



Time value of money

What is the time value of money and why is it so important in investing?



What is the time value of money?

The time value of money is the degree to which cash available today is worth more than the identical sum at some point in the future, due to its potential for growth. Interest rates are a key quantitative representation of the time value of money. When investing in bonds, for example, the interest increases the value of deposited cash over time if left reinvested.

That said, low-risk bonds cannot always provide an investor with the required return expected on their investment from the appreciation of assets over time, due to various risk factors inherent in interest rates, like inflation.

How do interest rates protect against risk?

There are two types of risk-free interest rates – real and nominal, which discount the effects of risk on interest.

Nominal risk-free interest rates are a hypothetical rate of return on an investment that represents an interest rate in an economy without inflation, possibly a zero-risk economy.

Using nominal risk-free interest rates as a base, then adding inflation, creates a real risk-free interest rate, encompassing potential risks originating from changes in a national economy. In this case, inflation represents the risk of a changing national economy independent of the bond risk itself.

Nominal risk-free interest rates are devalued by rising inflation, and mainly capture the risks produced by a national economy.

A three-month US Treasury bill (T-bill), for example, is backed by the US government, which has never defaulted on its debt obligations, meaning real risk-free interest rates and inflation expectations are the main variables likely to affect expected rates of return.

In recessionary environments, and at times when recessions are anticipated, the demand for risk-free assets may increase (pushing up the price and reducing their

effective yield) as the security of returns they provide becomes more highly valued.

The assets themselves can also directly affect the interest rate on an investment, reflected in the time to maturity (duration), liquidity and default risks of that bond.

How can these three different risks influence interest rates?

Maturity, liquidity and default risks are important to investors, particularly if they hold corporate bonds or emerging market debt, for example. These risks affect the likelihood of returning the principal and the additional rate of return on an investment required to compensate investors for taking on the specific risk.

Maturity refers to the length of an investment. Under normal circumstances, longer-term investments carry a greater premium. In contrast, the shorter time period of a short-term bond means it is less likely to default than its long-term counterpart, making long-term bonds less attractive to investors.

Offering a premium on interest rates for long-term bonds makes an unattractive asset more enticing (unless expectations for the future are considerably more uncertain than in the short term, which can result in a so-called inverted yield curve).

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‘A current topic of contention is the association of an inverted yield curve (shorter-term debt has a higher yield than longer-term debt) with period of recession. Historical correlations are reasonable, but no time in the market is exactly the same as a previous pre-recessionary period, so the recent inverted yield curve in the US may not be a harbinger of recession.’

Andy Smith, health care analyst

Liquidity risk reflects how easy it is for an investor to withdraw cash from an investment at fair value (the value of the investment's assets and liabilities), at a time of their choosing.

Default risk refers to the potential for a promised return on investment not being realised. Including default risk into the expected rate of return of an investment compensates investors by offering greater returns for a higher risk of default.

In our example, bonds traded by small issuers trade infrequently. The result is that the interest rates of a small issuer's bond commonly have a liquidity premium, returning more money over time to repay a risky investment that is difficult to divest if returns fail to meet expectations.

Investors may forego an investment if the perceived level of risk is too high compared to the premiums placed on interest rates to account for this risk, although each investor will have a different risk appetite. However, foregoing the opportunity to increase the time value of money can result in an opportunity cost.

What is an opportunity cost?

Investors have two options – spend cash today or save it. Generally speaking, when investing in the future rather than today, investors lose the opportunity to benefit from an investment's compound interest. For example, investing £900 with an 11.1% yearly interest rate equates to £1,000 after the first year and £1,111 at the end of the second, as this is an 11.1% increase on £1,000 rather than £900.

By choosing not to invest in the first year, an investor loses the opportunity of the 11.1% interest on the additional £100 made in the first period. So, the cost of that lost opportunity is an important factor when considering whether to invest or hold back. Any investment that competes for an investor's capital will have to at least beat this opportunity cost (or return) to attract investment, although a higher return will almost always come with a higher risk.

That said, when the risk of interest rate volatility is high due to default, liquidity, maturity and inflationary risks, there is an opportunity cost in investing rather than saving. An investment that defaults, for example, leads to more money going out than coming in.

How is the time value of money used in DCF valuations?

Discounted cash flow (DCF) is a widely used valuation method, signifying the importance of the time value of money concept.

Analysts use interest rates and other premia to discount future cash flows, using a rate of return that reflects both the risk of that investment and of the market. The resulting product of the time value of money is used to construct a DCF valuation, which estimates a company's present value.

For example, £1,000 in the future with a 11.1% discount rate would be worth £900 today, as £100 (11.1% of £1,000) has been discounted from the future value. As a result, discount rates share the same value as interest rates and are often used interchangeably, but differ in their use.

Investors see this £100 increase as the realisation of the expected rate of return on their original investment of £900.

Discount rates are both a significant and core concept of DCF valuations.