Learning Module 5: Natural Resources

LOS 5a: explain features of raw land, timberland, and farmland and their investment characteristics

Natural resources are essential production inputs that play a crucial role in the economy and daily life. These resources can be categorized into three main types:

- **Plants and animals**, also known as soft commodities (grown over a period of time). For instance, cotton is a soft commodity that is used in the textile industry to produce clothing and other fabric-based goods.

- **Energy and minerals,** also referred to as hard commodities (those mined). An example of this would be crude oil, which is a vital resource in the energy sector and is used for heating, transportation, and the production of various goods.

- **Metals and industrial goods**, which are used in the manufacturing of goods and provision of services. For example, steel is an industrial good used in construction, automotive, and many other industries.

A significant portion of investments in natural resources are made directly in farmland, raw land with exploration and mining rights, and timberland.

Defining Land Investments

- **Farmland:** Comprises row crops (e.g., corn, wheat) and permanent crops (e.g., apples, grapes). It can also be used as pastureland for livestock.

- **Timberland:** Functions as both a factory and warehouse, allowing flexibility in harvesting based on market conditions.

- **Raw land:** Refers to undeveloped land that has not been improved. It is land that remains in its natural state and hasn't been developed for any specific purpose.

Summary of Features and Investment Characteristics of Farmland, Timberland, and

Raw Land

	Raw land	Farmland	
Return drivers	Price of land	Harvest quantities Commodity prices Price of land	Bio Ha Lu Pri
Source of direct revenue	Price appreciation Lease revenue	Sale of crops and other agricultural products Price appreciation Lease revenue	Sale and pro Pric Lea
Value	Physical location	Physical location Growth cycle Soil quality	Ph Qu Ph pr
Main risks	Best alternative use	Weather factors and climate change Biological factors, diseases	Weather fac Biological fa
Owners	Mostly institutional, some individual	Mostly individuals, some institutional	Mos som
Ownership structure	Direct ownership, partnership	Direct ownership, partnership, REIT	Dir par TIN

Comparing Land Investments and Real Estate

Similarities

Investments in farmland, timberland, and raw land share common features with real estate. Both of them are unique, illiquid assets that are characterized by their distinct geographic location and features. Moreover, these assets involve forms of ownership capital, which are claims to residual cash flows. In some cases, such as developed real estate and farmland, there may also be steady cash flow streams from leases.

The sources of return from less developed land (farmland, timberland, and raw land) and associated mineral or drilling rights include expected **price appreciation** over time and **cash flows**. These cash flows can come from farm lease payments for owners, farm operating income for owner-operators, farm timberland income, and mineral and drilling royalties.

Differences

Compared to real estate, in raw land, farmland, and timberland investments, there is minimal emphasis on the physical improvements to the land. The value of these investments is determined by the quality of the soil, climate features, or geology, not the value of buildings, construction, and development.

The location of the land is also important, with land closer to transportation and markets commanding higher prices. While proximity to transportation is also crucial for real estate, transportation expenses can significantly affect the price of products from timberland and farmland.

Investing in raw land, timberland, or farmland requires specialized knowledge and understanding of the natural resource. For example, investors investing directly in timberland need forest investment expertise to manage a forest over its life cycle. Many major institutional investors lacking this specialized knowledge often turn to timberland investment management organizations (TIMOs). These entities aid institutional investors by overseeing their timberland investments and securing appropriate land holdings.

Commercial and residential real estate presents numerous financing options, whereas farmland, timberland, and raw land have fewer alternatives. Typically, these investments rely on bank loans or direct, private debt investment for financing.

Farmland, timberland, and raw land are assets that lack liquidity, having a restricted pool of potential buyers and sellers. This limitation is a result of the specialized knowledge and significant capital needed for engaging in these transactions.

Features of Farmland and Timberland Investment

- **Resilience:** These investments provide a cushion against financial market fluctuations, as evidenced by the positive returns of US farmland during the 2008 financial crisis.
- **Recurring Income:** Farmland and timberland produce regular income from crops and timber sales.
- **Inflation Protection:** Owning land offers protection against inflation.

- **Market Cycle:** These investments have long market cycles, particularly in new-growth forests and certain crops.
- **Revenue Determinants:** The prices of agricultural products and timber, combined with harvest quantities, influence the revenue from these investments. Moreover, the value of the land may fluctuate over time for both farmland and timberland, which impacts investment returns.

Forms of Farmland and Timberland Investment

Direct Investment

The primary form of natural resource investment has been direct ownership of farmland and timberland. This approach has traditionally been favored by long-term, tax-exempt investors, including pension funds, foundations, and endowments.

Direct timberland investors often engage Timberland Investment Management Organizations (TIMOs) to select, manage, and dispose of assets in alignment with their investment goals. TIMOs frequently collaborate with indirect investment vehicles like limited partnerships, limited liability corporations (LLCs), and private Real Estate Investment Trusts (REITs) to optimize investment strategies.

Indirect Investment

Indirect investment in farmland and timberland is usually preferred by smaller investors interested in timber and farmland. Indirect investment occurs through investment vehicles such as investment funds which are either offered on public markets, such as Real Estate Investment Trusts (REITs) in the United States, or managed privately through limited partnerships.

Indirect investment vehicles in agriculture often use separately managed accounts, which differentiate between owner and owner-operator models. In the owner model, investors rent out land used for row crops like grains, receiving fixed cash flows. In the owner-operator model, applicable to permanent crop properties like orchards and vineyards, investors retain some level of operating control. Here, cash flows tend to be variable, with investors assuming a portion of the operating risk.

Challenges in Farmland and Timberland Investments

- **Illiquidity:** Direct investments in farmland and timberland are not easily liquidated.
- **Price Transparency:** Limited information is available for investment decisions without sector specialists.
- **Risks:** Farmland investments are vulnerable to unpredictable weather patterns, which can adversely affect crops and revenue. Hedging strategies, such as agricultural commodity futures contracts, can mitigate some of these risks.

Environmental and Social Benefits of Farmland and Timberland Investments

- **Carbon Sequestration:** This is the process of storing carbon in a carbon pool. Farmland and timberland act as carbon sinks, offsetting human carbon emissions.
- **Conservation:** Conservation easements may enhance value by promoting traditional and natural conservation.
- **ESG Considerations:** Investments in sustainable farming and timberland practices align with Environmental, Social, and Governance values, attracting specific investor groups.

Question

In the context of farmland and timberland investments which of the following statements is *most likely* true?

A. The market prices for agricultural products and timber do not fluctuate considerably over time.
B. Timberland serves as both a factory and a warehouse, offering the flexibility of harvesting when timber prices are up and delaying harvests when prices are down.
C. Farmland mainly consists of row crops like corn and wheat that are planted and harvested, and it does not include permanent crops like apples or grapes that grow on trees or vines.

The correct answer is B.

Timberland indeed serves as both a factory and a warehouse, offering the flexibility of harvesting when timber prices are up and delaying harvests when prices are down. This is one of the unique characteristics of timberland investments. The growth of timber is a biological process that continues regardless of market conditions. Therefore, the owner of a timberland investment has the option to harvest the timber when prices are favorable and delay the harvest when prices are low.

This flexibility can help to smooth out the returns from timberland investments over time and reduce the impact of short-term price fluctuations. This characteristic, combined with the long market cycle of timberland investments, can make them an attractive option for investors looking for long-term, stable returns.

A is incorrect. The market prices for agricultural products and timber do fluctuate considerably over time. These fluctuations can be due to a variety of factors, including changes in supply and demand, weather conditions, and economic conditions. Therefore, the statement that the market prices for agricultural products and timber do not fluctuate considerably over time is not accurate.

C is incorrect. Farmland does not only consist of row crops like corn and wheat that are planted and harvested. It alo includes permanent crops like apples or grapes that grow on trees or vines. Therefore, the statement that farmland does not include permanent crops is not accurate. The type of crops grown on a piece of farmland can have a significant impact on its value and the returns that it can generate for investors.

LOS 5b: describe features of commodities and their investment characteristics

Commodity Investment Features

Source of Value

Unlike traditional investments such as stocks and bonds, commodities do not generate cash flows. Instead, they often incur costs, which are typically associated with the transportation, storage, and insurance of the physical commodities. For instance, an investor in gold would need to consider the costs of securely storing and insuring the gold bars.

The primary aim of commodity investors is to profit from the appreciation of the commodity's price, which should ideally exceed the carry cost. This appreciation is based on the future economic value of the commodity, rather than the actual use of the underlying asset.

Government Role

Over the years, there has been a substantial rise in government participation within natural resource markets. Governments often provide subsidies to maintain consumer-friendly food prices and extend price support to farmers. They also commonly regulate the extraction rights of natural resources, including energy resources and mining. In numerous emerging markets, strategic energy production or mining resources are controlled by governments or government-owned enterprises.

In certain countries, landowners' rights are restricted to cultivating the land and extracting specific minerals. Often, the government possesses and oversees subsurface rights, retaining the authority to extract particular resources like oil, gas, coal, gold, and silver.

Environmental Factors and Natural Resource Investments

Environmental factors have a direct influence on natural resource investments. Governments worldwide are implementing environmental safeguards to meet climate objectives and control activities with significant climate impacts, such as mining, agriculture, and energy extraction and production. Many countries are adopting national programs that align with these goals. The policy objective of reducing reliance on fossil fuels has led to a shift in focus towards electric vehicles and advances in battery technology.

The growing dependence on low-carbon energy technologies may result in increased need for numerous minerals and metals, like lithium, cobalt, and nickel, crucial in manufacturing batteries for electric vehicles. Yet, the rise in mining activities for these vital metals can have substantial effects on nearby water systems, ecosystems, and communities. For instance, lithium mining in Bolivia has triggered water scarcity problems in local communities.

ESG Investors and Sustainable Practices

ESG (Environmental, Social, and Governance) investors are increasingly focused on advocating sustainable farming techniques and employing timberland investments for carbon offset purposes. For instance, certain investors are backing sustainable coffee cultivation in Brazil, which serves to diminish carbon emissions while enhancing the well-being of local farmers.

Commodity Investments: Distinguishing Characteristics

Commodity sectors covers precious and base metals, energy and agricultural products, as summarized below:

Sector	Examples
Energy	Oil, natural gas, electricity, coal
Base metals	Copper, aluminum, zinc, lead, tin, nickel
Precious metals	Gold, silver, platinum
Agriculture	Grains, livestock, coffee
Other	Carbon credits, freight, forest products

Commodities can be further classified based on physical location and grade (quality). For example, there are different grades and locations for wheat and crude oil.

Commodities cover a broad spectrum of resources, and their importance fluctuates based on societal needs and preferences. Factors like rapid industrialization in countries like China and

India have increased global demand for commodities. Emerging technologies also play a role in driving demand for new materials while reducing it for others.

Most of the commodity investing is done through derivative contracts. These contracts specify the quantity, quality, maturity date, and delivery location.

The attractiveness to use of derivatives is due to the following

- Physical commodities are often associated with tax obligations and costs associated with storage,
  insurance, brokerage, and transportation of commodities.
- Physical commodity markets often lack price transparency.
- Benefits of financial derivative instruments: Since derivative instruments are traded on organized
  exchanges, they are very liquid and provide opportunities for price discovery.

Derivaties used to establish exposures to natural resources include mostly commodity futures and forwards and sometimes options on futures. Futures contracts are obligations to buy or sell a specific quantity of a commodity at a fixed price, date, and location.

Since futures are exchange-traded, they are marked to market daily. Settlement can either involve the physical delivery or just a financial settlement. Counterparty risks are managed through the clearinghouse/exchange and clearing brokers.

Alternative Investment Avenues: ETPs, CTAs, and Specialized Funds

Beyond futures contracts, several other investment avenues provide exposure to commodities:

- **Exchange-Traded Products (ETPs):** Investors limited to equity shares or seeking straightforward trading via a standard brokerage account can also attain commodity exposure using Exchange-traded products (ETPs), such as funds (ETFs) or notes (ETNs).
- **Commodity Trading Advisers (CTAs):** CTAs engage in directional investments

primarily in futures markets utilizing technical and fundamental strategies. Individual investors can set up separately managed accounts (SMAs) tailored to their unique investment preferences and risk tolerance, which are then managed accordingly.

- **Specialized Funds:** Specialized funds focus on particular commodity sectors, like private energy partnerships, and offer institutional exposure to the energy sector. These investments typically involve direct or indirect ownership of physical assets rather than ownership of residual (equity) or fixed (debt) cash flows.

It's worth noting that while commodities offer various investment benefits, they also come with associated risks, making a thorough understanding crucial for potential investors.

Basics of Commodity Pricing

For investors keen on tapping into direct commodity price movements, derivative instruments are a popular choice. These include exchange-traded futures, options, and forwards.

Under the derivative instruments, the underlying assets are individual assets or an index. Various commodity indexes comprise distinct commodities and feature significantly different index weights. These variations lead to different exposures, not just to particular commodities but also to entire commodity sectors.

Commodities can be traded in both physical and financial markets. As such, there is a one-to-one relationship between prices in physical and financial markets. One common relationship is the no-arbitrage condition

The no-arbitrage principle implies that the price differential between the cash (or spot) markets and derivative markets should equal the cost of carry. This cost of carry embodies:

- The opportunity cost associated with holding the asset
- Storage, transportation, and insurance costs

Physical commodity holders often anticipate compensation through a forward price exceeding the current cash price. However, there can be instances where holding the physical commodity offers non-monetary advantages. This **convenience yield** emerges when market players show a preference for the physical asset over its derivative. A practical example would be a coffee shop owner choosing to store actual coffee beans to guarantee consistent supply, even if it means facing a higher forward price.

Recall the pricing relationship between the spot price (cash) S_0 and forward price at time T, $F_0(T)$ can be expressed as follows:

$$F_0(T) = S_0 e^{(r+c-i)}$$

Where:

c = cost of carry.

i = convenience yield.

r = risk-free rate, and

T = time to the expiration of the forward contract.

From the above equation, it is intuitively right to say that the convenience yield decreases the forward price since it is a benefit and hence accrues to the owner.

Still, in the equation above, there are two relationships between the convenience yield and the cost of carry. When the spot price is above the forward prices, there is **backwardation**, a downward-sloping or inverted forward curve. This can occur for physically settled contracts when the convenience yield is positive, and the benefit of holding the commodity outright exceeds the cost of carry.

On the other hand, when the spot price is below the forward prices, there is **contango** because the cost of ownership exceeds the benefit of a convenience yield, and the forward price will be above the underlying spot asset price. Intuitively, a contango scenario generally decreases the return of the long-only investor, and a backwardation scenario increases it.

Commodities & Portfolio Diversification

Commodities, due to their low correlation with conventional assets like stocks and bonds, can offer enhanced portfolio diversification. In turbulent stock market conditions, certain commodities, like gold, might exhibit robust performance, acting as a hedge against market downturns.

Question

An investor is considering investing in the S&P GSCI Commodity Index, which includes a wide range of commodities from energy to agricultural products, with each commodity assigned a specific weight. If the investor is seeking improved portfolio diversification, how would investing in this index likely impact their portfolio during a period of stock market volatility?

A. The performance of the portfolio would be unaffected by the stock market volatility.
B. The portfolio would likely perform poorly due to the high correlation between commodities and traditional asset classes.
C. The portfolio would likely perform well due to the low correlation between commodities and traditional asset classes.

The correct answer is C.

Investing in the S&P GSCI Commodity Index would likely improve portfolio diversification and perform well during a period of stock market volatility due to the low correlation between commodities and traditional asset classes. Commodities often have a low or even negative correlation with traditional asset classes such as stocks and bonds. This means that when stocks are performing poorly, commodities may perform well, and vice versa.

This low correlation makes commodities a good tool for diversification, as they can help to reduce the overall risk of a portfolio. During periods of stock market volatility, a diversified portfolio that includes commodities can help to stabilize returns and reduce the impact of large swings in the stock market. Therefore, investing in a commodity index like the S&P GSCI Commodity Index can be a good strategy for an investor seeking to improve portfolio diversification and potentially enhance returns during periods of stock market volatility.

A is incorrect. The performance of a portfolio that includes commodities is not unaffected by stock market volatility. While commodities can help to reduce the overall risk of a portfolio and potentially enhance returns during periods of stock market volatility, they are not immune to market movements. Therefore, it is not accurate to say that the performance of the portfolio would be unaffected by stock market volatility.

B is incorrect. While it is true that commodities can sometimes exhibit a positive correlation with traditional asset classes, this is not always the case. In fact, commodities often have a low or even negative correlation with stocks and bonds, making them a good tool for diversification. Therefore, it is not accurate to say that the portfolio would likely perform poorly due to a high correlation between commodities and traditional asset classes.

LOS 5c: analyze sources of risk, return, and diversification among natural resource investments

Commodities, farmland, and timberland possess varying return drivers and cycles. For instance, commodities are instantaneously priced on public exchanges, while the land has irregular pricing methodologies and may include inaccurate estimates.

Moreover, commodity prices have risk and return drivers that are often related to the timing of the economic cycle. This means that the factors influencing commodity prices may not always align with the economic cycle that affects the prices of common equity and debt securities. For instance, the price of Gold can increase during economic downturns as investors seek safe-haven assets, which is contrary to the typical behavior of equity and debt securities.

Commodities

Supply and Deman Dynamics

Short-term shifts in physical commodity supply are production in the case of hard commodities, seasonal crop yields in the case of soft commodities, short-term inventory levels, and, secondarily by the actions of non-hedging investors. On the other hand, the ultimate demand for these commodities is influenced by the needs of end users and, secondarily, by the actions of non-hedging investors.

Factors Determining Commodity Supply and Demand

The primary influencers of commodity supply are production and inventory levels, while the actions of non-hedging investors hold a secondary role. For instance, a substantial surge in gold purchases by investors can promptly elevate the demand and price of Gold. Conversely, the demand for commodities is primarily shaped by the requirements of end users, with the actions of non-hedging investors holding a secondary position. Investor actions possess the ability to either moderate or stimulate commodity price shifts, particularly in the short term.

Gold as a Physical Commodity

Gold, a physical commodity and precious metal, is often a preferred safe haven due to its historical use as a store of value among investors and as a non-currency-based reserve among central banks. For example, during times of economic uncertainty, investors often buy Gold as a way to preserve their wealth.

Challenges in Altering Commodity Supply Levels

Producers face limitations in swiftly adjusting commodity supply levels because of the considerable time required to influence production. For instance, adjusting agricultural output may necessitate planting more crops and modifying farming methods, but visible results typically require at least one complete growing cycle.

Furthermore, external factors like weather can considerably impact output beyond the control of producers. Expanding infrastructure for heightened oil and mining production might extend across numerous years, involving the development of the mine itself, as well as the requisite transportation and refining elements.

Motivations for Investing in Commodities

The allure of investing in commodities lies in its potential for generating returns, diversifying portfolios, and shielding against inflation. Investors may opt for commodities when they anticipate price rises in the short or medium term.

Commodity futures contracts present investors with opportunities like liquidity premiums, fostering the possibility of achieving a favorable actual return. For instance, an investor might engage in a wheat futures contract if they anticipate a future increase in the price of wheat.

Farmland and Timberland: Unique Asset Classes

Farmland and timberland and less regularly traded and derive their value in the following ways:

- **Farmland:** The value accrues over multiple growing seasons, much like a vineyard yielding grapes over years.

- **Timberland:** Value is based on tree growth cycles and lumber demand, akin to the appreciation of a pine forest as trees mature and pine wood demand escalates.

For instance, the US's National Council of Real Estate Investment Fiduciaries (NCREIF) offers appraisal-based indexes for various assets, including timberland and farmland. Over 30 years (Q3 1992 - Q2 2022), the following has been observed:

- Farmland yielded higher annualized returns.
- Timberland exhibited a greater standard deviation in returns.

This performance analysis can be compared to how indices like the S&P 500 track major US companies.

Risks and Considerations in Farmland and Timberland

Investing in farmland timberland presents unique challenges. Farmland has limited liquidity and can face negative cash flows due to high fixed costs, such as maintenance and inputs.

The risks associated with farmland and timberland are similar, but the effect of weather conditions is unique and more exogenous to farmland and timberland and has different effects compared to real estate. For instance, drought and flooding can impact crop yields and hence expected revenue.

Farmland and timberland are exposed to more global risks than real estate. Real estate is mostly locally located. On the other hand, farmland and timberland result in commodities consumed and traded globally.

Investing in undeveloped (or unprepared for construction) raw land is more risky than farmland or timberland.

Inflation Hedging and Diversification Benefits of Natural Resource Investments

Commodities as a Hedge Against Inflation

Commodities, particularly energy and food, are often considered as a hedge against inflation. This is because the prices of these commodities are integral components of inflation calculations, and they significantly impact the cost of living for consumers.

The volatility of commodity prices, especially those of energy and food, is much higher than the volatility of reported consumer inflation. This is because consumer inflation is calculated from a variety of products, including housing, whose prices change at a slower pace compared to commodity prices.

Additionally, inflation calculations also incorporate statistical smoothing techniques and behavioral assumptions. For example, the Consumer Price Index (CPI) in the United States is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food, and medical care.

Portfolio Diversification with Natural Resources

Portfolio diversification involves spreading investments across various asset types to reduce risk and enhance potential returns. Incorporating alternative asset classes, such as farmland, timberland, and commodities, is a strategy to achieve this diversification.

Alternative assets like farmland, timberland, and commodities typically show low to zero correlation with traditional assets, such as bonds and stocks. This means their performance isn't strongly tied to the ups and downs of the stock and bond markets.

For instance, Gold, often seen as a "safe-haven" asset during economic turbulence, might also appreciate by 3%. Even though your stocks took a hit, the gains from your alternative assets could offset those losses, stabilizing your portfolio's overall performance. The diversified assets act as a cushion, mitigating the impact of stock market volatility. This exemplifies the benefits of diversifying into alternative asset classes.

Question #1

Which of the following statements is *most likely* accurate regarding naturall resource?

A. Commodities, farmland, and timberland all perform poorly during periods of low or declining inflation.

B. Farmland and timberland may not suffer during periods of low or declining inflation, unlike commodities which often have low returns.

C. Farmland and timberland perform better than commodities during periods of low or declining inflation due to their high correlation with inflation.

The correct answer is B.

Farmland and timberland may not suffer during periods of low or declining inflation, unlike commodities which often have low returns. This statement is accurate based on the information provided. During periods of low or declining inflation, the performance of different asset classes can vary significantly. Commodities often have negative returns during such periods. However, the investment performance of farmland and timberland may not suffer.

This lack of correlation between farmland and timberland with inflation is more likely due to their resilience during periods of low or declining inflation. Farmland and timberland are real assets that have intrinsic value and can generate income, which can help to offset the impact of low or declining inflation. In contrast, commodities are more directly impacted by changes in inflation and can suffer negative returns when inflation is low or declining.

A is incorrect. The statement that commodities, farmland, and timberland all perform poorly during periods of low or declining inflation is not accurate. While commodities often have negative returns during such periods, farmland and timberland may not suffer.

C is incorrect. The statement that farmland and timberland perform better than commodities during periods of low or declining inflation due to their high correlation with inflation is not accurate. The performance of farmland and timberland during periods of low or declining inflation is more likely due to their resilience, not their correlation with inflation.

Question #2

Consider an investor who is looking to diversify his portfolio by investing in alternative asset classes. He is particularly interested in farmland, timberland, and commodities such as gold and oil.

Based on his understanding of the correlation between these asset classes, which of the following statements is *most likely* to be correct?

A. If the price of timber increases, there's a good chance that the price of farmland will decrease.
B. If the price of timber increases, there's a good chance that the price of farmland will also increase.
C. If the price of commodities like gold or oil increases, the price of farmland and timberland will also increase.

The correct answer is B.

If the price of timber increases, there's a good chance that the price of farmland will also increase. This is because both timberland and farmland are types of real assets, and their prices are often influenced by similar factors. For example, both are affected by weather conditions, changes in commodity prices, and changes in demand for agricultural and forestry products.

Therefore, if the price of timber increases due to factors such as increased demand for wood products or favorable weather conditions, it is likely that the price of farmland will also increase due to similar factors. Additionally, both types of assets can be influenced by broader economic trends, such as inflation and changes in interest rates. Therefore, they often move in the same direction in response to these factors.

A is incorrect. As explained above, the prices of timberland and farmland are often influenced by similar factors and tend to move in the same direction. Therefore, it is unlikely that an increase in the price of timber would lead to a decrease in the price of farmland.

C is incorrect. While it is true that the prices of commodities like gold and oil can influence the prices of real assets like farmland and timberland, it is not always the case that an increase in commodity prices will lead to an increase in the prices of these assets. For example, an increase in oil prices could lead to higher production costs for farmers and foresters, which could put downward pressure on the prices of farmland and timberland.