EDHEC BUSINESS SCHOOL

INNOVATIONS IN FINANCE

LECTURE 5 : REGULATION, ETHICS & ESG IN FINANCIAL INNOVATION

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INTRODUCTION

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OUR GOAL : UNDERSTAND THE FUTURE OF FINANCE

Would you trust an AI to decide your loan approval or retirement investment?

LEARNING OBJECTIVES

- **Knowledge (know/understand):**
  - Understand the main regulatory frameworks for fintech, crypto, and AI globally (e.g. MiCA, GDPR, AI Act).
  - Recognize the ethical risks in financial innovation: bias, opacity, surveillance, systemic fragility.
  - Grasp ESG (Environmental, Social, Governance) criteria and their role in modern finance.
  - Understand how finance can align with SDGs (Sustainable Development Goals).
  - Define responsible innovation in the financial sector.

- **Skills (be able to):**
  - Analyze the regulatory responses to tech-driven finance.
  - Assess ethical risks related to AI and fintech.
  - Evaluate the ESG alignment of a financial product or service.
  - Build awareness of how innovation can create social and environmental value, not just financial ROI.

➔Curiosity, creativity and critical thinking will be rewarded

SESSION 5 OBJECTIVES

- The Regulatory Landscape for Fintech, Crypto & AI
- Ethical Risks in Financial Innovation
- Responsible Innovation in Finance
- ESG, SDGs & Impact Finance

CAPSTONE PROJECT #1: MARKET FACTORS & REGIMES

Understanding What Drives Performance

- **Context:**
  Financial markets alternate between **regimes** — growth vs value, high vs low volatility, inflation vs disinflation.
  Asset managers must identify which **factors** (growth, value, momentum, quality, size, etc.) **outperform under each regime**.
- **Objective:**
  Leverage data and AI to understand how **market factors evolve across regimes** and design an adaptive investment approach.
- **Partnership note:**
  This project is carried out with **InsightSolver**, a Canadian fintech specializing in **AI models for financial research**.
  Students will use InsightSolver's framework to extract insights and detect factor performance patterns.
- **Data used (monthly):**
  - Fama-French factors: MKT-RF, SMB, HML, RMW, CMA, MOM, RF
  - Sector returns, capitalizations, volumes
  - Macro variables: rates, spreads, inflation, PMI, VIX, MOVE, FX, oil
- **Work to produce:**
  - Align and cross datasets (time matching, lagging 1M–12M)
  - Build derived explanatory variables (z-scores, deltas, volatility, betas, momentum)
  - Identify **market regimes** and link them to factor performance
  - Develop a **"Rulebook"**:
    - *In which market regime should we rely on each factor?*
  - Validate findings with out-of-sample checks and transaction cost adjustments
- **Deliverables:**
  - 📘 **Written report** presenting data, variables, methodology, and insights
  - 📊 Analytical notebook or dashboard (Python, PowerBI, or Excel)
  - 📑 *InsightSolver* factor rulebook
  - 🧩 Optional: research article publication (with InsightSolver acknowledgment)

insightsolver

CAPSTONE PROJECT #2: TREASURY & RISK MANAGEMENT

Designing the Future of Corporate Treasury

- **Context:**
  In a volatile environment of **interest rates, currencies, and financing costs**,
  treasury has become a **strategic function** for CFOs.
  The goal: anticipate cash flows, manage risk, and make informed funding or investment decisions.
- **Objective:**
  Design an **innovative treasury analysis and forecasting platform** integrating modeling, scenario simulation, and digital tools.
- **Core Components:**
  - **Cash Flow Forecasting:**
    - Model inflows/outflows over 3–6 months
    - Identify recurring vs irregular flows, and seasonality
    - Build three scenarios: *Central, Optimistic, Pessimistic*
  - **Interest Rate Risk:**
    - Identify exposures to variable-rate debt and placements
    - Simulate ±100 bps rate shifts
    - Propose hedging and refinancing strategies
  - **FX Risk:**
    - Quantify exposure to USD, GBP, CHF…
    - Measure ±5% FX impact on liquidity
    - Recommend coverage: forwards, natural hedging, netting
  - **Financing & Investment Decisions:**
    - Optimize short-term investments and financing instruments
    - Assess costs, yields, and risk-return balance per scenario
- **Innovation & Digitalization:**
  - Automate data collection via **bank APIs**
  - Add simulation & alert modules
  - Build a prototype interface in **Streamlit, PowerBI, or Excel**
- **Deliverables:**
  - 📘 **Written report** explaining data, models, and recommendations
  - 📊 Treasury forecasting model (Python/Excel)
  - 🧩 Risk dashboard or interactive prototype

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THE REGULATORY LANDSCAPE

FINTECH, CRYPTO & AI

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GLOBAL REGULATORY PUZZLE

Who Regulates Fintech, AI, and Crypto in the US and Europe?

- **In the US :**

Domain	Regulatory Body	Key Challenges
Fintech	Consumer Financial Protection Bureau (CFPB), OCC	Fragmented oversight across states
Crypto	SEC (securities), CFTC (commodities), FinCEN (AML/KYC)	Regulatory turf wars
AI	No dedicated federal body yet — guidelines from NIST, White House AI Bill of Rights	Lack of specific regulation

- **European Union**

Domain	Regulatory Body / Framework	Key Features
Fintech	European Banking Authority (EBA), ECB, local regulators	Harmonization under PSD2
Crypto	**MiCA** (Markets in Crypto Assets), ESMA	Passporting rights, licensing
AI	**AI Act**, coordinated by European Commission & local DPAs	Risk-based approach, transparency

- There is **no single global regulator**. Different regions move at **different speeds** and apply **different philosophies** — Europe is precautionary, the US is more market-driven.

MICA AND CRYPTO REGULATION IN THE EU

The EU's First Comprehensive Framework for Crypto-Assets

- What is MiCA?
  - MiCA stands for **Markets in Crypto-Assets Regulation**
  - Adopted by the EU in **2023**
  - Aims to **protect consumers, ensure financial stability**, and **foster innovation**
  - Applies to crypto-assets not already regulated by EU financial laws
- Key Provisions of MiCA
  - **Licensing Requirements**
    - Crypto Asset Service Providers (CASPs) must obtain a license to operate in the EU
    - Once licensed, firms can operate across all EU countries ("passporting")
  - **Consumer Protection**
    - Mandatory whitepapers for crypto-assets
    - Clear disclosure of risks, project details, and issuer information
  - **Stablecoin Supervision**
    - Rules for reserve backing and operational limits
    - Issuers of e-money tokens and asset-referenced tokens must be authorized and supervised
  - **Market Integrity**
    - Rules to prevent insider trading and market manipulation

Why It Matters

• Creates a **single regulatory framework** across the EU

• Increases **investor trust** and **market transparency**

• Sets a **global benchmark** for crypto regulation

• Encourages **responsible innovation** while reducing systemic risk

AI ACT & GDPR

- What is the AI Act?
  - First comprehensive legal framework for **Artificial Intelligence** in the EU
  - Adopted in **2024**, with phased implementation starting 2025
  - Objective: Ensure AI systems are **safe, transparent, and respect fundamental rights**
- Key Features:
  - **Risk-Based Classification:**
    - **Unacceptable risk** → banned (e.g. social scoring)
    - **High risk** → strict requirements (e.g. AI in credit scoring, recruitment)
    - **Limited risk** → transparency obligations (e.g. chatbots)
    - **Minimal risk** → free use (e.g. AI in video games)
  - **Requirements for High-Risk AI:**
    - Human oversight
    - Robust documentation
    - Accuracy and cybersecurity standards

- What is the GDPR?
  - General Data Protection Regulation, in force since **2018**
  - Governs **personal data processing** in the EU
  - Core principle: give control of personal data back to individuals
- Key Principles:
  - Lawfulness, fairness, transparency
  - Purpose limitation, data minimization
  - Right to access, rectify, and erase data
  - Data Protection by Design and by Default

- **AI Act + GDPR: Complementary Tools**
  - GDPR ensures **data rights** → AI must comply with these when using personal data
  - AI Act ensures **ethical use of AI** → Especially in sensitive and high-impact areas
  - Together, they shape a **trustworthy AI ecosystem** in Europe

SEC & CFTC: WHO REGULATES WHAT IN THE US?

- **SEC – Securities and Exchange Commission**
  - **Founded:** 1934
  - **Mission:** Protect investors, maintain fair markets, facilitate capital formation
  - **Key Responsibilities:**
    - Regulates securities (stocks, bonds, investment contracts)
    - Oversees public company disclosures, broker-dealers, mutual funds, exchanges
    - Enforcement of securities law violations
    - Determines if a crypto asset is a “security” (based on the Howey Test)

- **CFTC – Commodity Futures Trading Commission**
  - **Founded:** 1974
  - **Mission:** Promote integrity, resilience, and vibrancy of the derivatives markets
  - **Key Responsibilities:**
    - Regulates commodity futures, swaps, and options markets
    - Supervises clearinghouses, derivatives exchanges, and commodity traders
    - Oversees crypto commodities like Bitcoin and Ethereum (in some cases)

❓ Crypto

- **Ambiguity** over whether crypto assets are **securities** (SEC) or **commodities** (CFTC)
- **SEC**: Often classifies tokens as securities if they pass the **Howey Test**
- **CFTC**: Classifies Bitcoin and Ethereum as commodities
- Result: **Regulatory overlap**, lawsuits, lack of clear federal crypto framework

💳 Fintech

- Fintechs combine **banking, investing, lending, and payments**
- No single regulator—depends on **activity type**:
  - Lending → **Consumer Financial Protection Bureau (CFPB)**
  - Payments → **Federal Reserve, state regulators, FinCEN**
  - Securities → **SEC**
  - Crypto → **SEC or CFTC?**

SEC & CFTC: WHO REGULATES WHAT IN THE US?

What Is the Howey Test?

- The Howey Test is a legal standard from a 1946 U.S. Supreme Court case (SEC v. W.J. Howey Co.) used to determine whether a transaction qualifies as a security.
- If it meets all four criteria, it is considered a security and falls under SEC regulation :
- A transaction is a security if it involves:
  - **An investment of money**→ Buyer contributes money or value.
  - **In a common enterprise**→ The investment is pooled with others.
  - **With an expectation of profit**→ The investor expects financial gain.
  - **Derived from the efforts of others**→ Profits depend on the work of third parties (not the investor).

Applied to Crypto

• **Many ICOs (Initial Coin Offerings)** and tokens pass the Howey Test → considered **securities**

• Example: Investors buy a token expecting it to rise in value due to the team's development efforts.

⚠️ **Implications**

• If a crypto asset **passes** the Howey Test → subject to **SEC registration, disclosure, and compliance**

• If it **doesn't** → could fall under **CFTC** or remain **unregulated**

CASE STUDY: BINANCE VS SEC

🔍 What Happened?

In **June 2023**, the **U.S. Securities and Exchange Commission (SEC)** filed a lawsuit against **Binance**, the world's largest crypto exchange, and its founder **Changpeng "CZ" Zhao**, for alleged violations of U.S. securities laws.

📋 Key Allegations

• **Unregistered Securities**:
Binance allegedly offered and sold crypto tokens (like **BNB** and **BUSD**) that qualify as **securities** without registering them.
• **Operating an Unregistered Exchange**:
Binance.com and Binance.US allegedly functioned as **unregistered exchanges**, brokers, and clearing agencies.
• **Comingling of Funds**:
The SEC accused Binance and CZ of **diverting customer assets** to a separate entity (**Sigma Chain**) controlled by CZ.
• **Deceptive Practices**:
Binance allegedly misled investors about its efforts to restrict U.S. customers' access to the platform.

⚠️ Implications

• The case **raises the question** of how crypto platforms operating **globally** must comply with **U.S. securities law**.
• Binance's structure (Binance.US vs Binance.com) and internal control practices came under scrutiny.
• Reflects SEC's increasing push to **enforce traditional rules** in the crypto world.

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ETHICAL RISKS

IN FINANCIAL INNOVATION

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WHAT CAN GO WRONG WITH AI IN FINANCE?

- **Bias in Decision-Making**
  - AI models can reflect or even amplify historical biases present in training data.
  - Example: Discriminatory credit scoring or loan denials based on ZIP codes, gender, or race.
- **Lack of Explainability**
  - Many AI systems (especially deep learning models) are black boxes:→ Decisions are made without a clear explanation of how or why.
  - In finance, this poses challenges for regulators, auditors, and customers.
- **Surveillance and Privacy Risks**
  - AI systems require massive data (often personal or behavioral) to operate effectively.
  - Risks of invasive profiling, data misuse, or breaches of GDPR principles.
- **Over-Reliance on Black Box Models**
  - Financial institutions may trust AI outputs without human oversight.
  - A model might perform well under normal conditions, but fail catastrophically in edge cases (e.g., market crash).

OPACITY AND TRUST: THE EXPLAINABILITY CHALLENGE

- **Why Does Explainability Matter?**
  - In **high-stakes financial decisions** (e.g. credit approval, risk scoring, fraud alerts), trust hinges on understanding how and why a decision was made.
- **The Problem: "Black Box" AI Models**
  - Complex models (like deep learning) often produce **accurate results**, but **with little transparency.**
  - Even developers may struggle to explain individual decisions.
- **Consequences of Opacity**
  - Regulatory non-compliance (e.g. GDPR "right to explanation").
  - **Customer frustration and loss of trust.**
  - Inability to audit or challenge biased or incorrect outputs.
  - Harder for institutions to debug or improve their systems.
- **Why Explainability Builds Trust**
  - Transparent AI helps institutions justify decisions to customers, regulators, and internal stakeholders.
  - Promotes fairness, accountability, and ethical finance.

DATA PRIVACY: WHEN FINTECH SEES TOO MUCH

- **The Power—and Risk—of Data in Fintech**
  - Fintech thrives on data: transactions, behaviors, devices, locations.
  - But **seeing too much** can lead to **misuse, regulatory violations**, and **loss of trust**.
- **Risks & Misuses**
  - Data misuse: Using personal or financial data for unintended purposes (e.g. targeted selling, hidden profiling).

    Example: Credit card companies selling transaction data to advertisers.
  - Third-party risk: Fintechs often rely on vendors, APIs, or cloud services.

    Breaches or leaks at partners = exposure for the fintech.

    Example: 2023 breach at a banking-as-a-service provider exposed customer data from multiple fintech apps.
  - Data scraping: Some apps scrape user data from other platforms without proper consent or security.

    Example: Budgeting apps accessing banking data via scraped login credentials rather than secure APIs.
- **Regulatory Pressure**
  - GDPR (EU): Strong on consent, purpose limitation, and data minimization.
  - CCPA (California): Consumers can opt-out of data sales.
  - Regulators now demand transparency, user control, and secure architecture.

SYSTEMIC RISK AND DEFI

- **When Decentralization Meets Interconnection**
  - DeFi protocols are interdependent, composable, and automated—strengths that can also create **systemic fragility**.
- **Key Risk Drivers**
  - **Interconnected Smart Contracts**

  DeFi protocols build on each other (e.g. yield farming across Aave, Curve, Compound) : A bug or exploit in one contract can cascade through the ecosystem.
  - Flash Loan Attacks

  Instant, uncollateralized loans used to manipulate markets or exploit contract logic. Example: 2020 bZx attack ($1M lost); 2022 Mango Markets attack ($114M).

  No human oversight = real-time manipulation.
  - **Lack of Circuit Breakers or Human in the Loop**

  Traditional finance has halts, audits, and humans. DeFi often lacks failsafes or real-time intervention mechanisms.

  Smart contracts execute automatically—even in bad conditions.
- 🧩 Why It Matters
  - Risk spreads quickly in liquidity pools and aggregators.
  - Small bugs or economic exploits can escalate into system-wide failures.
  - Users, even sophisticated ones, often cannot assess systemic exposure.

MINI CASE STUDY: LENDING ALGORITHM BIAS

- **The Problem: Algorithmic Discrimination**
  - In 2019, **Apple Card**, backed by Goldman Sachs, was criticized after reports that women received much lower credit limits than men — even with **equal or better financial profiles**.
    - Example: Tech entrepreneur Steve Wozniak's wife received **10x less** credit limit than he did; despite the fact they share all assets and acounts.
    - Apple & Goldman Sachs faced **regulatory scrutiny** from the New York State Department of Financial Services.
- **Why It Happened ?**
  - **Historical data** used to train the algorithm may reflect **past biases**.
  - Lack of **feature transparency** and **explainability** made bias hard to detect.
  - Absence of **auditing** and **fairness** checks during model development.
- **Why It's Bad ?**
  - **Reputation damage:** Public backlash and media attention.
  - **Regulatory risk:** Investigation and potential fines.
  - **Exclusion:** Undermines financial inclusion goals.
  - **Trust erosion:** Users lose confidence in digital financial services.
- **The Lesson: Ethics = Long-Term Value**
  - Bias reduction, transparency, and accountability are not just ethical—they build:
    - ✅ Customer trust
    - ✅ Regulatory alignment
    - ✅ Better, more inclusive models
    - ✅ Sustainable business performance

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RESPONSIBLE INNOVATION

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WHAT IS RESPONSIBLE INNOVATION?

- **Definition:**
  - Responsible Innovation in finance means designing and deploying financial technologies that are:
    - **Inclusive** – accessible to all, reducing bias and inequality
    - **Safe** – protecting users from harm, fraud, and misuse
    - **Sustainable** – environmentally and socially conscious
    - **Human-centric** – respecting human rights, autonomy, and dignity

    It integrates ethics, foresight, and accountability into the innovation process.
- **Examples in Practice**
  - **Ethical AI for Credit Scoring**: Models that are explainable, regularly audited, and tested for bias
  - **Green Fintech:** Platforms like Trine or Raise Green enabling investment in clean energy
  - **Privacy-first Finance Apps:** Tools like Privacy.com, which let users create burner cards to reduce tracking and fraud
  - **Financial Inclusion Tools:** Startups offering micro-loans or savings apps to underbanked populations (e.g., Tala, M-Pesa)
- **Why It Matters**
  - Prevents **harmful externalities** (e.g., exclusion, discrimination, data abuse)
  - Builds **trust** with users and regulators
  - Aligns with **ESG goals** and long-term impact
  - Encourages a shift from “can we do it?” to “**should we do it?**”

THE “ETHICS BY DESIGN” APPROACH

- **What Is It?**
  - **Ethics by Design** means embedding ethical principles into the **design, development, and deployment** of financial technologies — from day one.
  - It ensures that systems reflect **human values**, not just technical efficiency or profit.
  - Key values include:
    - **Fairness** – avoiding bias and discrimination
    - **Explainability** – making decisions transparent and understandable
    - **Safety** – minimizing harm, protecting data and autonomy
- **How It Works in Practice**
  - **Ethical Review During Design Phase**

  Anticipate impacts before launch: who might be excluded or harmed?
  - **Bias Testing and Audit Loops**

  Continuously monitor AI models for unintended bias (e.g., racial or gender)
  - **Human-in-the-loop Systems**

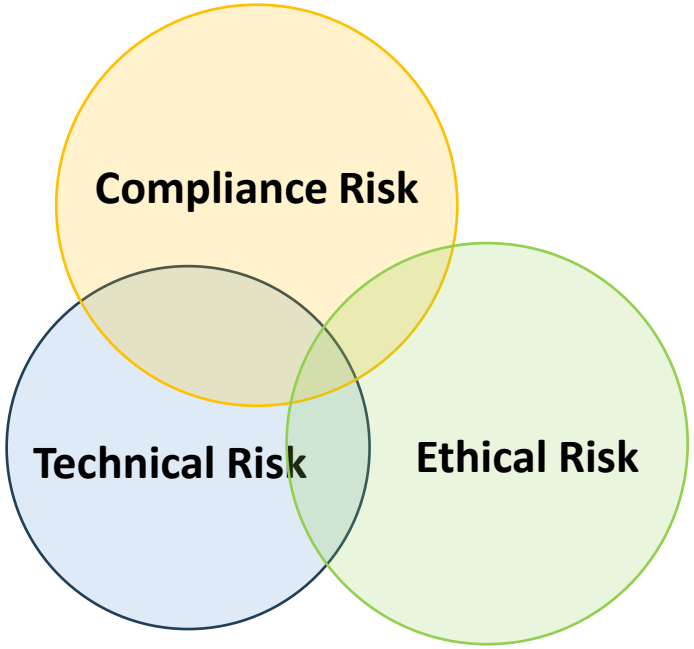
  Ensure oversight in high-stakes decisions (e.g., loan rejections)
  - **User Consent & Control**

  Let users control their data (e.g., opt-in policies, privacy dashboards)
- **Real-World Examples**
  - **Apple Card Bias Controversy** (2019)→ Sparked debate on fairness in algorithmic credit limits
  - **Monzo** (UK)→ Builds explainability into user alerts & transaction warnings
  - **Zest AI**→ Designs transparent credit models with bias-reduction layers

RISK MAPPING: ETHICS, COMPLIANCE, TECH RISKS TOGETHER

- **Why Map Risks Together?**
  - Innovative financial services (AI, DeFi, Open Banking) create **interconnected risks** that cut across traditional silos:
    - **Ethical Risks**: Bias, discrimination, lack of fairness
    - **Compliance Risks**: Regulatory breaches, data misuse
    - **Technical Risks**: System failures, security breaches, black-box AI

    A unified mapping framework helps fintechs, banks, and regulators anticipate **compound vulnerabilities** before they cause harm.
- **The Framework: Three Intersecting Risk Layers**
  - **Ethical Risks**
    - Bias in decision-making
    - Lack of transparency (black-box models)
    - Exclusion of vulnerable populations
  - **Compliance Risks**
    - Breach of GDPR, AI Act, or MiCA
    - Data sharing without consent
    - Inadequate KYC/AML controls
  - **Tech Risks**
    - Smart contract bugs
    - Flash loan exploits
    - Data scraping and surveillance leakage
- **Where They Intersect: Compounded Risk Zones**
  - **Bias + Compliance**: A credit-scoring AI that discriminates → Regulatory fine & reputational damage
  - **Tech + Ethics**: A trading algorithm that manipulates markets → Loss of trust + systemic risk
  - **Compliance + Tech**: Failure to secure personal data → Legal sanctions + user churn



CASE STUDY: ANT FINANCIAL'S CREDIT SCORE VS EU GUIDELINES

- **What Is It?**
  - Ant Financial (Alibaba Group) developed (2015) a credit scoring system called **Zhima Credit** (Sesame Credit) in China:
    - Based on alternative data: shopping habits, bill payments, social behavior, using Alibaba datas
    - Offered benefits: faster loans, simplifies access to employment and gives priority during administrative procedures
    - A low score can have a series of negative consequences: more difficult access to job offers, loans or administrative procedures
    - Integrated deeply with the Alipay ecosystem
- **Why It Raises Concerns in the EU?**
  - Despite innovation, **Zhima Credit** would face major legal and ethical barriers in Europe:

📌 Ant Financial Model	❌ EU Objections (GDPR, AI Act)
Uses behavioral & social data	Violates **data minimization** principles
Opaque scoring logic	Lacks **explainability & transparency**
No user control over scoring	Contravenes **user consent & autonomy**
Risk of social exclusion	Risks **discrimination & fairness**

Key Learning: Context Matters in Innovation

- **Cross-border Fintech = Cross-border Responsibility**
- What is *innovative* in one region may be **illegal or unethical** in another
- Ethical frameworks and regulation define **acceptable use of AI & data**

CASE STUDY: FACEBOOK'S LIBRA/DIEM VS GLOBAL REGULATORS

- **What Is It?**
  - In 2019, Facebook announced **Libra**, a global **stablecoin** initiative later renamed **Diem**:
    - Basket-backed digital currency for global payments
    - Managed by the **Libra Association**, a consortium of tech and financial firms
    - Intended to bypass traditional banking and reach unbanked populations
- **Why It faces Backlash**

📌 Libra/Diem Model	❌ Global Regulatory Concerns
Issued by a private tech giant	Central banks feared **loss of monetary sovereignty**
Global reach with billions of users	Raised **systemic risk** and **financial stability** fears
Weak regulatory clarity	Lacked **compliance with AML/CTF** standards
Cross-border infrastructure	EU cited **regulatory fragmentation** & data privacy issues

Key Learning: Innovation Without Trust Fails

- Libra faced **unprecedented resistance** from the **G7**, **U.S. Congress**, and **EU institutions**
- Regulatory legitimacy is **non-negotiable** in financial innovation
- Facebook's poor privacy track record undermined **public trust**

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ESG, SDGS & IMPACT FINANCE

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FROM ESG TO IMPACT FINANCE – DEFINITIONS & DIFFERENCES

What Is It?

Concept	Definition
ESG Investing	Integrates **Environmental**, **Social**, and **Governance** factors into financial analysis to **manage risks and opportunities**.
Impact Finance	Intentionally directs capital to generate **measurable positive social or environmental outcomes**, alongside financial returns.
SDG Alignment	Investments aligned with the **UN Sustainable Development Goals**, aiming to support global challenges such as poverty, health, climate, and education.

How Are They Different ?

ESG Investing	**Impact Finance**
Focuses on **risk management**	Focuses on **solving problems**
Screens companies based on behavior	Directs capital to projects/enterprises with a **defined social or environmental goal**
May invest in oil & gas if well-governed	Avoids such sectors if misaligned with impact outcomes
Often used in **public markets**	Often used in **private markets** or **thematic funds**

- Three Strategies to Know
  1. **ESG Integration:** Improves investment risk/return profile
  2. **SDG-Aligned:** Supports global goals while seeking market returns
  3. **Impact-First:** Willing to sacrifice some return to maximize measurable social/environmental benefit

WHAT MAKES A PRODUCT ESG COMPLIANT?

Understanding E, S & G

Pillar	What It Means	Fintech & Crypto Examples
E – Environmental	Reducing environmental footprint and promoting sustainability	🌱 Blockchain protocols using **Proof of Stake** (e.g., Ethereum post-Merge) to reduce energy use. 💳 Fintechs like **Aspiration** offering "green" debit cards that plant trees with each purchase.
S – Social	Promoting fairness, diversity, inclusion, and social equity	🏦 Platforms like **Kiva** or **Carbonplace**, which offer inclusive access to finance or carbon credit trading. 👥 Fintechs offering credit to **underserved populations** via alternative data (e.g., Tala, Nova Credit).
G – Governance	Ensuring ethical management, transparency, and accountability	🔍 DAOs (Decentralized Autonomous Organizations) that promote community governance in DeFi. 💼 Crypto platforms with **clear compliance frameworks**, strong **AML/KYC policies**, and **transparency** on tokenomics and decision-making.

Checklist: ESG-Compliant Product

- ✅ Minimizes carbon footprint or offsets impact
- ✅ Supports financial inclusion and ethical practices
- ✅ Follows transparent and responsible governance
- ✅ Protects user data and respects privacy laws
- ✅ Demonstrates measurable ESG outcomes

HOW TECH HELPS ESG REPORTING & MONITORING

- **Technology as an Enabler of ESG Transparency**
  - Modern technologies improve the **credibility, efficiency**, and **granularity** of ESG reporting and performance monitoring.

- **Blockchain: Traceability & Trust**

  - **Immutable audit trails:** Every transaction or event is timestamped and unchangeable.
  - **Supply chain transparency:** Tracks origin of goods (e.g., ethical sourcing, carbon footprint).
  - **Carbon credits & offset registries:** Public, verifiable tracking of ESG claims (e.g., Toucan Protocol).
  - **Smart contracts** automate ESG-linked terms in sustainable finance.

  👉 Example: **Circularise** uses blockchain to trace sustainable materials in manufacturing.

- **AI: Scoring, Monitoring & Predicting**

  - **Automated ESG scoring**: Processes unstructured data (news, reports, social media) for real-time ESG insights.
  - **Sentiment analysis**: Detects reputational risk or controversies.Predictive analytics: Flags ESG risks before they materialize (e.g., supply chain disruption, human rights violations).
  - **Natural Language Processing (NLP)**: Analyzes sustainability disclosures for greenwashing or gaps.

  👉 Example: **Clarity AI** provides AI-driven ESG assessments to investors and asset managers.

CASE STUDY: GREEN BONDS ON CHAIN

- **What is a Green Bond?**
  A green bond is a fixed-income instrument specifically earmarked to raise money for climate and environmental projects.
  It must comply with frameworks such as the Green Bond Principles (ICMA) and often requires transparent use-of-proceeds reporting.
- **Bringing Green Bonds On-Chain**
  On-chain green bonds leverage blockchain to digitize issuance, trading, and tracking, ensuring transparency, traceability, and automated reporting.

FORGE
SOCIETE GENERALE GROUP

- **Real-Life Example: Société Générale – Forge & European Investment Bank (EIB)**
  - **2021**: EIB issued a €100M **digital green bond** on Ethereum.
  - **Partners:** EIB (issuer), Société Générale (lead manager), Goldman Sachs & Santander.
  - **Use of blockchain:**
    - Fully digital lifecycle (issuance, settlement, custody)
    - Timestamped ESG reporting on-chain
    - Automated interest payments via smart contracts
  - **Benefits:**
    - **Instant settlement** reduces counterparty risk
    - **Transparent impact tracking**
    - **Lower cost** vs traditional bond issuance

- **Key Benefits of On-Chain Green Bonds**
  - Transparent use of proceeds and environmental impact
  - Real-time ESG performance monitoring
  - Secondary market liquidity via tokenized bonds
  - Reduced intermediaries and friction in issuance

CASE STUDY: ESG ROBO-ADVISOR

- **What Is an ESG Robo-Advisor?**
  An **ESG robo-advisor** is a **digital investment platform** that automatically builds and manages portfolios based on **Environmental, Social, and Governance (ESG)** criteria, aligning financial goals with ethical values.
- **How It Works**
  - Uses **algorithms and questionnaires** to assess investor risk, goals, and ESG preferences.
  - Builds a portfolio using **ESG-screened ETFs or funds**.
  - Continuously rebalances and **monitors ESG scores**.
  - Some platforms let users **prioritize issues** (e.g., climate, gender equality, governance).

Betterment

Real-Life Example: Betterment's ESG Investing Portfolios

- **Offers:**
  - Broad ESG portfolio (general ESG screened)
  - Social Impact portfolio (focus on diversity & inclusion)
  - Climate Impact portfolio (focus on clean energy, fossil fuel divestment)
- Underlying assets: ESG-aligned **ETFs** from providers like iShares, Nuveen, and Goldman Sachs
- **Personalization:** User can set impact preferences while still maintaining risk-adjusted returns
- **Automation:**
  - Rebalancing
  - Tax-loss harvesting
  - Goal-based planning
- **Transparency:** ESG metrics and fund compositions shown to investors

Benefits of ESG Robo-Advisors

- Align investing with personal values
- Automated, low-cost portfolio management
- Transparent impact reporting and scoring
- Expands access to sustainable investing

RISKS OF ESG-WASHING AND THE ROLE OF REGULATION

- **What Is ESG-Washing?**

  ESG-washing refers to the misleading use of ESG claims by companies or financial products that do not genuinely adhere to environmental, social, or governance standards.

  Common Forms:

  - Labeling a fund “sustainable” without clear criteria
  - Highlighting green efforts while ignoring social/governance flaws
  - Using vague ESG narratives with no measurable impact

- **Regulatory Response in the EU**
  - **SFDR – Sustainable Finance Disclosure Regulation**
    - Imposes mandatory disclosures for financial market participants
    - Classifies products as:
      - Article 6: no ESG consideration
      - **Article 8**: promotes ESG characteristics
      - Article 9: targets sustainable investment objectives
    - Requires clear explanation of methodology, metrics & impact
  - **EU Taxonomy**
    - Defines what qualifies as an environmentally sustainable economic activity
    - Based on 6 environmental objectives (e.g., climate mitigation)
    - Prevents misuse of terms like “green” or “sustainable”

- **Why This Matters**
  - Builds **trust in sustainable finance**
  - Ensures **transparency and comparability**
  - Prevents **consumer deception**
  - **Protects investors** and capital allocation integrity

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BUILD YOUR ESG PORTFOLIO WITH PYTHON

Make an impact

WHY ESG MATTERS FOR INVESTORS

Finance is Changing: From Profit to Purpose

- **ESG factors are financially material: they affect valuation, cost of capital, and risk**
- **Companies with strong ESG profiles tend to show:**
  - **Lower volatility**
  - **Better risk-adjusted returns**
  - **Stronger resilience in crises**
- **Institutional demand: pension funds, insurers, sovereign funds**
- **ESG ≠ philanthropy → it's risk management + opportunity**

ESG IN PRACTICE: FROM RATINGS TO DATA

How ESG is Measured

- **ESG data providers: MSCI, Refinitiv, Sustainalytics, Clarity AI, Arabesque**
- **Each company receives multiple scores → methodologies differ**
- **Common issues:**
  - **Lack of standardization**
  - **Correlation between agencies often <0.6**
  - **“Greenwashing” risks**
- **That’s why fintechs and data science matter: we can analyze ESG data ourselves.**

THE ROLE OF FINTECH & DATA SCIENCE

Fintech + ESG = Impact Intelligence

- **Fintechs collect, clean, and visualize ESG data at scale**
- **Use of AI, NLP, APIs, and blockchain for:**
  - **Data extraction from reports**
  - **Carbon tracking**
  - **ESG transparency and traceability**
- **Examples:**
  - **Clarity AI – AI-based ESG scoring**
  - **Arabesque S-Ray – sustainability quant metrics**
  - **Greenomy – regulatory ESG reporting tools**

TODAY'S WORKSHOP

Build Your ESG Portfolio with Python

- **Objective: learn to handle ESG data and build a simple "responsible portfolio"**
- **You'll learn to:**
  - **Load and explore data with pandas**
  - **Compute ESG scores and categories**
  - **Visualize ESG vs. performance**
  - **Select top companies combining impact & return**

INTRODUCTION TO PYTHON FOR FINANCE

Why Python is the Language of Modern Finance

- 🧠 **Simple and powerful** : readable like English, yet handles complex data.
- 💹 **Most used language in finance, data science and fintech**.
- 🧮 Perfect for :
  - Data analysis (pandas, numpy)
  - Visualization (matplotlib, plotly)
  - Financial modeling & machine learning (scikit-learn)
- 🧰 **Open-source & free** : thousands of libraries, huge community.
- 💡 Used by banks, funds, and fintechs for risk management, pricing, and ESG analytics.


```
import pandas as pd
df = pd.read_csv("data.csv")
df.describe()
```

GETTING STARTED WITH GOOGLE COLAB

Your Online Python Lab

- **Key points :**
- ☁️ **Google Colab = Jupyter Notebook in the Cloud**
  - No installation needed — just a browser and Google account.
  - Save your notebooks on Drive like any Google Doc.
- ⚙️ **Two main cell types :**
  - 💻 *Code* cells → execute Python (Shift + Enter)
  - 📝 *Text* cells → add notes and comments (Markdown)
- ✅ **Advantages** :
  - Free GPU/CPU for computations
  - Accessible from any device
  - Perfect for collaborative learning

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DETECT GREEN WASHING WITH PYTHON

Make an impact

WHAT IS GREENWASHING?

When Marketing Pretends to Be Sustainability

- Greenwashing = giving a *false impression* of environmental or social responsibility.
- Companies exaggerate, omit, or twist facts to appear sustainable.
- It's a **major risk** for investors and regulators:
  - damages trust,
  - misleads ESG funds,
  - inflates valuations.
- The EU now regulates it through **CSRD**, **SFDR**, and the **Green Claims Directive**.
- **Examples of Greenwashing tactics :**
  - Vague language: "eco-friendly", "responsible", "green" — without evidence.
  - Highlighting one positive aspect while hiding negative impacts.
  - Using nature imagery (green labels, leaves, earth icons) to signal virtue.

REAL-WORLD CASES

When Sustainability Meets PR

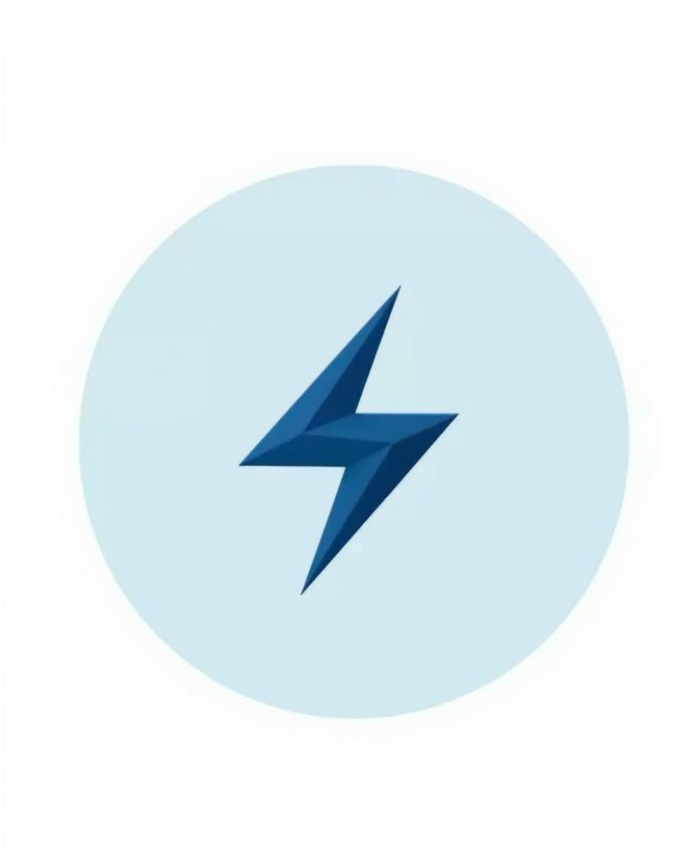
- **Volkswagen “Dieselgate” (2015)** –
  Claimed “clean diesel” engines; in reality manipulated emissions data.
  ➜ Massive ESG credibility collapse.
- **H&M & Zara “Conscious” collections** –
  Promoted “sustainable fabrics” while continuing overproduction.
  ➜ Greenwashing through selective communication.
- **Oil majors (BP, Shell)** –
  Rebranded as “Beyond Petroleum” and “Energy transition leaders” while >90% of capex still fossil fuels.
- **Financial funds** –
  “Sustainable ETFs” that still include high-carbon firms.

DETECTING GREENWASHING WITH AI

Turning Text into Transparency

- Corporate reports and press releases contain patterns we can analyze:
  - Overuse of **vague words** (“commitment”, “believe”, “aspire”)
  - Lack of **measurable targets** (“CO_2 reduction”, “audit”, “verified”)
- NLP (Natural Language Processing) lets us **quantify language tone and credibility**.
- In the notebook, we’ll:
  - Load sustainability statements
  - Count vague vs. concrete terms
  - Compute a *Greenwashing Index*
    → ratio of vague to concrete words
  - Visualize word clouds & sentiment

USUAL SUSPECTS



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WRAP-UP

Make an impact

KEY TAKEAWAYS FROM TODAY

- **Regulation must evolve with innovation.**
- **AI/Fintech introduce ethical, systemic, and privacy risks.**
- **ESG & SDGs guide finance toward social good.**
- **Responsible innovation is not a constraint — it's a long-term asset.**

➔ *Can finance really be a force for good — or is ESG a marketing gimmick?*

ETHICS & ESG IN FINANCIAL INNOVATION

What is the main purpose of the EU's Sustainable Finance Disclosure Regulation (SFDR)?

A. To regulate crypto asset exchanges

B. To mandate transparency around ESG claims in financial products

C. To ban fossil-fuel investments in the EU

D. To supervise central banks' climate policies

ETHICS & ESG IN FINANCIAL INNOVATION

Which of the following is a key risk associated with the use of AI in finance?

A. Currency devaluation
B. Bias in decision-making models
C. Higher transaction fees
D. Manual compliance effort

ETHICS & ESG IN FINANCIAL INNOVATION

What is the function of the Howey Test in U.S. regulation?

A. To identify financial institutions eligible for subsidies
B. To classify crypto tokens as securities
C. To assess AI bias in financial models
D. To test ESG compliance

ETHICS & ESG IN FINANCIAL INNOVATION

What's the difference between ESG investing and Impact Finance?

A. ESG focuses on returns, impact finance prioritizes measurable positive outcomes
B. ESG is illegal in the US, impact finance is not
C. Impact finance is less regulated than ESG
D. They are identical strategies with different names

ETHICS & ESG IN FINANCIAL INNOVATION

Which technology is most relevant to ensuring traceability in ESG reporting?

A. APIs
B. Cloud computing
C. Blockchain
D. Web scraping

ONE MORE THING…

Fintech is not about code — it’s about impact.

🧠 Before you go...

- You’ve built fintechs, studied fundamental ways to change Finance, and hopefully understood how important these topics are.
- You’ve seen how data, regulation, and innovation collide.
- You’ve learned that **finance can be rebuilt — smarter, fairer, greener.**

💬 Now it’s your turn.

- The next *Stripe*, *Qonto*, or *Binance* might be sitting in this classroom.
- The next financial revolution won’t come from Wall Street...
  👉 It’ll come from **your laptops**.

💖 Thank you!

- You’ve been a fantastic class. Please take 2 minutes to:
  ⭐ Vote for the course on the platform
  💬 Share your feedback — what you learned, what you’d change
  🔥 **Then go build something that matters.**

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