



THE UNIVERSITY OF HONG KONG

FITE7001 MSc(FTDA) Project

Detailed Project Plan

Title: Exploring the Use of Prediction Markets as Risk Assessment and Hedging Tools in the Financial Industry

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Project Objective

With the rising popularity of prediction platforms, such as Polymarket, which encompass a broad spectrum of event types, including politics, economics and socially related activities, prediction markets represent an emerging blockchain-based mechanism that remains under-adopted by major institutions despite their growth potential. This project investigates the extent to which market-driven, real-time probability estimates from these platforms can augment financial risk management practices by identifying potential value propositions and hedging opportunities. Specifically, it examines the application of simple derivative-like instruments—namely, binary Yes/No contracts—for retail investors and institutional entities to assume risks, generate returns, or hedge against tail exposures. These contracts, which resolve based on the occurrence or non-occurrence of specified events, offer a decentralised approach to risk transfer, potentially enhancing transparency, efficiency, and dynamism in comparison to traditional derivatives such as options or futures. Through systematic analysis, the project aims to contribute to the evolution of prediction markets as an integral element of institutional financial strategies.

Project Scope

To accomplish the project objectives, a comprehensive exploration is outlined, covering theoretical, methodological, and practical dimensions. The following areas are addressed to provide a structured framework that integrates academic rigour with practical relevance:

1. Identification of Gaps and Use Cases Where Prediction Market Outperforms

Traditional Risk Transfer Methods: This involves a comparative evaluation of the prediction market relative to conventional tools. Key deficiencies in traditional methods, including the challenges in addressing low-probability, high-impact events where centralised intermediaries may impose biases or inefficiencies, would be highlighted. Use cases of real-time sentiment in electoral or economic forecasts and other socio-political activities, where the decentralised structure and ongoing liquidity of prediction markets may deliver superior predictive accuracy, reduced costs and enhanced accessibility. Evidence from platforms, namely Polymarket, will be analysed to measure performance indicators, including forecast precision, transaction expenses, and settlement timeliness, thereby underscoring scenarios in which these markets facilitate improved risk diversification for retail and institutional users. Related activities include researching Polymarket as a decentralised prediction market platform for betting on real-world outcomes using cryptocurrency and oracle resolutions; identifying target audiences interested in politics, sports, crypto events, and niche underserved markets; and studying competitors such as Polymarket, Kalshi, or Augur for features like yes/no betting, liquidity pools, and resolution mechanisms.

2. Development of a Mathematical/Algorithmic Framework for Exploiting Pricing

Differences and Arbitrage Across Event Categories: Drawing from quantitative finance methodologies, this component entails the formulation of mathematical models and algorithms to identify and leverage pricing inefficiencies within and between prediction market categories, such as political and economic events. Approaches may include statistical arbitrage strategies, incorporating mean-reversion techniques or machine learning for anomaly detection, to address mispricings stemming from informational disparities or sentiment variations. Algorithms are designed to track cross-market correlations, supporting automated trading mechanisms that optimise profitability and accuracy. Risk-adjusted measures, such as Sharpe ratios and value-at-risk (VaR), are incorporated to bolster the framework's robustness against volatility, offering a systematic guide for enhancing returns

via blockchain-facilitated price discovery. Related activities would use established systems to handle the main processes; set up the rules for buying and selling shares backed by a stable form of digital money; include methods to automatically adjust prices and keep the market active; add ways to manage orders by combining off-site matching with on-site finalization; and create rewards to encourage participants to provide more activity and support in the market.

3. **Exploration of Institutional Applications, Including Parametric Insurance with Probabilistic Triggers and Commodity Hedging Informed by Market Consensus:** This area focuses on adapting prediction markets for institutional risk management, with emphasis on parametric insurance models featuring automated triggers based on probabilistic thresholds derived from collective market insights (e.g., activation upon a disaster probability surpassing 70%). Commodity hedging applications are also examined, utilising prediction market data to refine positions in assets like oil or agricultural goods, where crowd-sourced probabilities may surpass the accuracy of standard econometric approaches. Case studies from industries including agriculture, energy, and reinsurance are reviewed to evaluate integration viability, regulatory adherence, and basic risk reduction, demonstrating how these applications can optimise institutional processes and drive innovation in risk mitigation. Related activities include identifying target audiences and niche opportunities for institutional users; incorporating features such as leaderboards, analytics, event creation, and secure wallet integration into the frontend; and marketing the platform through social media, influencers, partnerships, and incentives for early users to attract institutional participation.
4. **Design of a Prototype Operational Model for Binary (Yes/No) Prediction-Market Derivatives:** A key practical aspect involves the development of an operational prototype for binary derivatives in prediction markets. This includes specifying contract parameters—such as duration, collateral obligations, and settlement protocols—while ensuring alignment with blockchain infrastructures like Ethereum or dedicated layers. The prototype simulates deployment scenarios, featuring interfaces for contract initiation, trading, and resolution, and undergoes testing to assess scalability and adoption potential. Modularity is prioritised to accommodate diverse risk profiles, establishing a foundational model for institutional implementation in controlled settings. Related activities span multiple phases, including understanding Polymarket basics; defining project scope for a full clone or custom build, with clone scripts enabling efficient launch; choosing a development approach for speed or uniqueness; learning prerequisites such as blockchain basics, Solidity for smart contracts, web development with HTML, CSS, JavaScript, React.js, and Node.js/Express.js, Web3 tools like Web3.js or Ethers.js, and wallet setup with MetaMask; setting up development environment tools including Node.js, Git, VS Code, blockchain selection (e.g., Ethereum or Polygon), smart contract development, frontend with React, Web3 integration, and testing; writing market creation contracts; implementing betting logic; adding resolution mechanisms; incorporating security features like reentrancy guards, input validation, and role-based access using libraries; handling disputes with challenge-and-appeal mechanisms; testing contracts through unit tests and simulations; building backend for server setup, decentralized storage, order management, and backend testing; designing UI/UX wireframes with focus on clean, intuitive design including dark mode; implementing frontend navigation with React Router, wallet connection, market display for active markets, odds, stakes, and rewards, betting interfaces with forms for placing bets, additional features, responsive design for mobile compatibility, fiat on-ramps for buying crypto, and frontend testing; integrating components

via Ethers.js and backend APIs, unit tests, and integration tests simulating full user journeys; testing on testnet with beta users; and deploying smart contracts to mainnet using tools like Hardhat and hosting frontend on decentralized storage.

5. **Integration of Oracle and Data-Extraction Protocols for Accurate Mapping of Real-World Outcomes to On-Chain Contracts:** Addressing the linkage between external events and blockchain resolutions, this component incorporates decentralised oracles (e.g., Chainlink) and data protocols to securely retrieve and validate real-world information, such as election outcomes or economic metrics, from reliable sources. Mechanisms are devised to ensure tamper-resistant mapping to contract results, with safeguards against oracle malfunctions or data tampering via redundancy and cryptographic verification. This enhances the dependability of binary contracts, reducing resolution disputes and building trust in prediction market systems for institutional purposes. Related activities include learning about oracles like Chainlink or UMA; integrating oracles for automated resolution and payouts; and implementing dispute handling with challenge-and-appeal mechanisms.
6. **Assessment of Governance Considerations for Supporting a Secure Public Launch, Promoting Regulatory and Cybersecurity Alignment to Enhance Stakeholder Confidence:** This final element evaluates governance structures critical for the sustainable rollout of prediction market derivatives, including decentralised autonomous organisation (DAO) models for oversight. Compliance with regulatory frameworks, such as those of the U.S. Commodity Futures Trading Commission (CFTC) or analogous entities, is analysed alongside cybersecurity protocols, including smart contract audits, vulnerability assessments, and privacy measures, to counter threats like front-running or sybil attacks. Alignment with industry standards in regulation and security is pursued to instil confidence among stakeholders, facilitating wider institutional engagement and overcoming adoption hurdles in this developing domain. Related activities include checking legal requirements and consulting for gambling laws, KYC/AML compliance; estimating costs and timelines for development, audits, and marketing; performing security audits by third-party auditors for vulnerabilities in contracts and code; fixing issues related to bugs, scalability (e.g., using Layer 2 solutions), or Sybil attack risks; implementing security in contracts; testing backend for high-volume handling and secure integration; setting up domain registration; ensuring final compliance checks including KYC if required; building community engagement on platforms like Discord, Twitter, or forums to grow users and liquidity; and deploying to mainnet.

Through this delineated scope, the project advances theoretical insights while yielding practical recommendations, establishing prediction markets as a pivotal instrument in advancing financial risk management.

Implementation Schedule

The following table provides a detailed task list focused exclusively on the business side of the project, organised by phase. It includes the main task, any associated subtasks, the assigned owner, who are primarily the business team members, with mixed involvement where relevant, and the current status. This breakdown emphasises strategic, planning, compliance, and promotional activities essential for aligning the prediction market prototype with market needs, regulatory requirements, and stakeholder engagement.

Phase	Task	Subtask	Hours Needed	Owner	Status
1. Research & Planning	Research about Polymarket	Study on Polymarket as a decentralised platform and gap identification	60	Sunny, Spencer	In Progress
		Use case on how a prediction market outperforms traditional risk transfer methods	60	Sunny, Spencer	In Progress
	Project Planning	Prototype operation model design for a binary predictive market	30	Sunny, Spencer	Completed
		Estimation on SDLC	20	Athena	Completed
	Cost Analysis	Budget for technical development	20	Spencer	Completed
	Identify Target Audience	User identification in politics, sports, crypto events, etc., which are niche opportunities in underserved markets	25	Sunny, Spencer	In Progress
		Institutional application exploration	25	Sunny, Spencer	In Progress
	Competitor Analysis	Study about Polymarket, Kalshi, Augur for multiple features, including yes/no betting, liquidity pools, resolution mechanism	60	Sunny, Spencer, Tom	To be started
	Legal Requirement Analysis	Regulatory research, including but not limited to gambling law, KYC/AML	70	Sunny, Spencer	To be started
	Technical Research	Study on Blockchain	50	Sunny, Spencer	To be started
		Study on Smart Contract	50	Sunny, Spencer	To be started
		Study on security measures	50	Sunny, Spencer, Athena	To be started
		Mathematical/ Algorithmic Framework Development	50	Sunny, Spencer, Tom	To be started
2. Report	Report Writing	Summarise the research	160	Sunny, Spencer, Tom, Athena, Ringo	To be started
		Provide insights into the risk transfer model of the prediction market	160	Sunny, Spencer, Tom, Athena, Ringo	To be started
		Report checking and finalisation	20	Sunny,	To be started

				Spencer	
3. Deployment & Launch	Market the Platform	Promote on social media	20	Sunny, Spencer	To be started
		Build community via Discord, Twitter and forums	20	Sunny, Spencer	To be started
		Estimated Total Hours Needed	950		

Apart from the research and analysis conducted from the business perspective, this project also focus the technical development of the prototype, incorporating advanced technologies such as blockchain fundamentals, smart contracts, and order management. The following outlines the project plan for prototype development, structured according to the Software Development Lifecycle (SDLC) and divided into seven principal phases: Preparation, Planning, Analysis, Design, Implementation, Testing and Integration, and Deployment.

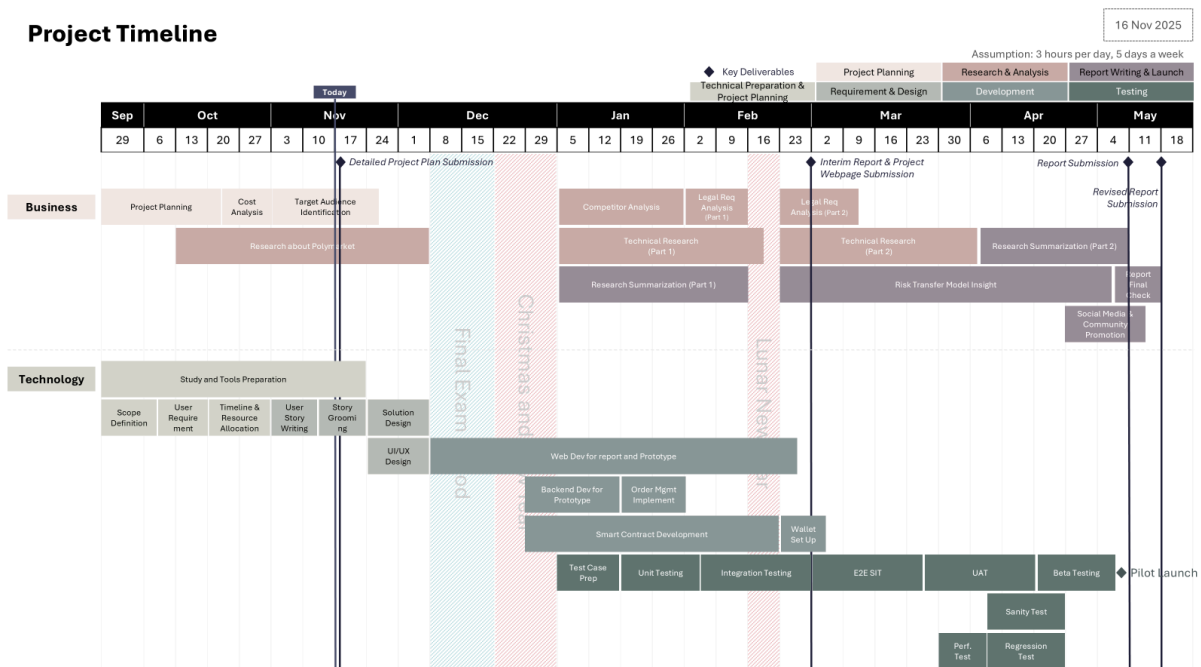
Phase	Task	Subtask	Hours Needed	Owner	Status
0. Preparation	Study	Study Blockchain, including Ethereum	90	Developer (Athena, Ringo, Tom)	In Progress
		Study Solidity for Smart Contract	90	Developer (Athena, Ringo, Tom)	In Progress
		Study Chainlink, UMA for real-world data fetching to resolve market	90	Developer (Athena, Ringo, Tom)	In Progress
	Tools	Install all relevant tools and study the relevant frontend and backend programming languages	30	Developer (Athena, Ringo, Tom)	Completed
1. Planning	Scope Definition		20	Business Analyst (Athena, Tom), End User (Sunny, Spencer)	Completed
	Requirement Gathering	Features to be developed	20	Business Analyst (Athena, Tom), Developer (Ringo)	Completed
	Waterfall Project Planning and Management	Timeline Establishment	15	Project Manager (Athena, Spencer)	Completed
		Resources Allocation	15	Project Manager (Athena, Spencer)	Completed
2. Analysis	User Story	User Story Creation	20	Business Analyst (Sunny, Spencer, Athena, Tom)	Completed
		User Story Grooming	20	Business Analyst (Sunny, Spencer, Athena, Tom), Developer (Ringo)	In Progress
3. Design	High-level Architecture Design		15	Solution Architect (Ringo)	To be started
	Technical Solution Design		15	Solution Architect (Ringo)	To be started
	UI/UX Design	Figma Prototype	30	Designer (Sunny)	To be

					started
4. Implementation	Web development for the report		30	Developer (Athena, Ringo)	To be started
	Backend development for prototype	Integration with Blockchain	20	Developer (Athena, Ringo, Tom)	To be started
		Decentralise file storage development	25	Developer (Athena, Ringo, Tom)	To be started
	Order Management Lifecycle Implementation	Tomybrid Central Limit Order Book (CLOB) for off-chain matching and on-chain execution	30	Developer (Athena, Ringo, Tom)	To be started
	Smart contract development	Contract creation for core logic	30	Developer (Athena, Ringo, Tom)	To be started
		Create a Solidity contract where users define events	40	Developer (Athena, Ringo, Tom)	To be started
		Function implementation for buying/selling shares	50	Developer (Athena, Ringo, Tom)	To be started
	Web development for prototype	React app creation	25	Developer (Athena, Ringo, Tom)	To be started
		Responsive application	8	Developer (Athena, Ringo)	To be started
		Integration with the Backend through user sessions or API calls	50	Developer (Athena, Ringo)	To be started
		Integration with Automated Market Makers (AMM) for dynamic pricing and liquidity	60	Developer (Ringo)	To be started
	MetaMask wallet setup for getting testnet ETH from faucets for the testing phase		25	Developer (Ringo)	To be started
5. Testing and Integration	Test Case Writing		20	Tester (Athena, Tom)	To be started
	Test Case Review		10	Tester (Athena, Tom)	To be started
	Unit Testing	Testing the modules individually for local blockchain simulation	40	Developer (Ringo)	To be started
	Integration Testing	Testing on the interaction between individual components	55	Tester (Athena, Tom)	To be started
	End-to-End System Integration Testing (E2E SIT)	Testing E2E functionality on Ethereum Testnet	55	Tester (Athena, Tom)	To be started
	User Acceptance Test (UAT)	End user testing on Ethereum Testnet	55	End User (Sunny, Spencer)	To be started
	Performance Testing	Evaluate the speed, responsiveness and stability of the prototype in handling high-volume trading	25	Tester (Athena, Tom)	To be started
	Sanity Test	Testing on the specific bug fix/minor change of work	40	Business Analyst (Sunny, Tom)	To be started
	Regression Test	Re-runs of the critical test cases	40	Tester (Sunny, Spencer,	To be

		to ensure code changes do not affect any existing functionality		Athena, Tom)	started
6. Deployment	Beta-Testing		30	End User (Sunny, Spencer)	To be started
	Pilot Launch		8	Business Analyst (Athena, Tom), Developer (Ringo), End User (Sunny, Spencer)	To be started
		Estimated Total Hours Needed	1241		

Given the project timeline is from October 2025 to May 2026, the following delineates the project plan in a weekly format to illustrate durations. This plan is predicated on the assumption that team members will allocate 3 hours per day, 5 days per week, to project activities, with key phases and associated deliverables prominently highlighted.

Project Timeline



Estimated Number of Learning Hours

Based on the backgrounds of the team members, each individual maintains a primary focus on either the business or technology domain. To ensure an equitable distribution of workload across the team, assignments incorporate a blend of business- and technology-oriented tasks. For instance, team members with a finance background primarily undertake research and analytical activities, while also engaging in end-user and business analyst responsibilities, such as requirements gathering, user story development, User Acceptance Testing (UAT), and related functions. Conversely, those with a stronger technical orientation concentrate on prototype and webpage development, supplemented by research into blockchain technologies, smart contracts, and cybersecurity measures. In cases where tasks involve multiple team members, the estimated hours outlined in the aforementioned tables are evenly allocated among the designated owners. The following delineates each team member's role, along with the estimated learning hours allocated to business and technological aspects, respectively, culminating in a total exceeding 300 hours per individual.

Member Name	Roles	Business Hours	Technical Hours	Total
Sunny	Researcher, UI/UX Designer, End User, Business Analyst, Tester	332.33	118.10	450.43
Spencer	Researcher, Project Manager, End User, Business Analyst, Tester	352.33	83.10	435.43
Tom	Researcher, Business Analyst, Developer, Tester	100.67	308.10	408.77
Athena	Project Manager, Business Analyst, Tester, Developer	100.67	347.10	447.77
Ringo	Solution Architect, Full Stack Developer, Tester	64.00	384.60	448.60