

Chapter 5: Behavioral Foundations: theories of consumption

5.1 The Keynesian consumption Function

Keynes made the consumption function central to his theory of economic fluctuations and it has played a key role in macroeconomic analysis ever since. Let's consider what Keynes thought about the consumption function, and then see what puzzles arose when his ideas were confronted with the data.

Keynes's Conjectures

Today, economists who study consumption rely on sophisticated techniques of data analysis. With the help of computers; they analyze aggregate data on the behavior of the overall economy from the national income accounts and detailed data on the behavior of individual households from surveys. Because Keynes wrote in the 1930s, however, he had neither the advantage of these data nor the computers necessary to analyze such large data sets. Instead of relying on statistical analysis, Keynes made conjectures about the consumption function based on introspection and casual observation.

First, Keynes conjectured that the marginal propensity to consume, the amount consumed out of an additional income, is between zero and one. He wrote that men increase their consumption as their income increases, but not by as much as the increase in their income. 'That is, when a person earns an extra birr, he typically spends some of it and saves some of it.

Second, Keynes posited that the ratio of consumption to income, called the average propensity to consume, falls as income rises. He believed that saving was a luxury, so he expected the rich to save a higher proportion of their income than the poor. Although not essential for Keynes's own analysis, the postulate that the average propensity to consume falls as income rises became a central part of early Keynesian economics.

Third, Keynes thought that income is the primary determinant of consumption and that the interest rate does not have an important role. This conjecture stood in stark contrast to the beliefs of the classical economists who preceded him. The classical economists held that a higher interest rate encourages saving and discourages consumption. Keynes admitted that the interest rate could influence consumption as a matter of theory. Yet, he wrote that the short-period influence of the rate of interest on individual spending out of a given income is secondary and relatively unimportant."

On the basis of these three conjectures, the Keynesian consumption function is often written as

$$C = C_a + cY, \quad C_a > 0, \quad 0 < c < 1,$$

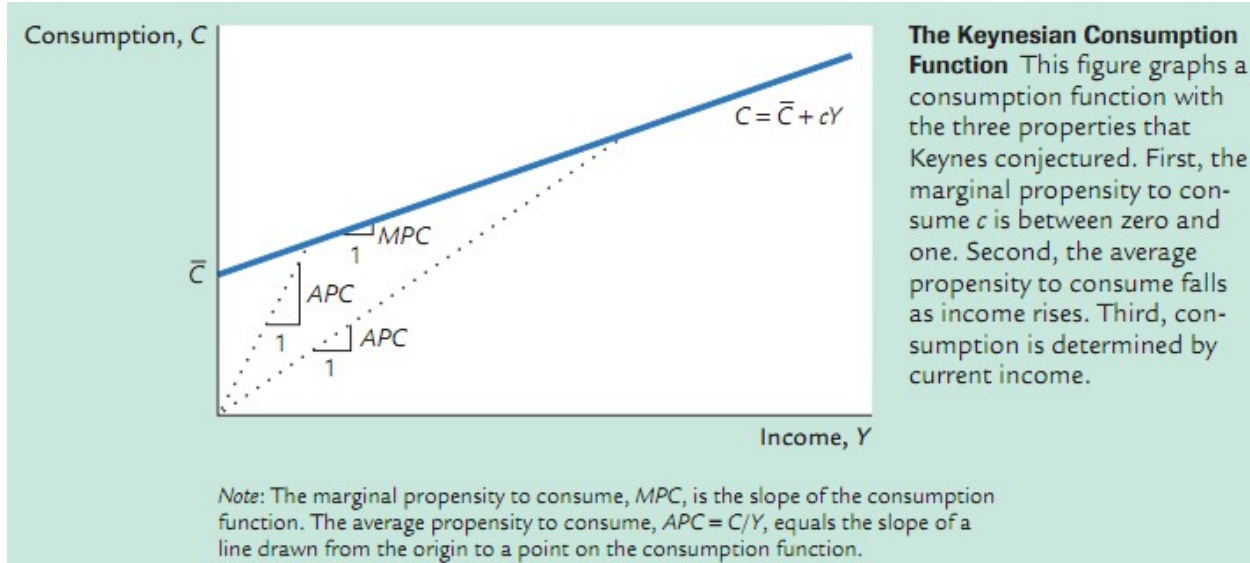
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Where C is consumption, Y is disposable income, C_a is autonomous consumption which is constant, and c is the marginal propensity to consume.

Note: This consumption function exhibits the three properties that Keynes posited. It satisfies Keynes's first property because the marginal propensity to consume c is between zero and one so that higher income leads to higher consumption and also to higher saving. This consumption function satisfies Keynes's second property because the average propensity to consume APC is

$$APC = C/Y = C_a/Y + c.$$

As Y rises, C_a/Y falls, and so the average propensity to consume C/Y falls. And finally, this consumption function satisfies Keynes's third property because the interest rate is not included in this equation as a determinant of consumption.



5.2 The early empirical successes

Soon after Keynes proposed the consumption function, economists began collecting and examining data to test his conjectures. The earliest studies indicated that the Keynesian consumption function is a good approximation of how consumers behave.

In some of these studies, researchers surveyed households and collected data on consumption and income. They found that households with higher income consumed more, which confirms that the marginal propensity to consume is greater than zero. They also found that households with higher income saved more, which confirms that the marginal propensity to consume is less than one.

In addition, these researchers found that higher-income households saved a larger fraction of their income, which confirms that, the average

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propensity to consume falls as income rises. Thus, these data verified Keynes's conjectures about the marginal and average propensities to consume.

In other studies, researchers examined aggregate data on consumption and income for the period between the two world wars. These data also supported the Keynesian consumption function. In years when income was unusually low, such as during the depths of the Great Depression, both consumption and saving were low, indicating that the marginal propensity to consume is between zero and one.

In addition, during those years of low income, the ratio of consumption to income was high, confirming Keynes's second conjecture. Finally, because the correlation between income and consumption was so strong, no other variable appeared to be important for explaining consumption. Thus, the data also confirmed Keynes's third conjecture that income is the primary determinant of how much people choose to consume.

5.3 secular Stagnation, Simon Kuznets and the consumption puzzle

Although the Keynesian consumption function met with early successes, two anomalies soon arose. Both concern Keynes's conjecture that the average propensity to consume falls as income rises.

The first anomaly became apparent after some economists made a dire and, it turned out, erroneous prediction during World War II. On the basis of the Keynesian consumption function, these economists reasoned that as incomes in the economy grew over time, households would consume a smaller and smaller fraction of their incomes. They feared that there might not be enough profitable investment projects to absorb all this saving. If so, the low consumption would lead to an inadequate demand for goods and services, resulting in a depression once the wartime demand from the government ceased. In other words, on the basis of the Keynesian consumption function, these economists predicted that the economy would experience what they called **secular stagnation**, a long depression of indefinite duration unless fiscal policy was used to expand aggregate demand.

Fortunately for the economy, but unfortunately for the Keynesian consumption function, the end of World War II did not throw the country into another depression. Although incomes were much higher after the war than before, these higher incomes did not lead to large increases in the rate of saving. Keynes's conjecture that the average propensity to consume would fall as income rose appeared not to hold.

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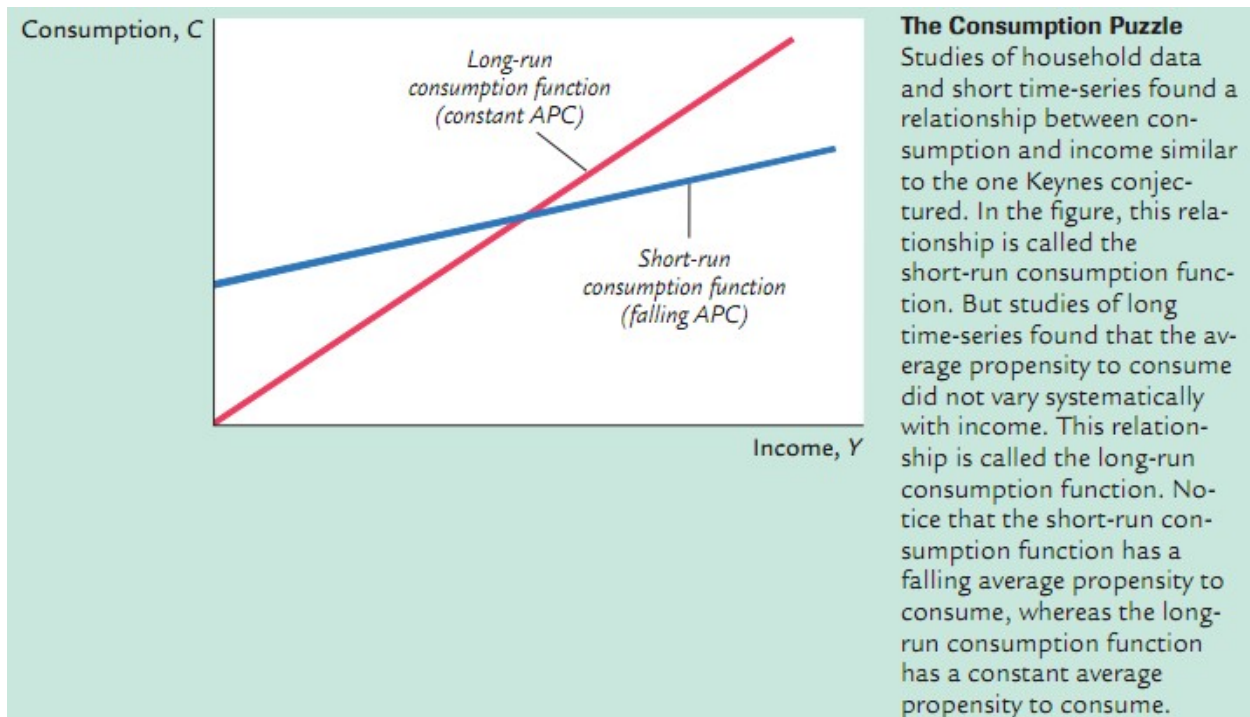
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The second anomaly arose when economist **Simon Kuznets** constructed new aggregate data on consumption and income dating back to 1869. Kuznets assembled these data in the 1940s and would later receive the Nobel Prize for this work. He discovered that the ratio of consumption to income was remarkably stable from decade to decade, despite large increases in income over the period he studied.

Again, Keynes's conjecture that the average propensity to consume would fall as income rose appeared not to hold. The failure of the secular-stagnation hypothesis and the findings of Kuznets both indicated that the average propensity to consume is fairly constant over long periods of time. This fact presented a **consumption puzzle** that motivated much of the subsequent work on consumption. Economists wanted to know why some studies confirmed Keynes's conjectures and others refuted them. That is, why did Keynes's conjectures hold up well in the studies of household data and in the studies of short time-series, but fail when long time-series were examined? (See the figure below). The evidence suggested that there were two consumption functions. For the household data or for the short time-series, the Keynesian consumption function appeared to work well. Yet for the long time series, the consumption function appeared to have a constant average propensity to consume.

Economists needed to explain how these two consumption functions could be consistent with each other. In the 1950s, Franco Modigliani and Milton Friedman each proposed explanations of these seemingly contradictory findings. Both economists later won Nobel Prizes, in part because of their work on consumption. But before we see how Modigliani and Friedman tried to solve the consumption puzzle, we must discuss Irving Fisher's contribution to consumption theory. Both Modigliani's life-cycle hypothesis and Friedman's permanent-income hypothesis rely on the theory of consumer behavior proposed much earlier by Irving Fisher.

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5.4 Irvin Fischer's Model

The consumption function introduced by Keynes relates current consumption to current income. This relationship, however, is incomplete at best. When people decide how much to consume and how much to save, they consider both the present and the future. The more consumption they enjoy today, the less they will be able to enjoy tomorrow. In making this tradeoff, households must look ahead to the income they expect to receive in the future and to the consumption of goods and services they hope to be able to afford.

The economist Irving Fisher developed the model with which economists analyze how rational, forward-looking consumers make intertemporal choices that is, choices involving different periods of time. Fisher's model illuminates the constraints consumers face, the preferences they have, and how these constraints and preferences together determine their choices about consumption and saving.

The Intertemporal Budget Constraint

Most people would prefer to increase the quantity or quality of the goods and services they consume; to wear nicer clothes, eat at better restaurants, or see more movies. The reason people consume less than they desire is that their consumption is constrained by their income. In other words, consumers face a limit on how much they can spend, called a budget constraint. When they are deciding how much to consume today versus how much to save for the future, they face an **intertemporal** budget constraint,

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which measures the total resources available for consumption today and in the future. Our first step in developing Fisher's model is to examine this constraint in some detail.

To keep things simple, we examine the decision facing a consumer who lives for two periods. Period one represents the consumer's youth and period two represents the consumer's old age. The consumer earns income Y_1 and consumes C_1 in period one, and earns income Y_2 and consumes C_2 in period two. (All variables are real, i.e. adjusted for inflation.) Because the consumer has the opportunity to borrow and save, consumption in any single period can be either greater or less than income in that period. Consider how the consumer's income in the two periods constrains consumption in the two periods. In the first period, saving equals income minus consumption. That is

$$S = Y_1 - C_1$$

Where S is saving. In the second period, consumption equals the accumulated saving, including the interest earned on that saving, plus second-period income.

$$\text{That is, } C_2 = (1 + r) S + Y_2$$

Where r is the real interest rate. For example, if the interest rate is 5 percent, then for every 1 birr of saving in period one, the consumer enjoys an extra birr 1.05 of consumption in period two. Because there is no third period, the consumer does not save in the second period.

Note that the variable S can represent either saving or borrowing and that these equations hold in both cases. If first-period consumption is less than first period income, the consumer is saving, and S is greater than zero. If first-period consumption exceeds first-period income, the consumer is borrowing, and S is less than zero. For simplicity, we assume that the interest rate for borrowing is the same as the interest rate for saving.

To derive the consumer's budget constraint, combine the two preceding equations. Substitute the first equation for S into the second equation to obtain

$$C_2 = (1 + r) (Y_1 - C_1) +$$

$Y_2.$

To make the equation easier to interpret, we must rearrange terms. To place all the consumption terms together, bring $(1 + r)C_1$ from the right-hand side to the left-hand side of the equation to obtain $(1 + r) C_1 + C_2 = (1 + r)Y_1 + Y_2.$

Now divide both sides by $1 + r$ to obtain

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$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

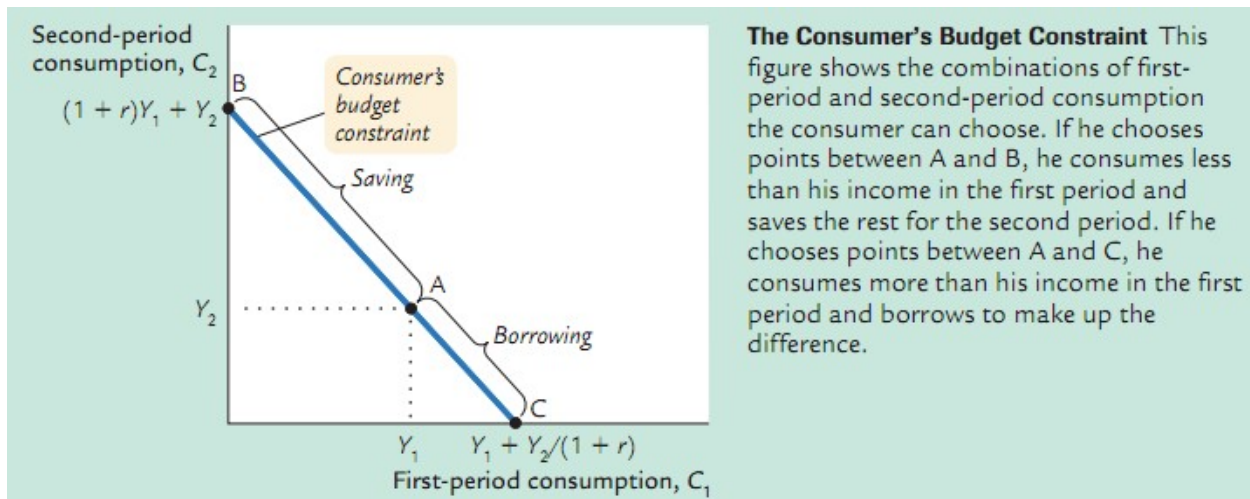
This equation relates consumption in the two periods to income in the two periods. It is the standard way of expressing the consumer's intertemporal budget constraint.

The consumer's budget constraint is easily interpreted. If the interest rate is zero, the budget constraint shows that total consumption in the two periods equals total income in the two periods. In the usual case in which the interest rate is greater than zero, future consumption and future income are discounted by a factor $1 + r$. This discounting arises from the interest earned on savings. In essence, because the consumer earns interest on current income that is saved, future income is worth less than current income. Similarly, because future consumption is paid for out of savings that have earned interest, future consumption costs less than current consumption. The factor $1/(1 + r)$ is the price of second period consumption measured in terms of first-period consumption: it is the amount of first-period consumption that the consumer must forgo to obtain 1 unit of second-period consumption.

The following figure shows the consumer's budget constraint. Three points are marked on this figure. At point A, the consumer consumes exactly his income in each period ($C_1=Y_1$ and $C_2=Y_2$), so there is neither saving nor borrowing between the two periods. At point B, the consumer consumes nothing in the first period ($C_1 = 0$) and saves all income, so second-period consumption C is $(1 + r) Y_1 + Y_2$.

At point C, the consumer plans to consume nothing in the second period ($C_2 = 0$) and borrows as much as possible against second-period income, so first-period consumption C is $Y_1 + Y_2 / (1 + r)$. Of course, these are only three of the many combinations of first and second-period consumption that the consumer can afford: all the points on the line from B to C are available to the consumer.

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5.5 Modigliani's Life cycle Hypothesis model

In a series of papers written in the 1950s, Franco Modigliani and his collaborators Albert Ando and Richard Brumberg used Fisher's model of consumer behavior to study the consumption function. One of their goals was to solve the consumption puzzle. i.e, to explain the apparently conflicting pieces of evidence that came to light when Keynes's consumption function was brought to the data. According to Fisher's model, consumption depends on a person's lifetime income. Modigliani emphasized that income varies systematically over people's lives and that saving allows consumers to move income from those times in life when income is high to those times when it is low. This interpretation of consumer behavior formed the basis for his life-cycle hypothesis.

The Hypothesis

One important reason that income varies over a person's life is retirement. Most people plan to stop working at about age 65, and they expect their incomes to fall when they retire. Yet they do not want a large drop in their standard of living, as measured by their consumption. To maintain consumption after retirement, people must save during their working years. Let's see what this motive for saving implies for the consumption function. Consider a consumer who expects to live another T years, has wealth of W , and expects to earn income Y until she retires R years from now. What level of consumption will the consumer choose if she wishes to maintain a smooth level of consumption over her life?

The consumer's lifetime resources are composed of initial wealth W and life time earnings of $R \times Y$. (For simplicity, we are assuming an interest rate of zero; if the interest rate were greater than zero, we would need to take account of interest earned on savings as well.) The consumer can divide up her lifetime resources among her T remaining years of life. We assume that

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she wishes to achieve the smoothest possible path of consumption over her lifetime. Therefore, she divides this total of $W + RY$ equally among the T years and each year consumes

$$C = (W + RY)/T.$$

We can write this person's consumption function as

$$C = (1/T)W + (R/T)Y.$$

For example, if the consumer expects to live for 50 more years and work for 30 of them, then $T = 50$ and $R = 30$, so her consumption function is $C = 0.02W + 0.6Y$.

This equation says that consumption depends on both income and wealth. An extra \$1 of income per year raises consumption by \$0.60 per year, and an extra \$1 of wealth raises consumption by \$0.02 per year.

If every individual in the economy plans consumption like this, then the aggregate consumption function is much the same as the individual one. In particular, aggregate consumption depends on both wealth and income. That is, the economy's consumption function is

$$C = aW + bY,$$

Where the parameter a is the marginal propensity to consume out of wealth, and the parameter b is the marginal propensity to consume out of income.

Implications

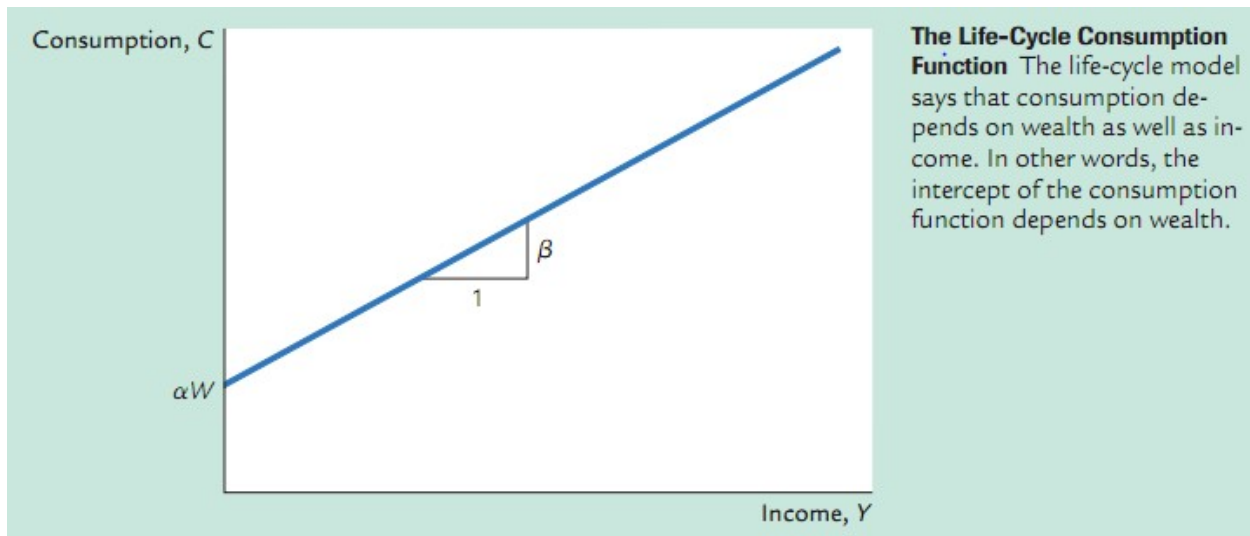
The graph below shows the relationship between consumption and income predicted by the life-cycle model. For any given level of wealth W , the model yields a conventional consumption function similar to the one shown in figure below. Notice, however, that the intercept of the consumption function, which shows what would happen to consumption if income ever fell to zero, is not a fixed value, as it is in the figure below. Instead, the intercept here is aW and, thus, depends on the level of wealth.

This life-cycle model of consumer behavior can solve the consumption puzzle. According to the life-cycle consumption function, the average propensity to consume is

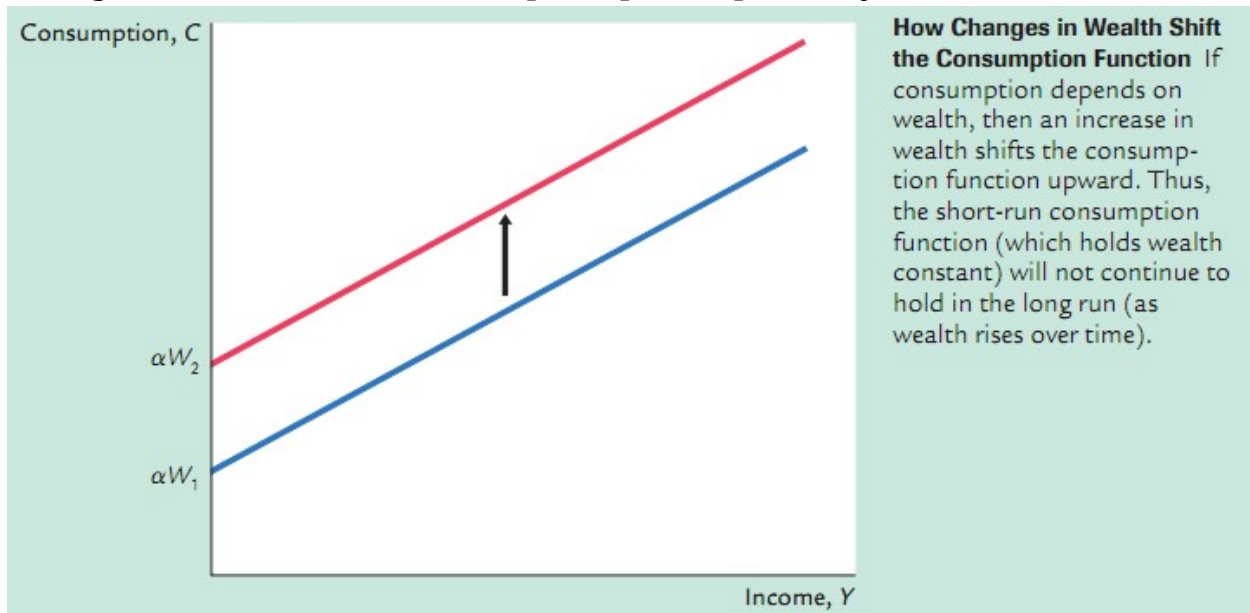
$$C/Y = a(W/Y) + b.$$

Because wealth does not vary proportionately with income from person to person or from year to year, we should find that high income corresponds to a low average propensity to consume when looking at data across individuals or over short periods of time. But, over long periods of time, wealth and income grow together, resulting in a constant ratio W/Y and thus a constant average propensity to consume.

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To make the same point somewhat differently, consider how the consumption function changes over time. As the above figure shows, for any given level of wealth, the life-cycle consumption function looks like the one Keynes suggested. But this function holds only in the short run when wealth is constant. In the long run, as wealth increases, the consumption function shifts upward, as in Figure below. This upward shift prevents the average propensity to consume from falling as income increases. In this way, Modigliani resolved the consumption puzzle posed by Simon Kuznets's data.

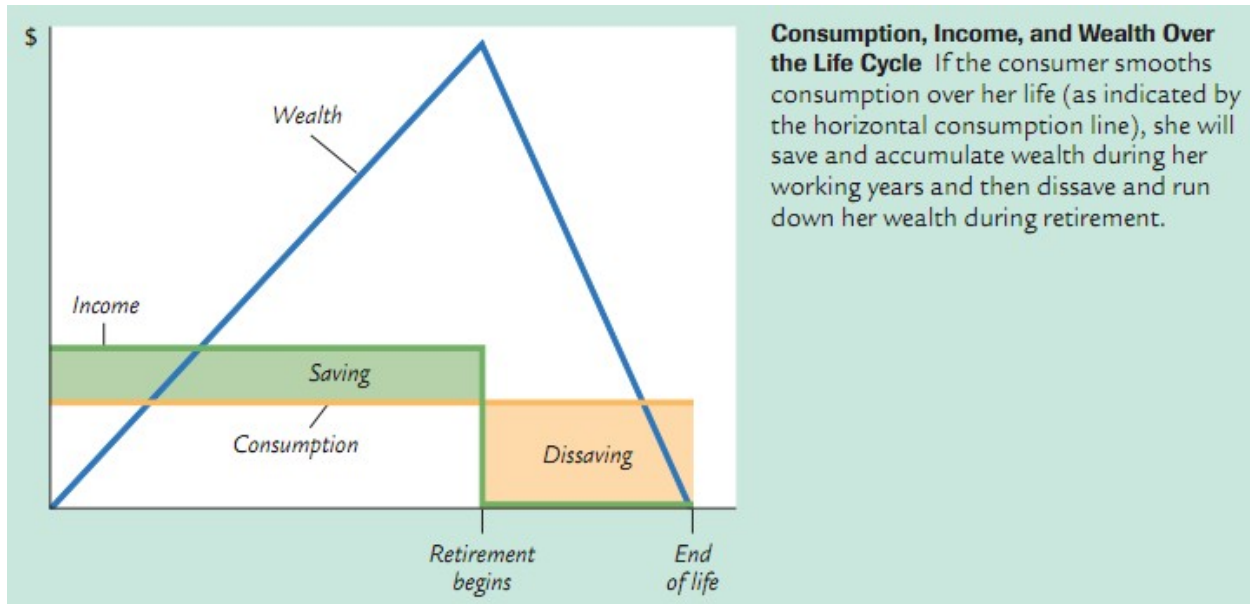


The life-cycle model makes many other predictions as well. Most important, it predicts that saving varies over a person's lifetime. If a person begins adulthood with no wealth, she will accumulate wealth during her working years and then run down her wealth during her retirement years. The figure

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below illustrates the consumer's income, consumption, and wealth over her adult life.

According to the life-cycle hypothesis, because people want to smooth consumption over their lives, the young who are working save, while the old who are retired dissave.



5.6 **Friedman's permanent income Hypothesis**

In a book published in 1957, Milton Friedman proposed the permanent income hypothesis to explain consumer behavior. Friedman's permanent income hypothesis complements Modigliani's life-cycle hypothesis: both use Irving Fisher's theory of the consumer to argue that consumption should not depend on current income alone. But unlike the life-cycle hypothesis, which emphasizes that income follows a regular pattern over a person's lifetime, the permanent-income hypothesis emphasizes that people experience random and temporary changes in their incomes from year to year.

The Hypothesis

Friedman suggested that we view current income Y as the sum of two components, permanent income Y^P and transitory income Y^T . That is,

$$Y = Y^P + Y^T.$$

Permanent income is the part of income that people expect to persist into the future. Transitory income is the part of income that people do not expect to persist. Put differently, permanent income is average income, and transitory income is the random deviation from that average.

To see how we might separate income into these two parts, consider these examples:

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Maria, who has a law degree, earned more this year than John, who is a high-school dropout. Maria's higher income resulted from higher permanent income, because her education will continue to provide her a higher salary. Sue, a Hawassa orange grower, earned less than usual this year because a freeze destroyed her crop.

Bill, a Bahir Dar orange grower, earned more than usual because the freeze in Bahir Dar drove up the price of oranges.

Bill's higher income resulted from higher transitory income, because he is no more likely than Sue to have good weather next year.

These examples show that different forms of income have different degrees of persistence. A good education provides a permanently higher income, whereas good weather provides only transitorily higher income. Although one can imagine intermediate cases, it is useful to keep things simple by supposing that there are only two kinds of income: permanent and transitory.

Friedman reasoned that consumption should depend primarily on permanent income, because consumers use saving and borrowing to smooth consumption in response to transitory changes in income. For example, if a person received a permanent raise of \$10,000 per year, his consumption would rise by about as much. Yet if a person won \$10,000 in a lottery, he would not consume it all in one year. Instead, he would spread the extra consumption over the rest of his life. Assuming an interest rate of zero and a remaining life span of 50 years, consumption would rise by only \$200 per year in response to the \$10,000 prize.

Thus, consumers spend their permanent income, but they save rather than spend most of their transitory income.

Friedman concluded that we should view the consumption function as approximately

$$C = aY^p,$$

where a is a constant that measures the fraction of permanent income consumed. The permanent-income hypothesis, as expressed by this equation, states that consumption is proportional to permanent income.

Implications

The permanent-income hypothesis solves the consumption puzzle by suggesting that the standard Keynesian consumption function uses the wrong variable.

According to the permanent-income hypothesis, consumption depends on permanent income; yet many studies of the consumption function try to relate consumption to current income. Friedman argued that this errors-in-variables problem explains the seemingly contradictory findings.

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Let's see what Friedman's hypothesis implies for the average propensity to consume. Divide both sides of his consumption function by Y to obtain

$$APC = C/Y = aY^P/Y.$$

According to the permanent-income hypothesis, the average propensity to consume depends on the ratio of permanent income to current income.

When current income temporarily rises above permanent income, the average propensity to consume temporarily falls; when current income temporarily falls below permanent income, the average propensity to consume temporarily rises.

Now consider the studies of household data. Friedman reasoned that these data reflect a combination of permanent and transitory income. Households with high permanent income have proportionately higher consumption. If all variation in current income came from the permanent component, the average propensity to consume would be the same in all households. But some of the variation in income comes from the transitory component, and households with high transitory income do not have higher consumption. Therefore, researchers find that high-income households have, on average, lower average propensities to consume.

Similarly, consider the studies of time-series data. Friedman reasoned that year-to-year fluctuations in income are dominated by transitory income.

Therefore, years of high income should be years of low average propensities to consume. But over long periods of time say, from decade to decade the variation in income comes from the permanent component. Hence, in long time-series, one should observe a constant average propensity to consume, as in fact Kuznets found.

5.7 Hall's Random Walk model

The permanent-income hypothesis is based on Fisher's model of intertemporal choice. It builds on the idea that forward-looking consumers base their consumption decisions not only on their current income but also on the income they expect to receive in the future. Thus, the permanent-income hypothesis highlights that consumption depends on people's expectations.

Recent research on consumption has combined this view of the consumer with the assumption of rational expectations. The rational-expectations assumption states that people use all available information to make optimal forecasts about the future. It is the expectation formation process in which optimal (rational and efficient) use is made of all available and relevant information that eventually eliminates systematic forecasting errors. This then makes expectations correct and equivalent to the prediction of the relevant theory. This assumption can have profound implications for the

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costs of stopping inflation. It can also have profound implications for the study of consumer behavior.

The Hypothesis

The economist Robert Hall was the first to derive the implications of rational expectations for consumption. He showed that if the permanent-income hypothesis is correct and if consumers have rational expectations, then changes in consumption over time should be unpredictable. When changes in a variable are unpredictable, the variable is said to follow a random walk. According to Hall, the combination of the permanent-income hypothesis and rational expectations implies that consumption follows a random walk.

Hall reasoned as follows. According to the permanent-income hypothesis, consumers face fluctuating income and try their best to smooth their consumption over time. At any moment, consumers choose consumption based on their current expectations of their lifetime incomes. Over time, they change their consumption because they receive news that causes them to revise their expectations. For example, a person getting an unexpected promotion increases consumption, whereas a person getting an unexpected demotion decreases consumption. In other words, changes in consumption reflect “surprises” about life time income. If consumers are optimally using all available information, then they should be surprised only by events that were entirely unpredictable. Therefore, changes in their consumption should be unpredictable as well.

Implications

The rational-expectations approach to consumption has implications not only for forecasting but also for the analysis of economic policies. If consumers obey the permanent-income hypothesis and have rational expectations, then only unexpected policy changes influence consumption. These policy changes take effect when they change expectations. For example, suppose that today Congress passes a tax increase to be effective next year. In this case, consumers receive the news about their lifetime incomes when Congress passes the law (or even earlier if the law’s passage was predictable). The arrival of this news causes consumers to revise their expectations and reduce their consumption. The following year, when the tax hike goes into effect, consumption is unchanged because no news has arrived.

Hence, if consumers have rational expectations, policymakers influence the economy not only through their actions but also through the public’s expectation of their actions. Expectations, however, cannot be observed

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directly. Therefore, it is often hard to know how and when changes in fiscal policy alter aggregate demand.

- **Adaptive expectations**

Adaptive expectations is a hypothesized process by which people form their expectations about what will happen in the future based on what has happened in the past. For example, if inflation has been higher than expected in the past, people would revise expectations for the future. It is the way of forming expectations in which the future value of the variable of interest is solely dependent on its past values i.e. in our case consumption.

The value of expected variable can be expectational error plus current observation. Hence, the adaptive expectation hypothesis is progressive expectation or error learning hypothesis.

Agents are arbitrarily supposed to ignore sources of information which, otherwise, would affect their expectations. For example, government announcements are such sources: agents are expected to modify their expectations and break with the former trends when changes in economic policy necessitate it. This is the reason why the theory of adaptive expectations is often regarded as a deviation from the rational tradition of economics.

- **Naïve expectations:**

There are no predictable expectations about the future.

A very complicated economic model that is likely to be highly inaccurate.

Naive models are sometimes created intentionally in academics to demonstrate the idea that complex models are not necessarily predictive.

Sometimes, however, they are used to clarify thinking, even if their results are inaccurate.