified in systematic ways, changing the temporal profile of production activities. A marginal decrease in late-stage activities coupled by a marginal increase in early-stage activities has important implications for the economy's overall growth rate. Significantly, a related pattern of marginal changes gives rise to boom and bust. Changes in the intertemporal pattern of resource allocation have a claim on our attention, according to the Austrians, even if these marginal changes cancel one another out in some conventional macroeconomic aggregate such as investment spending (in all stages) or total spending (by both consumers and the investment community).

The pattern of resource allocation associated with intertemporal equilibrium exhibits a certain uniformity in terms of the value differentials that separate the stages of production. The difference in the value of the output of one stage and the value of output of the next stage reflects, among other things, the general terms of intertemporal exchange, expressed summarily as the market rate of interest. With a given rate of interest, excessive stage-to-stage value differentials would present themselves as profit opportunities which could be exploited only by reallocating resources toward the earlier stages of production. In the limit, when all such profit opportunities have been competed away, the relative prices of inputs used in the various stages are brought into line with the equilibrium rate of interest. A summary graphical rendering of the intertemporal capital structure takes the form of a triangle encasing the sequence of stages that constitute such an intertemporal equilibrium. The Hayekian triangle in Figure 9.1 keeps the many complexities of capital theory at bay while keeping in play the overall time element in the production process.

The extreme level of simplification warrants some discussion. First, we note that the triangle's hypotenuse, which tracks the value of the yet-to-be completed consumables, rises linearly from no value at all to the full market value of the consumables. Yet, we know that the interest rate is expressed in percentage terms and, starting from some initial input value, allows for compounding. Clearly—and contrary to the Hayekian triangle—such percentage value differentials implies that the cumulative value should be tracked by a curve that rises exponentially from some initial value to some final value. Here, linearity wins out on the grounds of its being simpler in construction yet adequate to the task. It is also true to Hayek's original formulation. We need to recognize, however, that the triangle would be inadequate for dealing with any issue for which the compounding effect is critical. Ambiguities about the precise relationship between the interest rate and the overall degree of roundaboutness arise when the effects of compound interest are factored in. These and related ambiguities concerning capital intensity lay at the heart of the

Cambridge capital controversy (Harcourt, 1972), a protracted and, ultimately, sterile debate that attracted much attention a few decades ago. But for dealing with the business cycle and related macroeconomic issues, the triangle, simple as it is, does just fine.

Second, the horizontal leg of the triangle, which invites us to imagine a sequence of unit time intervals, does not translate readily into calendar time. In application, an early stage of production consists only partly in goods in process—pine saplings that mature over time into lumber or wine that undergoes an aging process. Earliness is also implicit in durable capital goods or even in human capital. These factors of production are categorized as early-stage because they will have a yield over an extended future. The heterogeneity of capital warns against trying to create a single metric, such as some average period of production, or to quantify in some other way the production time for the macroeconomy. Still, many early-stage activities and late-stage activities are readily discernable. Inventory management at retail is a late-stage activity. Product development is an early-stage activity. Increases in the time dimension of the economy's capital structure might take the form of shifting resources from relatively late to relatively early stages, of creating capital goods of greater durability, or of simply changing the mix of goods produced in favor of those involving more time-consuming (but higher yielding) production processes.

Third, the vertical leg of the Hayekian triangle, which represents the value of consumable output, implies that consumption occurs at a single point in time at the end of the production process. This is not to deny the existence of consumer durables. But expanding the intertemporal aspect of the macroeconomy to include consumption time would complicate matters without adding much to the analysis. The triangle focuses attention on the particulars of production and on aspects of the market process that lose much of their relevance once the goods are in the hands of the consumer. The notion of "stages of consumption" would be contrived if not meaningless.

In application there is a fine line—in Austrian theory as in more conventional theory—between an investment good and a consumer durable. Residential housing, whether or not owner occupied, is universally categorized as investment, the rental value (actual or implicit) of its services qualifying as consumption. Owner-driven automobiles, however, despite their considerable durability and implicit lease value are categorized as consumption goods. Instances can be imagined in which a consumable (e.g. a light truck purchased new for non-commercial use) is later sold into an early stage of production (e.g. as a work truck). But as a general rule, goods delivered into the hands of consumers stay in the hands of consumers. Attention to these and related matters may be necessary in particular applications of the Austrian theory, but the theory itself is based on the vision of a multi-stage production process that yields a consumable output.

In its simplest interpretation, Figure 9.1 represents a no-growth economy. Gross investment, financed by saving, is just enough to offset capital depreciation. With given tastes and technology, the macroeconomy settles into an intertemporal equilibrium and produces consumption goods at an unchanging rate. More typically, saving and gross investment exceed capital depreciation, allowing the economy to grow at every margin. If we can assume for the moment an unchanging rate of interest, the growth can be represented by a triangle of increasing size, its general shape remaining the same.

The payoff to Hayekian triangulation, however, comes from allowing for changes in the triangle's shape. More conventional macroeconomic constructions make the implicit assumption of structural fixity or structural irrelevance. In the Austrian theory, changes in saving behavior have implications for the allocation of resources within the economy's capital structure. In turn, the changing shape of the triangle affects the time profile of consumable output. The natural focus of the analysis is on intertemporal coordination and possible causes of intertemporal discoordiantion.

9.3 Saving and Economic Growth

We tend to think of economies as experiencing some on-going rate of growth. The growth rate will be positive, negative, or zero, depending upon the relationship between saving and capital depreciation. In a stationary, or no-growth, economy, saving finances just enough investment to offset capital depreciation. Consumable output is constant over time, as depicted in the first two periods in Figure 9.2.

If saving is in excess of capital depreciation, the economy grows. The volume of consumable output rises over time, as depicted in the last three periods of the Figure 9.2. The output of each of the stages of production increases as well. The economy grows at every margin, allowing even for a continual increase in the number of stages. During a period of secular growth, the Hayekian triangle increases in size but not—or not necessarily—in shape.

An interesting question, one whose answer serves as a prelude to the Austrian analysis of business cycles, concerns the transition from no growth to a positive rate of growth—or, for that matter, from some initial growth rate to a higher growth rate. What must be true about the time profile of consumable output during the transition? Let's assume that there has been no change in the state of technology or in the general availability of resources. We assume, though, that people's intertemporal preferences change if favor of future consumption. If confronted with the simple choice between no growth and growth, people would surely prefer the latter. The choice, however, is never quite that simple. A memorable acronym introduced by science-fiction writer Robert Heinlein (1966) applies. TANSTAAFL:

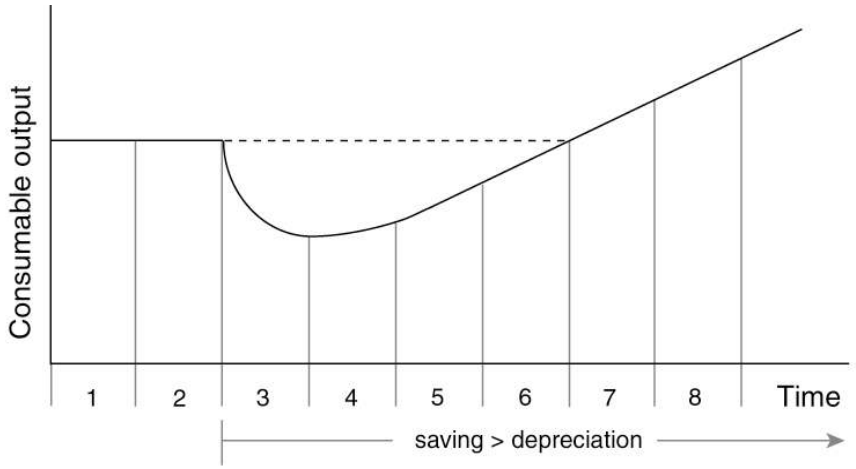


Figure 9.2 A possible temporal pattern of consumable output

"There ain't no such thing as a free lunch." Modifying the acronym to fit the application, we recognize that TANSTAFG. Free growth is not available for the asking, either.

The relevant trade-off is that between consumable output in the near future and consumable output in the more remote future. Are people willing to forgo some current and near-term consumption in order to enjoy increasing consumption over an extended period? It is the forgoing of current and near-term consumption, after all, that frees up the resources with which to expand the economy's productive capacity and make increasing future consumption possible. In Figure 9.2 the hypothesized preference change occurs at the end of the second period. In light of this change, the output of consumption goods during the third period needs to be reduced. The freed-up resources can be employed in earlier stages of production. So altered, the capital structure will eventually begin yielding consumables at an increased rate, matching the initial output level at the end of the sixth period (in this particular example) and exceeding it in the subsequent periods.

The market economy, in the judgment of the Austrians, is capable of tailoring intertemporal production activities to match intertemporal consumption preferences. The temporal pattern of consumable output shown in Figure 9.2 requires a capital restructuring, as can be depicted by a change in the Hayekian triangle's shape. Figure 9.3 shows the general nature of the required change. The no-growth periods 1 and 2, which predate the preference change, are depicted by the triangle having a relatively short intertemporal capital structure. Beginning with the preference change at the end of period 2, consumption falls, reaching a minimum at the end of period 3. The freed-up resources can be allocated to the early stages of production

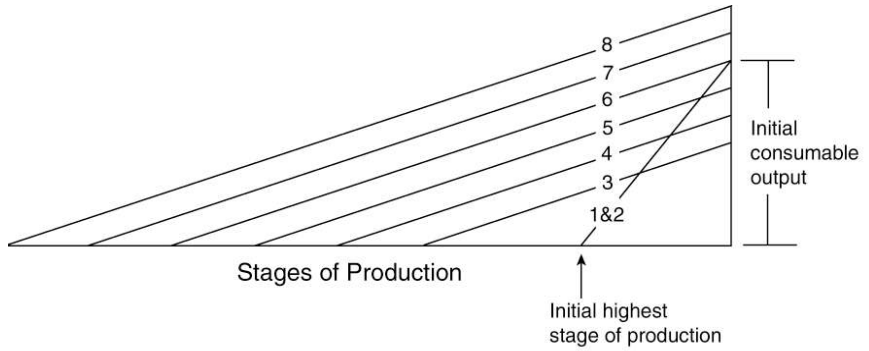


Figure 9.3 Intertemporal capital restructuring

and to the creation of still earlier stages, enhancing the ability of the economy to produce consumable output in the future. The reduced near-term yield of consumable output and the increased number of stages of production is depicted by the triangle 3, the smallest of the reshaped triangles.

As goods in process begin to move through the restructured sequence of stages, the output of consumables begins to rise. And with saving now in excess of capital depreciation, expansion continues in each of the stages of production. The economy experiences a positive secular growth rate, as shown by the triangles 4 through 8, triangle 6 having the same consumable output as the initial no-growth triangle. Yet to be discussed are the market mechanisms that actually bring about this capital restructuring. At the point, the focus is on the correspondence between the intertemporal capital restructuring shown in Figure 9.3 and the temporal pattern of consumable output shown in Figure 9.2.

The attention here to a one-time simple preference change resulting in a transition from a no-growth economy to an economy experiencing a positive secular growth rate finds justification in analytical and heuristic convenience. More complex preference changes can easily be imagined. Actual changes in intertemporal preferences may themselves be gradual, and the preferred time profile of consumables is undoubtedly not as simply described as is the intertemporal pattern in Figure 9.2. This in only to say that a decentralized economy—including its intertemporal dimension—entails much more complexity than can be depicted by our simple pedagogical constructions.

The key feature of Figure 9.2 is the reduction of consumable output during the transition from no growth to a positive rate of growth. The forgone consumption is a manifestation of the Heinleinian principle: There ain't no such thing as free economic growth. In applications where the initial rate of growth is positive, there need not be an actual decline in consumable output. In this circumstance, the

Heinleinian principle would manifest itself in a more subtle way. With consumable output growing initially at a rate of, say, 2%, an increased willingness to save may give rise to a pattern of output that rises continuously but at changing rates—possibly from the initial rate of 2% to 1% and then subsequently to 3%. During the transition period, in which the growth rate is only 1%, people are forgoing consumable output that they could have enjoyed had they not decided to increase their saving.

The explicit recognition of the opportunity costs associated with saving-induced growth underlies a general proscription relevant to policymaking. In short, the Austrians are not cheerleaders for growth. Many introductory and intermediate texts introduce the subject matter of macroeconomics with a short list of policy goals. Invariably, a prominent entry on the list is rapid economic growth. But is there any basis for including a high growth rate as a goal for policymakers to achieve? What is needed, according to the Austrians, is institutional arrangements that allow the growth rate of consumable output to be consistent with peoples willingness to save. Production plans need to be consistent with consumption preferences. But that consistency may entail a low growth rate, no growth, or—in unusual circumstances—even a negative growth rate. The growth rate itself is nothing but a summary description of people's willingness to forgo consumption in the near future in order to enjoy increased consumption in the more remote future. Macroeconomists should not adopt "rapid growth" as one of their goals any more than microeconomists should adopt "plenty of vegetables" as one of theirs.

Still, there are key macroeconomic issues in play here. Achieving the right growth rate in macroeconomics has its parallel in microeconomics in achieving the right quantity of vegetables. As discussed in the following two sections, both of these goals are achieved if the relevant supply and demand schedules accurately reflect the fundamentals—the preferences and constraints that govern the respective market activities.

9.4 The Saving-Investment Nexus

Is there a market mechanism that allows people actually to make the trade-offs discussed in the previous section? This is a critical question—one that lies at the heart of macroeconomic debate and one whose answers separate the different schools of thought. The question can be posed in a way that highlights the macroeconomic concerns: Is there a market mechanism that brings saving and investment in line with one another without at the same time having perverse effects (e.g. widespread resource idleness) on the macroeconomy? The alternative answers have clear implications about the viability of market economies and about the proper role of the policymaker.

9.4.1 A Detour through monetarism

Some macroeconomists would answer the critical question in the affirmative, taking the market's allocation of resources to the production of consumption goods and the production of investment goods, the later financed by saving, to be on a par with the market's allocation of resources to the production of fruits and the production of vegetables. In other words, within the overall output aggregate, the allocation issue—whether among narrowly defined goods (peaches and potatoes) or among broad-based sub-aggregates (consumption and investment)—is largely the province of microeconomics.

Macroeconomics, in this view, should focus on the overall output aggregate itself as it relates to other macroeconomic variables, such as the general price level and the money supply. These macroeconomic variables, symbolized as Q, P, and M, come together in the familiar equation of exchange,

$$MV = PQ. \tag{1}$$

This equation, of course, was ground zero for the monetarist counterrevolution against the Keynesianism of the 1950s. The velocity of money, V, is defined by the equation itself, and prior to the 1980s its empirically demonstrated near-constancy in different countries and in different time periods established a strong relationship between the money supply and some index of output prices. What is commonly known as the quantity theory of money is more descriptively called the quantity-of-money theory of the price level.

The monetarists argued that the long-run consequence of a change in the money supply is an equi-proportional change in the general level of prices—a consequence tempered only by ongoing secular changes in real output and in the velocity of money. Allowances were made for short-run variations in real output. That is, overall output Q may rise and then fall while P is adjusting to an increased M. However, the monetarists paid little attention to the relative movements of the major sub-aggregates (consumption and investment) during the adjustment process and no attention at all to the sub-aggregates (stages of production) that make up aggregate investment. Whether dealing with long-run secular growth or with short-run money-induced movements in real output, the focus was on the summary output variable Q. Whatever change is occurring *within* the output aggregate—as might be tracked by the Austrians in terms of the Hayekian triangle—were taken to be irrelevant to the greater issues of macroeconomics.

9.4.2 The saving-*cum*-investment perversity of Keynesianism

It was Keynesian economics, of course, that the monetarist counterrevolution was intended to counter. But on the issue of a saving-investment nexus, the counter could be more accurately described as a cover-up. In his *General Theory* Keynes

(1936, p. 21) had explicitly faulted his predecessors and contemporaries for "fallaciously supposing that there is a nexus which unites decisions to abstain from present consumption with decisions to provide for future consumption." According to Keynes, there is no simple and effective way of coordinating these two decisions. Rather, the mechanisms that do eventually bring saving into line with investment are indirect and perverse. The saving-*cum*-investment perversity, in fact, is central to the Keynesian vision of the macroeconomy (Leijonhufvud, 1968).

The equation of exchange can be rewritten in a way that uncovers the issues on which the Keynesian revolution was based. Aggregate output Q consists of the output of consumption goods plus the output of investment goods. That is, $Q = Q_C + Q_I$, the Q_I reckoned as the "final" output of investment goods—so as to avoid double counting. The equation of exchange, then, can be rewritten as

$$MV = P(Q_C + Q_I), \tag{2}$$

emphasizing that the problem as seen by Keynes (the volatility of Q_I and its impact on all other macroeocnomic magnitudes) is a problem that is simply not addressed by the monetarists. Rather, replacing the Keynesian $Q_C + Q_I$ with the monetarist Q served only to cover up the primary locus of perversity. The question of just how the output of investment goods gets squared with preferred trade-off between current consumption and future consumption is not answered by the monetarists—nor is it even asked.

In the Keynesian vision, which will be dealt with at some length in Section 9.10, movements in the investment aggregate impinge in the first instance on incomes, which in turn impinge on consumption spending. That is, Q_C and Q_I move in the same direction, the movements in Q_I being unpredictable and the corresponding same-direction movements in Q_C being amplified by the familiar Keynesian multiplier. Similarly, autonomous changes in current consumption, if any, would tend to affect profit expectations and hence cause investment spending to change in the same direction. Here, the principle of derived demand is in play.

With the two major sub-aggregates moving up and down together (though at different rates), the Keynesian theory precludes by construction any possibility of there being a trade-off of the sort emphasized by the Austrians. Further, considerations of durable capital and the so-called investment accelerator imply the absence of a generally binding supply-side constraint. There is simply no scope in the Keynesian vision for investment to rise *at the expense of* current consumption. Similarly, market participants willing to forgo current consumption (i.e., to save) in order to be able to enjoy greater future consumption would find their efforts foiled by the market mechanisms that link saving and investment. Rather than stimulating investment, increased saving would impinge on overall spending and hence on

overall income. This perverse negative income effect, which Keynes identified as the paradox of thrift, is discussed at length in Section 9.8.

9.4.3 Austrian disaggregation

The Austrian perspective on Keynesianism and monetarism in the context of the equation of exchange is revealing. Keynesianism adopts a level of aggregation that suggests a potential problem—one of dividing resources appropriately between consumption and investment—but without allowing for a non-perverse market solution to that problem. Monetarism, as well as most strands of new classicism, increases the level of aggregation, obscuring this central issue and hence relegating the problem as well as its solution to the realm of microeconomics. Predating both monetarism and Keynesianism, the Austrians were inclined to work at a lower level of aggregation than either of these schools, one in which both the problem and a potentially viable market solution could be identified.

Again, the equation of exchange can serve as the common denominator of the different schools of thought. For the Austrians, the investment aggregate in the Keynesian rendition must be disaggregated so as to bring the stages of production into play. Q_C is consumable output, or goods of the first order—to use Menger's terminology. Investments distributed across the nine preceding stages are identified as Q_2 through Q_{10}. The equation of exchange thus becomes:

$$MV = P(Q_C + Q_2 + Q_3 + Q_4 + Q_5 + Q_6 + Q_7 + Q_8 + Q_9 + Q_{10}). \tag{3}$$

Just as Q_I is reckoned as "final" output in conventional macroeconomic theorizing, the second and higher-order goods (Q_2 through Q_{10}) in Equation 3 are similarly reckoned so as to maintain the integrity of the equation of exchange. Double counting is thus avoided, and the sum of the output magnitudes (in Equations 2 and 3) is equal to total output and, equivalently, to total income. But with the Austrian disaggregation, the focus of the analysis is on the relative movements among the Q's as well as on their sum.

In the Keynesian construction, it might well seem implausible that an increase in saving and a corresponding decrease in spending on Q_C could cause Q_I to increase. If business firms are having problems selling out of their current inventories, they are unlikely to be inspired to commit additional resources to an expanded capacity and hence to the further overstocking of these inventories. The doctrine of derived demand suggests that the demand for productive capacity will mirror the demand for output. In the Austrian construction, the doctrine of derived demand is tempered by considerations of time discount. The multiple stages of production allow for enough degrees of freedom for the consequences of a fall in consumer spending to be described in terms of a change in the *pattern* of investment spending rather than exclusively in terms of an opposing movement in an all-

inclusive investment aggregate. The story of how the market can plausibly work can be squared with the doctrine of derived demand, but as told by the Austrians, the story is not dominated by it. The analysis draws on microeconomics as well as macroeconomics and, as indicated earlier, the main character is the entrepreneur.

9.4.4 Derived demand and time discount

An increase in saving sends *two* market signals to the business community. Both must come into play if a change in intertemporal preferences is to get translated successfully into corresponding changes in the economy's multi-stage production process. Changes in output prices together with changes in the interest rate have consequences that affect the various stages of production differentially. A non-perverse reallocation of resources in the face of increased saving hinges critically on two principles: the principle of derived demand and the principle of time discount. It is worth noting here that perceived perversities in the saving-*cum*-investment nexus of market economies stem from an implicit denial of the second-mentioned principle. If derived demand is taken to be the only principle in play, then it follows almost trivially that the market cannot adapt to an increase in saving.

Increased saving means decreased current demand for consumer goods. (Of course, for a growing economy in which both saving and consumption are increasing, we would have to think in terms of changes in the relative rates of increase. More rapidly increasing saving means a less rapidly increasing demand for consumer goods.) A decrease in the demand for goods of the first order—again, Menger's terminology—has straightforward implications for the demand for goods of the second order. The demand for coffee beans moves with the demand for coffee. Menger's Law prevails. More generally, the demand for inputs that are in close temporal proximity to the consumable output moves with the demand for that output. The demand for goods of the second order is a derived demand. Under strict *ceteris paribus* conditions, which would entail no change in the rate of interest, derived demand would be the whole story.

The more favorable credit conditions brought about by the increase in saving is the basis for the rest of the story. A lower interest rate allows businesses to carry inventories more cheaply. But how important is this change in supply conditions? In gauging the relative changes in the demands for goods of the first order and goods of the second order (coffee and coffee beans), the time-discount effect is weak. Inventories of coffee beans are held for only a short period of time, and consequently, the time discount effect—in this case, the reduced costs of carrying inventory—is trivial compared to the derived-demand effect. The demand for coffee beans falls *almost* as much as the demand for coffee. The strength of the time discount effect is greater—and increasingly greater—for the higher orders of goods. Consider, say, a tenth-order good in the form of durable capital equipment. Testing facilities and laboratory fixtures devoted to product development are good

examples. More favorable credit conditions could easily tip the scales toward creating or expanding such a facility. In early stages of production, the time-discount effect can more-than offset the derived-demand effect.

Considerations of time discount draws resources into early stages of production. Further, in gauging the profitability of early-stage activities, the derived-demand effect itself can be augmenting rather than offsetting. Here, the entrepreneurial element comes into play in a special way. What counts as the relevant derived demand is not based on the *current* demand for goods of the first order but rather on the anticipated demand at some future point in time—a demand that may well be strengthened precisely because of the accumulation of savings. The increased saving need not be taken as an indication that the demand for consumables is *permanently* reduced. Rather, savers are saving up for something. And entrepreneurs who best anticipate just what they will be inclined to buy with their increased buying power stand to profit from the intertemporal shift in spending.

The interplay between derived demand and time discount accounts for the change in the pattern of resource allocation brought about by an increase in saving. A judgment might be made that this account saddles the entrepreneurs with a greater burden than they can bear. Yet, those same entrepreneurial skills were already in play in maintaining the intertemporal capital structure before the increase in saving. That is, even in the absence of a change in intertemporal preferences, market conditions throughout the economy are continuously changing in every other respect—changes in tastes, in technology, in resource availabilities. Entrepreneurs must continuously adapt to those changes, while maintaining the temporal progression from early-stage to late-stage activities. An increase in saving simply requires that they make use of those same skills—but under marginally changed credit conditions. A more plausible judgment would be that an economy unable to adapt to a change in saving preferences is most likely unable to maintain a tolerable degree of economic coordination even in the absence of such changes.

Figure 9.4 reproduces the equation of exchange with the investment sector disaggregated into nine stages of production. The arrows indicate the direction and relative magnitude of the change in the output quantities brought about by an increase in saving. The reduction in the output of first-order goods (Q_C) is echoed in the reduction in the output of second-through-fifth order goods (Q_2, Q_3, Q_4, and Q_5), the magnitude of the reduction attenuated by the time-discount effect for the increasingly higher orders of goods. Starting (in this illustration) with sixth-order goods, the time-discount more-than-offsets the derived-demand effect. There are increases in the output levels of sixth and earlier stages of production (Q_6, Q_7, Q_8, Q_9, and Q_{10}), the time-discount effect becoming more dominant with increasingly higher order goods.

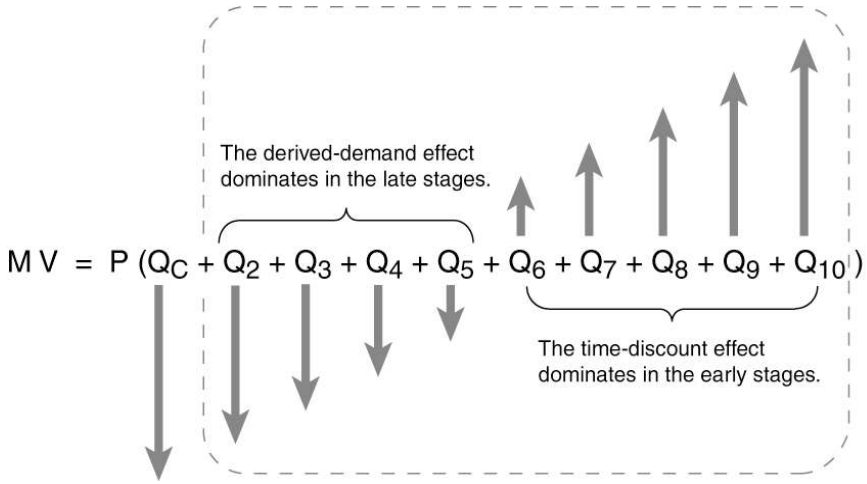


Figure 9.4 Time discount and derived demand

The increased savings frees up resources, which are then allocated to the different stages of production in a pattern governed by the more favorable credit conditions. Grouping Q_2 through Q_{10} together in Figure 9.4, we see that overall investment rises as the current demand for consumable output (Q_C) falls. Contrary to Keynes's paradox of thrift, consumption and investment can move in opposite directions. Attention to the intertemporal pattern of investment allows us to resolve the paradox and to show how changes in investment can be consistent with changes in saving behavior. The wholesale neglect of the pattern of investment underlay an early judgment by Hayek (1931) that "Mr. Keynes's aggregates conceal the most fundamental mechanisms of change." It is significant that those fundamental mechanisms are set into motion by the supply and demand for loanable funds—because it was loanable-funds theory, a staple in the pre-Keynesians' toolkit, that Keynes specifically jettisoned.

9.5 The Market for Loanable Funds

Loanable-funds theory has an honorable history. Over the years and across several schools of thought, theorizing abstractly in terms of "loans" was simply a way of recognizing that the mechanisms of supply and demand govern the intertemporal allocation of resources. The macroeconomic implications of loanable-funds theory are best seen by focusing on the resources themselves rather than on any particular financial instrument that allows the allocator—the entrepreneur—to take command of the resources.

People produce output in a wide variety of forms. With their incomes they engage in consumption spending, laying claim to most-but-not-all of the output that they have collectively produced. The part of income not so spent, that is, their saving, bears a strong and systematic relationship to the part of the output that is not currently consumed. These unconsumed resources can be made available for increasing the economy's productive capacity. In a market economy, there are a number of different financial instruments (bank deposits, passbook accounts, bonds, and equity shares) that transfer command over the unconsumed resources to the business community.

The term "loanable funds," then, refers summarily to all the ways that the investment community takes command of the unconsumed resources. Further, *taking* command has to include *retaining* command—in the case of the undistributed earnings of the business community. Here, the business firm, in order to expand its own productive capacity, is forgoing some market rate of return on its retained earnings, a rate that it could have obtained through the financial sector. For macroeconomic relevance, however, loanable funds exclude consumer loans. Income earned by one individual and spent on consumption either by that individual or—through saving and the consumer-loan market—by another individual is not the focus of loanable-funds theorizing.

With loanable funds broadly defined to capture the variety of ways that real investments can be financed, the corresponding interest rate that equilibrates this market must be understood in terms that are similarly broad. A full-bodied theory of finance would have to allow for many interest rates, the variations among them being attributable to differences in risk, liquidity, and time to maturity. But for getting at the fundamental relationships among the variables of capital-based macroeconomics (output, consumption, saving, investment, and even the intertemporal pattern of resource allocation), a summary rate is adequate. As will be noted in subsequent sections, some considerations that account for a variation among different interest rates may exacerbate the effects of a change in the summary rate, while other considerations may ameliorate those effects. But in any case, the fundamental differences that separate capital-based macroeconomics from other schools of macroeconomics do not hinge in any important or first-order way on relative movements of different rates of return within the financial sector.

Figure 9.5 represents the simple analytics of the loanable-funds market. The supply of loanable funds is, for the most part, saving out of current income. In real terms, it is that part of current output not consumed. The demand for loanable funds reflects the eagerness of the business community to use that saving to take command of the unconsumed resources. These two macroeconomically relevant magnitudes of saving and investment are not definitionally the same thing but rather are brought into balance by equilibrating movements in the broadly conceived rate of interest.

To feature the supply and demand for loanable funds in this way is only to suggest that in a market economy the interest rate is the fundamental mechanism through which intertemporal coordination is achieved. Simply put, the interest rate allocates resources over time. There need be no claim here that this Marshallian mechanism works as cleanly and as swiftly as the supply and demand for fish at Billingsgate. Because of the elements of time and uncertainty inherent in the intertemporal dimension of loanable-funds market, the interest-rate signal can be subject to interpretation.

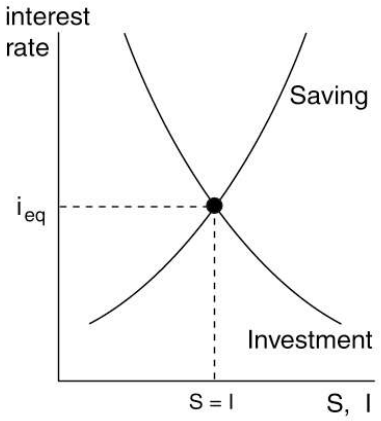


Figure 9.5 Loanable funds market

What if some income is neither spent on consumption nor offered as funds for lending? That is, what if people—unexpectedly and on an economywide basis—prefer to add to their cash holdings? The increased demand for cash holdings would constitute saving in the sense of income not consumed but would not constitute saving in the sense of an increase in the supply of loanable funds. One important consequence of the Keynesian revolution was to elevate considerations of liquidity preferences to the point of dwarfing considerations of intertemporal preferences. The rate of interest was thought to be dominated by changes in the demand for money. Even in the counterrevolutionary contributions of the monetarists, the interest rate was featured on the left-hand side of the equation of exchange—as a parameter that affects the demand for money—and not on the right-hand side as a key allocating mechanism working within the output aggregate. (It is precisely because of this left-handedness of its treatment of the interest rate that Milton Friedman's restatement of the quantity theory is taken by some scholars as a contribution in the Keynesian tradition; see Garrison, 1992.)

The attention to the loanable-funds market as depicted in Figure 9.5 reflects the judgment of the Austrians that the rate of interest, though hidden from view in the monetarists' equation of exchange, is quintessentially a key right-hand-side variable. The interest rate's primary role in a market economy is that of allocating investable resources in accordance with saving behavior. There is no denying that the interest rate can, on occasion, play a role on the left-hand-side of the equation of exchange—as a minor determinant of money demand or as a short-run consequence of hoarding behavior. Still, these monetarist and Keynesian concerns are subordinate ones in the Austrians' judgment. An exogenous change in money demand is rarely if ever the source of a macroeconomic disruption. (Here, the

Austrians fall in with the monetarists.) And an occasional dramatic change in liquidity preference is more likely to be a *consequence* of an economywide intertemporal coordination failure than a *cause* of it. (Here, even Keynes agreed that in the context of business cycles the scramble for liquidity is a secondary phenomenon. His concern about the "fetish of liquidity," a wholly unfounded concern in the Austrians' view, was spelled out in the context of long-term secular unemployment.)

Figure 9.5 (the loanable-funds market) and Figure 9.1 (the Hayekian triangle) tell the same story but at two different levels of aggregation. Figure 9.5 shows *how much* of the economy's resources are available for investment purposes. Figure 9.1 shows *just how* those resources are allocated throughout the sequence of stages. A change in the interest rate, say, a reduction brought about by an increase in saving, has systematic consequences that can be depicted in both figures. The interest rate governs both the amount of investable resources and the general pattern of allocation of those resources. A rightward shift in the supply of loanable funds would move the market along its demand curve, reducing the interest rate to reflect the increased availability of investable resources. At the same time, that reduced rate on interest would give a competitive edge to early-stage investment activities. Resources available for the expansion of long-term projects come in part form the overall increase in unconsumed resources and in part from a transfer of resources from late-stage activities, where lower investment demand reflects the lower demand for current and near-term output.

The effects of increased saving at both levels of aggregation are explicit in Figure 9.4 and implicit in Figure 9.5. The change in the pattern of resource allocation is depicted as the systematic changes in the direction and magnitude of the stage-by-stage output levels. The increase in unconsumed resources is depicted by the reduction in the output of goods of the first order and in the corresponding (overall) increase in the output of second-through-tenth-order goods. And all this is implied by a rightward shift in the supply of loanable funds: More unconsumed resources are being allocated on the basis of lower interest rate.

What is missing in the discussion at this point is any explicit recognition of an overall resource constraint. Scarcity is implicit in the notion that, for a given period, output magnitudes as depicted in Figures 9.3 and 9.4 move differentially, with some increasing and others decreasing. Early-stage activities are expanded at the expense of current consumption and late-stage activities. The overall resource constraint can be made explicit by the introduction of a production possibilities frontier that makes the two-way distinction between current consumption, which is already depicted as the vertical leg of the Hayekian triangle, and investment, which is already being tracked along the horizontal axis of the loanable-funds diagram. A fully employed economy can be represented as an economy producing on its production possibilities frontier.

9.6 Full Employment and the Production Possibilities Frontier

The existence of an overall resource constraint is inherent in the concept of full employment. A fully employed economy is one in which the supply-side constraints are binding. The full employment of labor and other factors of production gets us full-employment output and full-employment income. This much is accepted by all schools of macroeconomic thought. But what constitutes unemployment in the macroeconomically relevant sense? And what can we make of the conventionally defined categories of frictional, structural, and cycle components of unemployment? These are the issues that separate the Austrians from other schools.

For Keynes, unemployment was to be gauged with reference to some "going wage," which itself came into being during a period when the economy was suffering from no macroeconomic maladies. In subsequent periods the economy's actual state of macroeconomic health is determined, in the Keynesian way of thinking, by comparing the quantity of labor demanded at the going wage with the quantity of labor offered in supply. If these two quantities (demanded and supplied) are the same, then labor (along with all other resources) is fully employed. If, under less favorable market conditions, the quantity demanded is deficient relative to the quantity offered in supply at the previously established going wage, the discrepancy stands as a measure of cyclical unemployment.

Central to this Keynesian reckoning was the idea that the going wage kept going even after the market conditions that underlay it were gone. It was in this context that Keynes (1936, p. 15) used the term "involuntary unemployment," the involuntariness deriving from the idea that the workers have fallen victim to the institutions of capitalism—institutions that do not allow for some uniform adjustment in the overall level of wages. Involuntary unemployment is used here to mean cyclical unemployment. But we should acknowledge Keynes's belief, not shared by modern Keynesians, that ongoing secular unemployment of the involuntary variety is inherent in the nature of the market system.

Both Keynes and modern Keynesians allow for some unemployment even in the absence of involuntary unemployment, that is, even when the economy is not in recession. In a healthy economy, the unemployed consist of new entrants into the labor force who haven't yet accepted a job offer as well as members of the labor force who are between jobs. Modern textbooks commonly make the distinction between frictional unemployment, meaning simply that in a market economy job applicants and job openings are not matched up infinitely fast, and structural unemployment, meaning that there are significant mismatches between applicants and openings, such as to require costly retraining and/or relocation.

Though the difference between frictional and structural unemployment is a substantive one, the ultimate purpose of this unemployment taxonomy is to make a sharp distinction between these components of unemployment and the remaining

component, which alone is a measure of the economy's departure from its overall, macroeconomically relevant supply-side constraints. As a rule of thumb, the frictional-*cum*-structural unemployment may be five-to-six percent of the labor force. Hence, a measured unemployment in a market economy of, say, eight percent would suggest that the economy is in recession and that the cyclical component of the measured unemployment, that is, the unemployment attributable to recessionary conditions, is two-to-three percent.

This well-known taxonomy of unemployment (frictional, structural, and cyclical) is spelled out here to facilitate an important contrast between the Austrians' reckoning of unemployment and this more conventional reckoning. Capital-based macroeconomics features the intertemporal *structure* of production. And as will be seen in Section 9.9 below, business cycles entail a distortion of the structure, a misallocation of labor and other resources among the stages of production. Hence, *cyclical* unemployment—or, at least, an essential part of it—is a special case of *structural* unemployment. The Austrians depart from convention, then, in their judgment that structural unemployment and cyclical unemployment are not mutually exclusive categories.

A second feature of the Austrian's reckoning of employment levels—and of resource constraints generally—is illuminated by considering the monetarists' notion of the natural rate of unemployment. Rather than emphasize the different categories of unemployment as discussed above, the monetarists make the two-way distinction between the rate of unemployment that would "naturally" exist even in a healthy market economy and rates of unemployment that are in excess of this natural rate. (Milton Friedman coined the term "natural rate of unemployment" to emphasize its kinship with the "natural rate of interest," a similarly defined term introduced by Swedish economist Knut Wicksell; see Leijonhufvud, 1981.) The difference here between the monetarists and the Keynesians is terminological rather than substantive. The natural rate of unemployment is in the range of five-to-six percent. And an economy that is experiencing the natural rate of unemployment is said to be fully employed.

Consistent with this reckoning, an economy experiencing the natural rate of unemployment can be said to be on its production possibility frontier. The frontier, then, can allow for deviations in either direction. That is, an economy in recession would be represented by a point inside its frontier, and an overheated economy, one in which the unemployment rate has been pushed temporarily below the natural rate, would be represented by a point beyond its frontier. This is only to say that the frontier itself is defined in terms of sustainable levels of output and not in terms of some short-run maximal level of output.

Figure 9.6 depicts a wholly private economy's production possibilities frontier in terms of sustainable combinations of consumable output and investment. This economy is experiencing full employment, its unemployment rate being no

more than five-to-six percent. The vertical axis keeps track of consumables in a way that conforms to final-stage output as represented by the vertical leg of the Hayekian triangle. The horizontal axis keeps track of gross investment. Hence, if capital depreciation just happened to be equal to the gross investment, the economy would be experiencing no economic growth. Typically, depreciation will be something less than gross investment, and the economy will enjoy a positive growth rate, the frontier itself expanding outward from period to period. In the unlikely case in which gross investment falls short of depreciation, of course, the economy would be in economic decline, the frontier shifting inward from period to period.

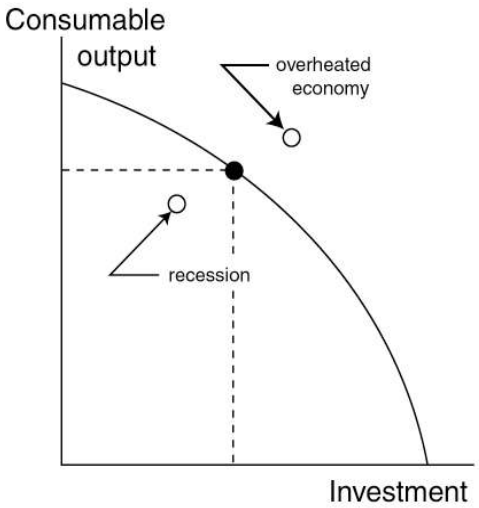


Figure 9.6 Production possibilities frontier

As one of its critical features, capital-based macroeconomics allows for movements *along* the frontier in one direction or the other in response to changes in intertemporal preferences. A clockwise movement would represent the sacrifice of current consumption in favor of additional investment. The initial reduction of consumable output would eventually be offset and then more-than-offset as the frontier itself shifts outward at an accelerated rate. The time path of consumable output would be that depicted in Figure 9.2. A counterclockwise movement would represent a sacrifice in the opposite direction. The initial increase in consumable output would carry the cost of a decrease in the economy's growth rate and possibly even a negative growth rate.

Significantly, these possible clockwise and counterclockwise movements are the sort of movements precluded by construction in Keynesian theorizing, as will be shown in Sections 9.8 and 9.10, and ignored in monetarist theorizing, owing to the level of aggregation that characterizes the equation of exchange. A major focus of Austrian theorizing is on the market mechanisms that allow for such movements—and on policy actions that lead to a disruption of these mechanisms. The macroeconomic health entails more than an unemployment rate that stays within the range of five-to-six percent. It also entails a growth rate that is consistent with intertemporal preferences.

Three distinct but mutually reinforcing perspectives on the key relationships of capital-based macroeconomics are provided by the production possibilities

frontier, the loanable-funds market, and the Hayekian triangle. In the following section, these three graphical components, which come together to create a capital-based macroeconomic framework, provide a firm basis for the Austrian propositions about saving and growth and for the Austrian theory of the business cycle.

9.7 The Capital-Based Macroeconomic Framework

The three components discussed above are assembled in Figure 9.7 to depict an intertemporal equilibrium in a fully employed macroeconomy. Full employment is indicated by the locus of this economy *on* its production possibilities frontier. The particular location on the frontier is determined by the loanable-funds market, in which the rate of interest reflects the saving preferences of market participants. The corresponding consumption preferences are accommodated by the output of the final stage of production in the Hayekian triangle. Resources are being allocated among the stages of production on the basis of the cost of investment funds, such that the rate of return in the real sector, as reflected in the slope of the triangle's hypotenuse, corresponds to the rate of return in the financial sector, as depicted by the market-clearing interest rate in the loanable-funds market. Figure 9.7 and subsequent figures are adapted from Garrison (2001).

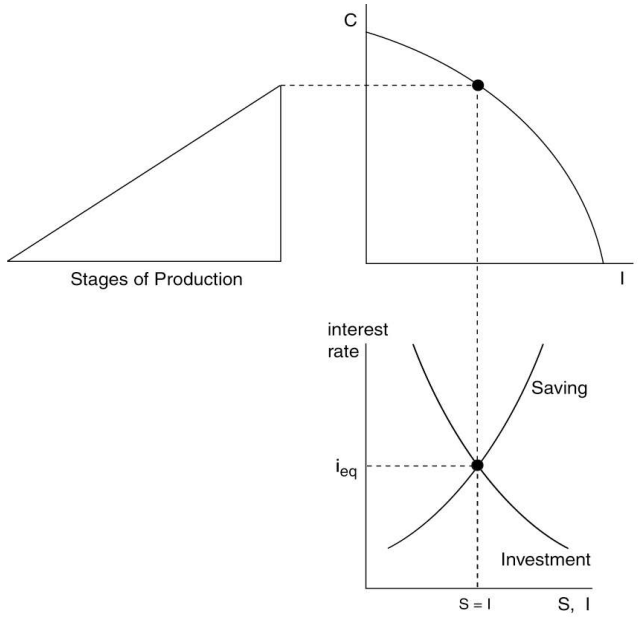


Figure 9.7 A capital-based macroeconomic framework

For an economy in a macroeconomic equilibrium as just described, the rates of return (in both the real and the financial sectors) can be summarily described as "the natural rate of interest." Parametric changes, such as a change in saving preferences, can change the natural rate. For instance, increased saving preferences will cause the market-clearing rate of interest to be lower *and* the slope of the

triangle's hypotenuse to be a shallower one. The capital-based macroeconomic framework is designed to show (1) how market forces establish a new natural rate in response to some parametric change and (2) how the economy reacts to policies aimed at maintaining an interest rate in the financial sector that is inconsistent with—typically below—the natural rate. Uses of these analytics to deal with other macroeconomic issues, such as deficit finance and tax reform, are demonstrated in Garrison (2001); some extensions of Austrian business cycle theory are suggested by Cochran (2001).

In its simplest interpretation, Figure 9.7 depicts a steady-state, no-growth economy. There is no *net* investment. The positive level of saving and investment shown in the loanable-funds market is just enough to offset capital depreciation. As capital goods wear out and are replaced, the Hayekian triangle is maintained from period to period in terms of both size and shape. This is the circumstance that corresponds to the first two periods of Figure 9.2. If, as is ordinarily the case, investment exceeds capital depreciation, the economy experiences secular growth in all its dimensions. The production possibilities frontier shifts outward, both the supply and demand for loanable funds shift rightward, and the Hayekian triangle changes in size but not—or, at least, not necessarily—in shape. This is the circumstance that corresponds to the last several periods of Figure 9.2. It should be noted that secular growth in which there is no change in the shape of the Hayekian triangle presupposes that the supply of loanable funds and the demand for loanable funds shift rightward *to the very same extent*, such that there is no change in the rate of interest. Ordinarily, we would think of the increased income and wealth that economic growth makes possible as being accompanied by an expanding time horizon and hence by an increased inclination to save. Factoring in increased saving preferences would allow for a reduction in the rate of interest and a change in the shape as well as of the size of the Hayekian triangle.

9.8 Saving-Induced Capital Restructuring

Suppose that in circumstances of a no-growth economy and a natural rate of interest of i_{eq}, people become more thrifty. The increased saving is depicted in Figure 9.8 as a rightward shift in the supply of loanable funds (from S to S'). With the resulting downward pressure on the interest rate, the loanable-funds market is brought back into equilibrium. The natural rage of interest falls from i_{eq} to i'_{eq}. The reduced cost of borrowing motivates the business community to expand investment activities. Increased saving, of course, *means* decreased consumption. But the decreased consumption is offset by the increased investment, allowing the economy to stay on its production possibility frontier. The clockwise movement along the frontier in the direction of increased investment is consistent with the hypothesized change in intertemporal preferences.

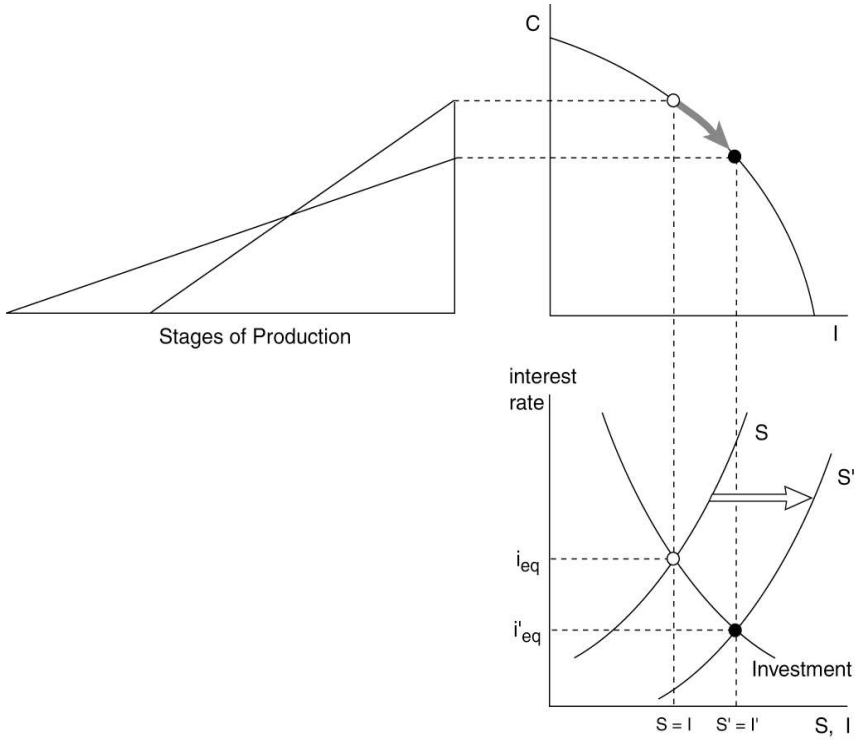


Figure 9.8 Saving-induced economic growth

The corresponding changes in the Hayekian triangle follow straightforwardly. The currently reduced demand for consumable output (which *depresses* investment) is accompanied by reduced borrowing costs (which *stimulate* investment). The effects of these changes in market conditions were discussed in Section 9.4.4 above in terms of "derived demand" and "time discount." The derived-demand effect dominates in the late stages; the time-discount effect dominates in the early stages. Input prices are bid down in the late stages (reflecting the low demand for current and near-term output) and are bid up in the early stages (reflecting the low borrowing costs). The changes in relative prices draw resources out of the late stages and into the early stages. Further, stages of production temporally more remote from final consumption than had existed before will have yields that are attractive in the light of the low borrowing costs. In the absence of any further changes in saving preferences or in any other data, the new intertemporal equilibrium will entail a rate of return in the real sector (consisting of all the stages)

that matches the low rate of interest in the financial sector. The general pattern of resource reallocation is depicted as a shallower slope of the triangle's hypotenuse.

In discussing in more concrete terms the nature of these saving-induced reallocations, the relevant distinction is not between labor and capital but rather between resources of both kinds that are (relatively) nonspecific and resources of both kinds that are (relatively) specific. Nonspecific capital, such as building materials that can be used for building either retail outlets or research facilities; will move out of comparatively late stages and into early ones in response to relatively small price differentials. Specific capital, such as mining equipment or amusement park attractions, may enjoy a capital gain (in the first instance) or suffer a capital loss (in the second). Similarly, nonspecific labor will migrate in the direction of the early stages in response to small wage-rate differentials, while workers who are wedded to particular stages may experience increased—or decreased—wage rates. Note that the focus on the allocation of resources among the stages of production in response to changes in relative prices and wages warns against theorizing in terms of *the* wage rate.

Once the capital restructuring is complete and the earliest saving-induced investments work their way through the stages of production, the output of consumables will increase, eventually exceeding the output that characterized the initial no-growth economy. If we understand that the saving which gave rise to the capital restructuring not as a permanent reduction in consumption but rather as an increased demand for future consumption, then we see that the reallocations are consistent with the preference change that gave rise to them. Further, we see that the clockwise movement along the production possibilities frontier, followed by an outward expansion of the frontier itself traces out a temporal pattern of consumption that is wholly consistent with the pattern depicted in Figure 9.2. By forgoing consumption in the near term, people's saving behavior allows the economy to make the transition from a no-growth economy to an economy experiencing secular growth.

Two qualifications will help to put in perspective this account of the market's reaction to an increase in saving. First, the assumption of an initial no-growth economy was made purely for pedagogical reasons. In this setting the changes brought about by an increase in saving are isolated from any other ongoing changes, such as those associated with secular growth. The demand for inputs falls in some stages and rises in others. Some stages lose resources; others gain them. In application, however, where there is already ongoing secular growth, these same relative effects are expressed not in terms of absolute decreases and increases but rather in terms of increases at a relatively slow rate and increases at a relative rapid rate. The market is simply doing the same things it did before the increase in saving—except for its doing them under conditions of moderated consumption demand and marginally more favorable credit conditions. As suggested earlier, the

plausibility of the market being able to accommodate itself to the increase in saving is about the same as the plausibility it could function reasonably well during the period of secular growth.

Second, and relatedly, the substantial one-time shift in the supply of loanable funds shown in Figure 9.8 is not intended to suggest that saving behavior sometimes changes that dramatically. Like adopting the assumption of no-growth, hypothesizing a dramatic change serves a purely pedagogical purpose. In teaching the basics of supply and demand, professors draw a substantially shifted curve on the blackboard so that students in the back row can see it. There is no implication here that actual changes in saving preferences tend to be dramatic ones or that saving is in some sense unstable. Quite to the contrary, in light of the complexities of the capital structure and the nature of the market mechanisms that keep it in line with saving preferences, the message should be that even small and gradual changes in saving preference need to be accommodated by the appropriate movements of resources among the stages of production. As in microeconomics, Austrian macroeconomics is about marginal adjustments to parametric changes.

Because of the explicit temporal element in the capital structure any inter-stage misallocations can be cumulative. The avoidance of such misallocations requires the interest rate to tell the truth about intertemporal preferences. The consequences of a falsified interest rate (cumulative intertemporal misallocations followed by a crisis) are the subject of Section 9.9. But in the following section we consider the Keynesian view of increased saving in the context of our capital-based macroeconomic framework.

9.8 Keynes's Paradox of Thrift Revisited

It is instructive to compare the Austrians' treatment of increased saving and consequent market adjustments with Keynes's treatment of these issues. There are two important differences. First, pre-empting any extended analysis of changes in saving preferences was Keynes's judgment that such changes are unlikely to occur. Second, any increase in thriftiness, should such a preference change actually occur, would in his reckoning have perverse consequences for the economy.

Saving, in Keynes's theory, is a residual. It's what's left over after people do their consumption spending, which itself is dependent only (or predominantly) upon incomes. In the Keynesian framework, the rate of interest has no effect (or only a negligible effect) on saving behavior. Hence, an extended analysis of a change in saving preferences was largely uncalled for. Keynes's analysis of the interest rate is carried out in terms of the supply and demand for money (i.e., cash balances) and not in terms of the supply and demand for loanable funds. And to the extent that Keynes did deal with loanable funds—or, more pointedly, investment funds—his focus was on the other side of the loanable-funds market. The demand for

investment funds, in his view, is subject to dramatic shifts owing to the uncertainties that are inherent in investment decisions. A comparison of Keynesian and Austrian theories of the business cycles, the Keynesian theory featuring a collapse in investment demand, will be the subject of Section 9.10

Keynes's judgment that saving behavior is not subject to change was accompanied by some degree of relief that this was the case. He argued that an increase in saving would send the economy into recession. This is Keynes's celebrated "paradox of thrift." If people try to save more out of a given income, they will find themselves saving no more than before but saving that unchanged amount out of a reduced income. That is, in their effort to increase their saving rate, S/Y, by increasing the numerator of that ratio, they set a market process in motion that increases the saving rate by decreasing the ratio's denominator. What is the essence of this market process that produces results so different from those envisioned by the Austrians? In summary terms, the Austrian story about derived demand and time discount becomes, in Keynesian translation, a story about derived demand alone.

The market adjustments envisioned by Keynes can be revealingly depicted as an alternative sequence to the one shown in Figure 9.8. In Figure 9.9 the same initial conditions of full employment are assumed. But in the spirit of Keynes, the loanable-funds market is drawn with relatively inelastic saving and investment schedules. The initial saving schedule is labeled $S(Y_0)$ to indicate that people are saving out of an initial level of income of Y_0. As in the Austrian story, we show an increase in thriftiness by a rightward shift of the supply of loanable funds—from $S(Y_0)$ to $S'(Y_0)$. And as before, there is downward pressure on the interest rate. But in the Keynesian story, the market process that might otherwise restore an equilibrium relationship between saving and investment is cut short by a dominating income effect. More saving means less consumption spending. And less consumption spending means lower incomes for those who sell these consumer goods. It also means reduced demand for the inputs with which to produce the consumables, i.e., a reduced demand in factor markets, generally.

The economy spirals downward as spending and incomes fall in multiple rounds. With reduced incomes, saving is also reduced. As the process plays itself out, the saving schedule shifts leftward from to $S'(Y_0)$ to $S'(Y_1)$, where $Y_1<Y_0$. The negative income effect fully offsets the positive increased-thrift effect. Both saving and investment are the same as before the preference change. But with reduced consumer spending and no change—and certainly no increase—in investment spending, the economy has fallen inside the production possibilities frontier. (In Figure 9.9 the upward-sloping line that intersects the frontier suggests that the level of consumption in the thrift-depressed economy is lower than it would have been had intertemporal coordination somehow been achieved without the lapse from full employment. The parameters of this upward-sloping "demand constraint" will be identified in Section 9.10.)

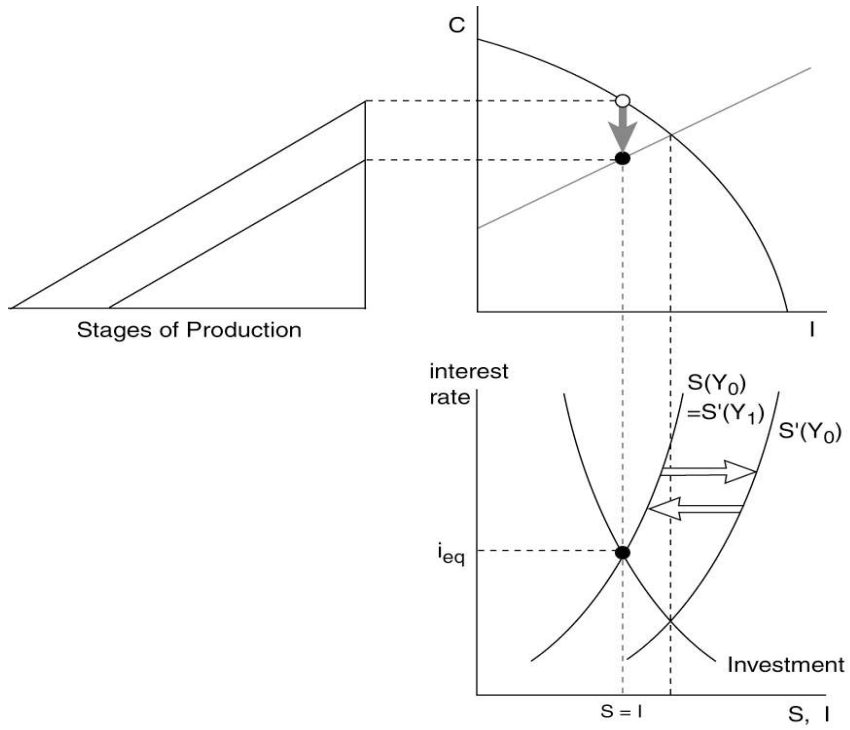


Figure 9.9 A saving-induced recession

The Hayekian triangle changes in size but not in shape. Note that even if Keynes were to allow for the allocation of resources within the capital structure to be achieved by changes in the interest rate, no thrift-induced reallocation would take place—since (abstracting from possible changes in liquidity preferences, which would only compound the perversities) the interest rate does not change.

To isolate the consequences of increased thriftiness, it is assumed that investment spending does not change at all. But, of course, if the recessionary conditions dampen profit expectations in the business community, investment spending will actually fall, exacerbating the problems caused by the increased thriftiness.

The paradoxical—and perverse—consequences of an increase in thriftiness are seen by Keynes as the unavoidable outcome of the market process. In his own words, "Every such attempt to save more by reducing consumption will so affect incomes that the attempt necessarily defeats itself" (Keynes, 1936, p. 84). The economy simply cannot move along its production possibilities frontier, and savers

who push in that direction will cause the economy to sink into recession. Keynes paradox of thrift stands as a summary denial that a market economy has the capability of achieving and maintaining an intertemporal equilibrium in the face of changing saving preferences. Relative change in resource allocations within the capital structure are no part of the story. Again, the wholesale neglect of all such structural changes is what Hayek (1931) had in mind when he remarked that "Mr. Keynes's aggregates conceal the most fundamental mechanisms of change."

9.9 The Austrian Theory of the Business Cycle

The previous two sections provide a stark contrast between Austrian and Keynesian views. They show how an increase in saving can move the economy along its production possibilities frontier, allowing for an increase in the economy's rate of economic growth (the Austrian view), and how an increase in saving necessarily throws the economy off its frontier and into recession (the Keynesian view). Simply put, markets work in one view and don't work in the other.

For the Austrians, the idea that markets work is not axiomatic. There is no claim that markets are *always* guided only by the underlying economic realities—no matter what institutional arrangements are in place and no matter what macroeconomic policies are pursued. In fact, the Austrian theory of the business cycle is a theory about a policy-induced departure—first in one direction and then in the other—from the economy's production possibilities frontier.

For Keynes, increased saving leads to recession. This proposition, however, did not transform his paradox of thrift into an excess-saving theory of recessions. As already indicated, Keynes believed that saving preferences were not likely to change. The recession-inducing changes, in his view, were almost always spontaneous changes on the *demand* side of the loanable-funds market.

Keynes and Hayek were critical of one another's efforts to explain recessions, but their assessments of one another's books generated more heat than light and failed to produce a head-to-head comparison of the contrasting views. Despite all the interpreting, reinterpreting, and reconstructing of Keynesian ideas over the last three-quarters of a century, it is instructive to compare (in this and the following sections) the Austrian and (original) Keynesian views on the nature and causes of business cycles.

According to the Austrians, the market is capable of allocating resources in conformity with intertemporal preferences on the basis of a market-determined (natural) rate of interest. It follows, then, almost as a corollary that an interest rate substantially influenced by extra-market forces will lead to an intertemporal *mis*allocation of resources. This latter proposition is the essence of the Austrian theory of business cycles. The cyclical quality of the departures from the economy's production possibilities frontier derives from the self-correcting properties of a

market economy. Misallocations are followed by reallocations. Note that the market is not judged to be so efficient as to prevent from the outset all policy-induced misallocations. As Hayek (1945) has taught us, it cannot allocate resources in accordance with the "real factors" (consumer preferences, technological possibilities, and resource availabilities) except on the basis of information conveyed by market signals, including importantly the rate of interest. It is movements in the interest rate, along with the corresponding movements in input prices and output prices that give clues to the business community about what those real factors are and about how they may have changed.

The Austrian theory of the business cycle is a theory of boom and bust with special attention to the extra-market forces that initiate the boom and the market's own self-correcting forces that turn boom into bust. We have already seen that increased saving lowers the rate of interest and gives rise to a genuine boom, one in which no self-correction is called for. The economy simply grows at a more rapid rate. By contrast, a falsified interest rate that mimics the loan-market conditions of a genuine boom but is not accompanied by the requisite savings gives rise to an artificial boom, one whose artificiality is eventually revealed by the market's reaction to excessively future-oriented production activities in conditions of insufficient saving.

As with the graphical depiction of saving and growth, the analytics of boom and bust is begun with an assumed no-growth economy in an intertemporal equilibrium. The initial (market-determined) rate of interest (i_{eq} in Figure 9.10) also qualifies as the natural rate of interest. An artificial boom is initiated by the injection of new money through credit markets. The central bank adopts an interest-rate target below the rate of interest that otherwise would have prevailed. Its operational target rate, of course, is much more narrowly defined than the broadly conceived market rates shown in the diagram. The central bank achieves its interest-rate target by augmenting the supply of loanable funds with newly created credit. The Federal Reserve buys securities in sufficient volume so as to drive the federal funds rate down to the chosen target. With this action, market rates generally are brought down to a similar extent—although, of course, some more so than others. The fact that long-term rates tend not to fall as much as short-term rates may mitigate—but cannot eliminate—the general effects of the credit expansion. Further, these general effects are independent of which particular policy tool the Federal Reserve employs. Credit expansions brought about by a reduction in the discount rate (now called the primary credit rate) or by a reduction in reserve requirements could be similarly described. All of the institutionally distinct monetary tools are macroeconomically equivalent: They are all means of lending money into existence and hence have their initial effect on interest rates.

For comparison, the central bank's augmentation of credit depicted in Figure 9.10 is set to match the actual shift in the supply of saving depicted in Figure 9.8.

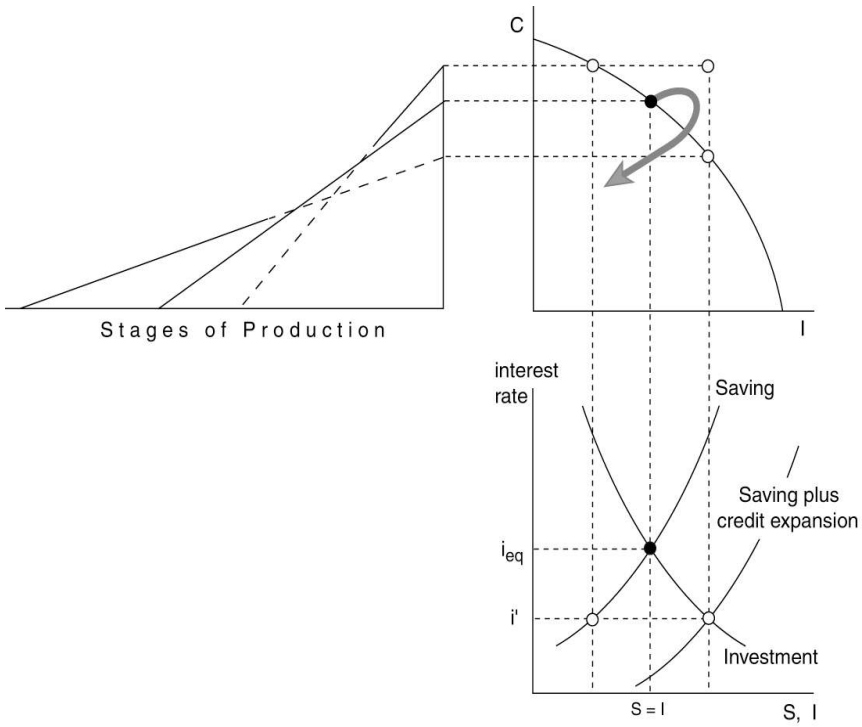


Figure 9.10 A policy-induced boom and bust

Rather than create a new equilibrium interest rate and a corresponding equality of saving and investment as was the case in a saving-induced expansion, the credit expansion creates a double disequilibrium at a sub-natural interest rate. Savers save less, while borrowers borrow more. Note that if this low interest rate were created by the imposition of an interest-rate ceiling, the situation would be different. With a legislated ceiling, borrowing would be saving-constrained. The horizontal distance at the ceiling rate between supply and demand would represent a frustrated demand for credit. A credit shortage would be immediately apparent and would persist as long as the credit ceiling was enforced.

Credit expansion papers over the credit shortage that would otherwise exist. The horizontal distance between supply (of saving) and demand (for credit) is not frustrated demand but rather demand accommodated by the central bank's injections of new credit. It represents borrowing—and hence investment—that is *not* accommodated by genuine saving. In the final analysis, of course, real investment cannot be in excess of real unconsumed output. To say that credit expansion papers

over the shortage is not to say that it eliminates the problem of a discrepancy between saving and investment. It only conceals the problem—and conceals it only temporarily. In summary terms we see that padding the supply of loanable funds with newly created money drives a wedge between saving and investment. The immediate effect of this padding is (1) no credit shortage, (2) an economic boom in which the (concealed) problem inherent is a mismatch between saving and investment festers, and (3) a bust, which is the eventual but inevitable resolution to the problem. (With this summary reckoning, however, we have gotten ahead of the story.)

The double disequilibrium in the loanable-funds market has as its counterpart the two limiting points on the production possibilities frontier. Saving less means consuming more. But with a falsified interest rate, consumers and investors are engaged in a tug-of-war. If, given the low rate or return on savings, the choices of consumers were to carry the day, the economy would move counterclockwise along the frontier to the consumers' limiting point. Similarly, if, with artificially cheap credit, the decisions of investors were to carry the day, the economy would move clockwise along the frontier to the investors' limiting point. Of course, neither set of participants in this tug-of-war is wholly victorious. But both consumer choices and investment decisions have their separate—and conflicting—real consequences. Graphically, the participants are pulling at right angles to one another—the consumers pulling upward in the direction of more consumption, the investors pulling rightward in the direction of more investment. Their combined effect is a movement of the economy beyond the frontier in the direction of a "virtual" disequilibrium point that is defined by the two limiting points.

Having defined the production possibilities frontier in terms of sustainable levels of output, we can allow for the economy to move beyond the frontier—but only on a temporary basis. People are drawn into the labor force in numbers that cannot be sustained indefinitely. Additional members of households may take a job because of the unusually favorable labor-market conditions. Some workers may work overtime. Others may delay retirement or forgo vacations. Maintenance routines that interrupt production activities may be postponed. These are the aspects of the boom that allow the economy to produce temporarily beyond the production possibilities frontier. However, the increasingly binding real resource constraints will keep the economy from actually reaching the virtual disequilibrium point—hence the "virtual" quality of that point. The general nature of the path traced out by the economy—its rotation in the clockwise direction—will become evident once we consider the corresponding changes in the economy's structure of production.

The wedge driven between saving and investment in the loanable-funds market and the tug-of-war that pulls the economy beyond its production possibility frontier manifests itself in the economy's capital structure as clashing triangles. In

the case of a saving-induced capital restructuring, the derived-demand effect and the time-discount effect work together to reallocate resources toward the earlier stages—a reallocation that is depicted by a change in the shape of the Hayekian triangle. In the case of credit expansion, the two effects work in opposition to one another. The time-discount effect, which is strongest in the early stages, attracts resources to long-term projects. Low interest rates stimulate the creation of durable capital goods, product development, and other activities whose ultimate payoff is in the distant future. The excessive allocations to long-term projects are called "malinvestment" in the Austrian literature. The derived-demand effect, which is strongest in the late stages, draws resources in the opposite direction so as to satisfy the increased demand for consumer goods. The Hayekian triangle is being pulled at both ends against the middle. Skousen (1990) identifies this same internal conflict in terms of an early stage "aggregate supply vector" and a late-stage "aggregate demand vector."

During the boom, resource allocations among the various stages are being affected in both absolute and relative terms. As explained above, the economy is producing generally at levels of output that cannot be sustained indefinitely. And at the same time that the overall output levels are higher, the pattern of output is skewed in both directions—toward the earliest stages and toward the latest stages. Middle stages experience a relative decline and some of them an absolute decline. While this characterization of the boom is gleaned from Hayek (1967 [1935] and Mises (1953 [1912] and 1966), there remain some fundamental doctrinal differences (both terminological and substantive) in the alternative expositions offered by these early developers of capital-based macroeconomics (Garrison, 2004).

Richard Strigl (2000 [1934]), writing without reference to the Hayekian triangle, provided an account of boom and bust consistent with the one offered here. In his account, production activities are divided into three broadly conceived categories: current production of consumables (late stage), capital maintenance (middle stage), and new ventures (early stage). Policy-induced boom conditions tend to favor current production and new ventures at the expense of capital maintenance. The economic atmosphere has a "make hay while the sun shines" quality about it, and the economy seems to be characterized by prosperity and rapid economic growth. However, the under-maintenance of existing capital (the sparse allocations to the middle stages) distinguishes the policy-induced boom from genuine, sustainable, saving-induced economic growth.

In time but before the new ventures (the early-stage activities) have come to full fruition, the under-maintained capital (the attenuated middle-stage outputs) must impinge negatively of consumable output. This is the essence of intertemporal discoordination. The relative or even absolute reduction of consumable output is dubbed "forced saving" in the Austrian literature. That is, the pattern of early-stage investment reflects a higher level of saving than was forthcoming on a voluntary

basis. The push beyond the production possibilities frontier towards the virtual disequilibrium point is cut short by the lack of genuine saving. The downward rotation of the economy's adjustment path in Figure 9.10 reflects the forced saving.

The forced saving is but one aspect—and not necessarily the first observed aspect—of the self-reversing process that is characteristic of an artificial boom. Increasingly binding resource constraints drive up the prices of consumables as well as the prices of inputs needed to support the new ventures. The rate of interest rises as overextended businesses bid for additional funding. Distress borrowing (not shown in Figure 9.10) is a feature of a faltering boom.

Many of the new ventures and early-stage activities generally are now recognized as unprofitable. Some are seen through to completion in order that losses are minimized. Others are liquidated. The beginning of the liquidation phase of the business cycle is depicted in Figure 9.10 by economy's adjustment path turning back towards the production possibilities frontier.

As boom turns to bust, much of the unemployment is associated with liquidations in the early stages of production. Too much capital and labor have been committed to new ventures. The liquidations release these factors of production, most of which can be reabsorbed—though, of course, not instantaneously—elsewhere in the structure of production. For the Austrians, this particular instance of *structural* unemployment is not something distinct from *cyclical* unemployment. Quite to the contrary, the cyclical unemployment that marks the beginning of the downturn has a characteristically structural quality about it.

Under the most favorable conditions, the bust could be followed by a recovery in which the structural maladjustments induced by the credit expansion are corrected by the ordinary market forces. The structurally unemployed resources are reabsorbed where they are most needed, and the economy returns to a point on its production possibilities frontier. But because of the economywide nature of the intertemporal disequilibrium, the negative income effect of the unemployment may initially propel the economy deeper into depression rather than back to the frontier. This secondary, or compounding, aspect of the downturn is likely to be all the more severe if the general operation of markets is countered by macroeconomic policies aimed at preventing liquidation and at reigniting the boom.

The following section puts the Austrian theory in perspective by using the capital-based analytics to depict the Keynesian view of economywide downturns. For Keynes, the negative income effect that can compound the problem of a discoordinated capital structure becomes the whole problem, the origins of which are shrouded in the cloud of uncertainty inherent in investment activities.

9.10 A Keynesian Downturn in the Austrian Framework

The level of aggregation that characterizes the Keynesian framework precludes any treatment of boom and bust as an instance of intertemporal discoordination. Structural changes in the economy as might be depicted by a change in the shape of the Hayekian triangle are no part of the analysis. The triangle can change only in size, increasing with economic growth (but, in light of the paradox of thrift, not with saving-induced growth) and decreasing with occasional lapses from full employment.

The interest rate plays no role in allocating resources among the stages of production and only a minor role in determining the overall level of investment. Hence, investment is treated as a simple aggregate—with the demand for investment funds taken to be unstable and highly interest inelastic. Further, to the extent that investment is self-financing, such that increased investment leads to increased income, which in turn leads to increased saving, the two curves (saving and investment) shift together and hence the particular interest-elasticity of investment is irrelevant.

Straightforwardly, the circular-flow equation (the equality of income and expenditure as an equilibrium condition) together with a simple consumption function implies a positively sloped, linear relationship between investment and consumption. Consider a wholly private economy in which income and expenditures are in balance:

$$Y = C + I. \tag{4}$$

Consumer behavior is described by the conventional linear consumption equation

$$C = c_0 + mpc\ Y, \tag{5}$$

where c_0 is the autonomous component of consumption spending and *mpc* is the marginal propensity to consume. Combining these two equations so as to eliminate the income variable gives us the relationship between consumption and investment for an economy in a circular-flow equilibrium.

$$C = c_0/mps + (mpc/mps)\ I, \tag{6}$$

where *mps*, of course, is simply the marginal propensity to save: *mps* = 1- *mpc*. This upward-sloping linear relationship was clearly recognized by Keynes (1937, pp. 220-21) and can be called the Keynesian demand constraint. There is an intuitive interpretation of it that follows straightforwardly from our understanding of the marginal propensity (*mpc*) and the investment multiplier (1/*mps*). Suppose the *mpc*

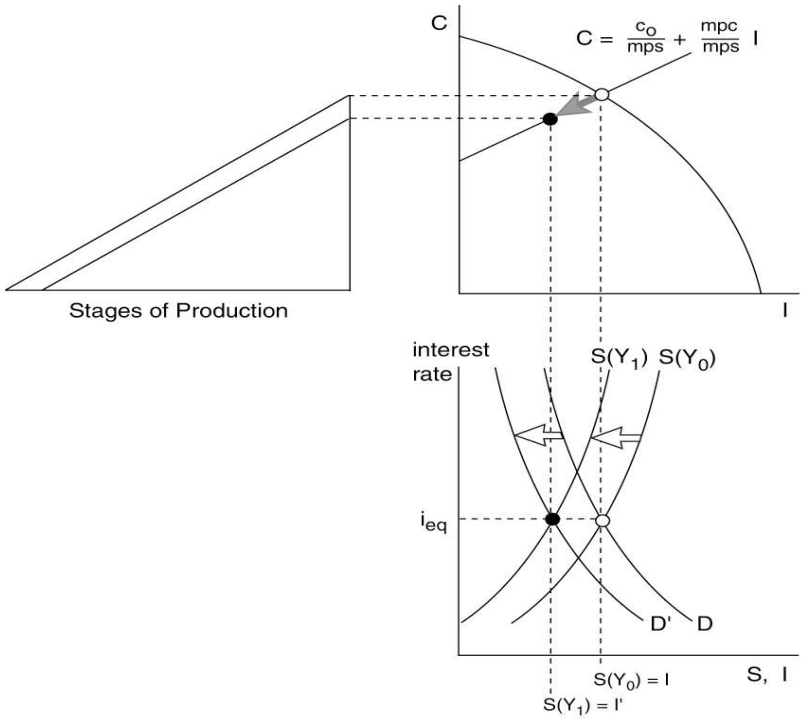


Figure 9.11 An investment-led collapse into recession

is 0.8, implying an *mps* of 0.2 and a multiplier of 5. An increase in investment spending of $100, then, would cause income to spiral up by $500, which would boost consumption spending by $400. This same result follows directly from the slope of the demand constraint (*mpc*/*mps* = 0.8/0.2 = 4): an increase in investment of $100 increases consumption by $400.

The Keynesian demand constraint appears in Figure 9.11, sharing axes with the production possibilities frontier. In Keynesian expositions, however, the downward-sloping supply constraint plays a very limited role. When the multiplier theory is put through its paces, the frontier serves only to mark the boundary between *real* changes in the spending magnitudes (*below* the frontier) and *nominal* changes in the spending magnitudes (*beyond* the frontier). Significantly, the economy is precluded by the demand constraint from moving *along* the frontier.

The constraint itself is as stable as the consumption function—as is clear from its sharing parameters with that function. Hence the point of intersection of the constraint and the frontier is the only possible point of full employment. (In the earlier Figure 9.9, which illustrates the paradox of thrift, the demand constraint

shifts downward, reflecting an increase in saving—and hence a decrease in the consumption function's intercept parameter c_0. It was precisely because of his belief that this parameter was *not* subject to change that Keynes was not particularly concerned about the implications of increased saving.) Finally, we can note that a more comprehensive rendering of the Keynesian relationships—one that takes into account the demand for money (i.e., liquidity) as it relates to the interest rate—would alter the demand constraint only in ways inessential to our current focus.

According to Keynes (1936, p. 315), economywide downturns characteristic of a market economy are initiated by sudden collapses in investment demand. The constitutional weakness on the demand side of the investment-good market reflects the fact that investments are always made with an eye to the future, a future that is shrouded in a cloud of uncertainty. Here, the notions of loss of business confidence, faltering optimism, and even waning "animal spirits" (Keynes, 1936, pp. 161-62) come into play. In Figure 9.11, the demand for investment funds collapses: It shifts leftward from D to D'. Reduced investment impinges on incomes and hence on consumption spending. Multiple rounds of decreased earning and spending pull the economy below the frontier. The reduced incomes also translate into reduced saving, as shown by a supply of loanable funds that shifts from S to S'. If the shift in supply just matches the shift in demand, the rate of interest is unaffected.

The solitary diagram that Keynes presented in his *General Theory* (p. 180) is constructed to make this very point. Abstracting from considerations of liquidity preference, Keynes tells us, the supply of loanable funds *will* shift to match the shift in investment demand. Further, an inelastic demand for investment ensures that even if the interest-sensitive demand for money allows for a reduction in the interest rate, the consequences of the leftward shift in investment demand will be little affected. More to the point of the present contrast between Keynesian and Austrian views, the economy's departure from the production possibility frontier and the leftward shifting of the supply of loanable funds are but two perspectives on the summary judgment made by Keynes. The market economy in his view is incapable of trading off consumption against investment in the face of a parametric change—in this case, an increased aversion to the uncertainties associated with investment activities. The economy cannot move along its production possibilities frontier.

The reduction in demands all around is depicted by a shrunken Hayekian triangle. With an unchanged rate of interest, there can be no time-discount effect. Hence, an untempered derived-demand effect reduces the triangle's size without changing its shape. But even if, following Keynes, we were to allow for a change in the rate of interest, the change would be in the wrong direction, compounding the economic collapse. A scramble for liquidity would *increase* the interest rate with consequences (not shown in Figure 9.11) of further reduced investment, further reduced incomes, further reduced consumption, and further reduced saving.

The Austrians would be on weak grounds if they were to deny even the possibility of a self-aggravating downward spiral. Markets are at their best in making marginal adjustments in the face of small or gradual parametric changes. A dramatic loss of confidence by the business community may well send the economy into a downward spiral. Axel Leijonhufvud (1981) discusses price and quantity movements relative to their equilibrium levels in terms of a "corridor." Price or quantity deviations from equilibrium that remain within the corridor are self-correcting; more dramatic deviations that take prices or quantities outside the corridor can be self-aggravating.

The Austrians are on firmer grounds to question the notion that such widespread losses of confidence are inherent in market economies and are to be attributed to psychological factors that rule the investment community. Business people's confidence may instead be shaken by economywide intertemporal discoordination, which itself is attributable to a prior credit expansion and its consequent falsification of interest rates. If this is the case, then Keynes's theory of the downturn is no more than an elaboration of the secondary contraction that was already a part of the Austrian theory of boom and bust.

9.11 Inflation and Deflation in the Austrian Theory

The Austrian theory of the business cycle is an account of the credit-induced, unsustainable boom. The "fundamental mechanisms" mentioned in Hayek's assessment of Keynesian constructions are the market forces (time discount and derived demand) that keep production plans aligned with intertemporal preferences and that can malfunction when the rate of interest is falsified by credit expansion. Artificial booms contain the seeds of their own undoing—hence their fundamental unsustainability.

The reader may well have noticed that the Austrian theory does not feature the general rise in prices and wages that may be experienced during a credit-induced boom. Neither price and wage inflation nor the potential misperceptions of the inflation rate are fundamental to the theory. The focus instead is on the misallocation of resources during the period of artificially cheap credit. Intertemporal discoordination can occur on an economywide basis, according the Austrians, even during a period of overall price-level stability. In fact, it is during just such periods that the conflict between producers and consumers are likely to be hidden until market conditions in the various stages of production eventually reveal the boom's unsustainability. The problem that festers during the boom is likely to go undetected, all the more so if macroeconomists—and financial markets—take an unchanging price level to the hallmark of macroeconomic health.

Showing the particulars of saving-induced growth (Figure 9.8) and of credit-induced booms (Figure 9.10) made use of the simplifying assumption that we begin

with a no-growth economy. In application, of course, we have to allow for some ongoing economic growth—and possibly for some fairly high real growth rate. In a rapidly growing economy, credit expansion may be seen by policymakers as simply "enabling" growth or possibly as "fostering" growth. The Austrians take a different view: Credit expansion fosters a little more growth than can be supported by real saving. The upward pressure on prices attributable to credit expansion may just offset the downward pressure on prices attributable to the underlying real growth. Thinking in terms of the equation of exchange, we can say that increases in M may just about match increases in Q, such that P remains fairly constant. While the monetarists would see this price-level stability as evidence of a successful and commendable application of the monetarist rule, the Austrians would see price-level constancy during a period of real economic growth as a warning sign. The monetary rule does not rule out credit-induced intertemporal discoordination.

The contrast here between monetarist and Austrian views sheds light on the issue of the respective theories' applicability. For the monetarists who rely on Phillips curve analysis (and for new classicists who set out a monetary misperception theory of the business cycle), booms that lead to busts must be characterized by inflation. The differential perceptions of inflation experienced by employers and employees (in the case of Phillips curve analysis) and the general misperceptions of inflation (in the case of new classical theory) have as a strict prerequisite that there actually be some inflation to perceive differentially or to misperceive. These theories, then, cannot apply to the boom and bust during the interwar period or to the more recent expansion of the 1990s. In these key cyclical episodes, the inflation rate was nil (in the former case) and very mild (in the latter). The inflation-dependent theories apply only to the less dramatic cyclical variations dating from the late 1960s and extending into the late 1980s. The ability of the Austrian theory to account for the downturns in 1929 and 2001 would seem to add to this theory's credibility.

The Austrian literature does contain much discussion about inflation. But in connection with business cycle theory, the strong long-run relationship between the quantity of money and the overall price level serves to answer a secondary question about the sustainability of the credit-induced boom. Once the artificial boom is underway, can the bust be avoided by further credit expansion? The Austrian answer is that there may be some scope for postponing the market correction—but only by worsening the root problem of intertemporal discoordination and hence increasing the severity of the eventual downturn. In the long run, credit is not a viable substitute for saving. Further, attempts to prolong the boom through continued increases in credit can fuel an asset bubble. (Think of the stock market orgy in the late 1920s and the "irrational exuberance" in the late 1990s.) And, ultimately, increasingly dramatic injections of credit can set off an accelerating inflation (hyperinflation) that robs money of its utility.

Deflation, like inflation, is a secondary issue in the Austrian literature. Growth-induced deflation, that is, the decline in some overall price index that accompanies increases in real output, is considered a non-problem. Price reductions occur wherever supply and demand conditions warrant. Here, the microeconomic forces that govern individual markets are fully in play.

Deflation caused by a severe monetary contraction is another matter. Strong downward pressures on prices in general put undue burdens on market mechanisms. Unless, implausibly, all prices and wages adjust instantaneously to the lower money supply, output levels will fall. Monetary contraction could be the root cause of a downturn—as, for instance, it seems to have been in the 1936-1937 episode in the US. The Federal Reserve, failing to understand the significance of the excess reserves held by commercial banks, dramatically increased reserve requirements, causing the money supply to plummet as banks rebuilt their cushion of free reserves. But what caused the money supply to fall at the end of the 1920s' boom? The monetarists attribute the monetary contraction to the inherent ineptness of the central bank or to the central bank's (ill-conceived?) attempt to end the speculative orgy in the stock market, an orgy that itself goes unexplained.

In the context of Austrian business cycle theory, the collapse in the money supply is a complicating factor rather than the root cause of the downturn. In 1929, when the economy was in the final throes of a credit-induced boom, the Federal Reserve, uncertain about just what to do and hampered by internal conflict, allowed the money supply to collapse. The negative monetary growth during the period 1929 to 1933 helps to account for the unprecedented depth of the depression. But like Keynes's focus on the loss of business confidence, the monetarists' focus on the collapse of the money supply diverts attention from the underlying maladjustments in the economy that preceded—and necessitated—the downturn.

9.12 Policy and Reform

The political attractiveness of the policy prescriptions based on the Keynesian theory (spending programs, tax cuts, deficit finance, and monetary expansion) and the absence of a comparable list of politically attractive policy prescriptions associated with the Austrian theory go a long way in accounting for the decisive victory in the 1930s of Keynesianism over Austrianism. Over the following decades, however, the cumulative effects of the excesses of Keynesian policy (debt monetization and double-digit inflation) eventually caused monetarism to be seen as the more responsible alternative. Endorsing monetarism—though not actually institutionalizing the monetary rule—became politically viable

Although credit expansion was curtailed in the 1980s, there was never a sustained period of steady monetary growth at a pre-announced low rate. Further, monetary reforms enacted in that same period blurred the distinction between

money and other highly liquid assets, making the implementation of the monetary rule all but impossible. The very definition of money became problematic, and the once-stable demand for money (as tracked by "velocity" in the equation of exchange) itself became unstable. By default, the Federal Reserve reverted to managing interest rates, expanding credit to whatever extent was necessary to achieve its chosen target rate. With a pro-active central bank dominating credit markets, the natural rate of interest is a strictly non-observable rate, but to the extent that the central bank is sensitive to political considerations, the managed rate is more often than not below the natural rate.

The Austrians' policy advice to the central bank consists of prevention rather than cure: Do not engage in credit expansion—not even if ongoing economic growth is causing some index of output prices to fall. Abiding by this imperative is not only politically difficult but also technically difficult—because the central bank cannot know what the natural rate of interest is and how it might be changing. The difficulties (both political and technical) of the central bank's avoiding a credit-induced boom suggest that what is needed is fundamental reform rather than policy prescription. Late in his career, Hayek recommended the *Denationalization of Money* (1976). Subsequent writings by contemporary Austrians—Lawrence H. White (1989) and George Selgin (1988)—have made the case that a thoroughly decentralized banking system, one in which the market rate of interest is an unbiased approximation of the natural rate, may be the ultimate solution to the problem of boom and bust.

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