

## **Dynamic Betting**

The Patent-Pending Technology Behind Crowdpark's  
Social Betting Engine

## Executive Summary

**Dynamic betting** is a new way to bet invented by Crowdpark. It allows players to make bets and cash-out their staked amounts at any time before or during an event – before the actual outcome of the event becomes known!

This unique feature engages a player in betting activity throughout the life-time of the underlying event. In contrast, in traditional betting once a bet was placed the player cannot do anything anymore but wait for the underlying event to end.

BetTycoon, Crowdpark's first Social Game and currently the largest betting game on Facebook, is the first to use **dynamic betting** technology to provide the most engaging way to bet on events – both for first and second screen entertainment. BetTycoon is 100% legal because it uses virtual currency.

## Dynamic Betting

Crowdpark is the world's leading developer of social betting games – bringing the thrill of legal betting to the world of social gaming. Crowdpark games such as *Bet Tycoon* take advantage of Crowdpark's patent-pending technology called **dynamic betting** – or, betting where the odds are not fixed. This is the same technology used in the stock market, but with virtual currency. Similar to traditional betting, **dynamic betting** allows players to bet on outcomes using virtual money. The big difference lies in the things which a player can do *after* having placed a bet.

The main difference is that in **dynamic betting**, a player can make repeated bets on one outcome. In other words, because of **dynamic betting**, players can change their bet at anytime as the event or news unfolds. For instance, after a player has made his first bet, e.g. 10 C\$ on the Boston Red Sox, he can cash out his stake at any point in time. In order to allow this, we have developed a mechanism using **dynamic betting**, which assigns a value to a stake at each point in time. For instance, the Crowdpark Dollars (C\$) 10 C\$ stake from the previous example might now have a value of 15 C\$. The player can cash out his stake now and will receive 15 C\$, making a profit of 5 C\$ - even before the outcome has occurred!

The value of a stake keeps changing all the time depending on the stakes of the other players. For example, if many players start betting against the Red Sox, then the value of the stake from the previous example can go down from 10 C\$ to 8 C\$. The player can decide to limit his losses and cash out his stake for 8 C\$, losing 2 C\$. All bets are made with virtual currency and are fully legal. Players compete for virtual goods and can work their way up through the levels of the game.

Another key difference is that the odds of **dynamic betting** are not made by a bookmaker but *by the crowd itself*. Thus, this is a truly social betting game where players compete against each other. In contrast, traditional bookmakers are extremely secretive about their methods for odd settings and there is no transparency in their game.

## Core Technology

Crowdpark's patent-pending **dynamic betting** technology is embodied in our social betting engine. It draws from research in statistical decision theory, as well as financial markets. A major ingredient of **dynamic betting** is a concept known as prediction markets (PM).

Prediction markets are small financial exchanges where people do not trade company stocks but rather stocks of events. Much like in normal financial stock markets, PMs are about the future – knowing which stock to buy low in order to sell high later, or vice versa.

$$price_{yes} = \frac{e^{v_{yes}/B}}{e^{v_{yes}/B} + e^{v_{no}/B}}$$

**Equation 1:** Price equation for an event with two outcomes – yes and no. The symbol  $v_{yes}$  and  $v_{no}$  designate the total outstanding 'yes' and 'no' shares,

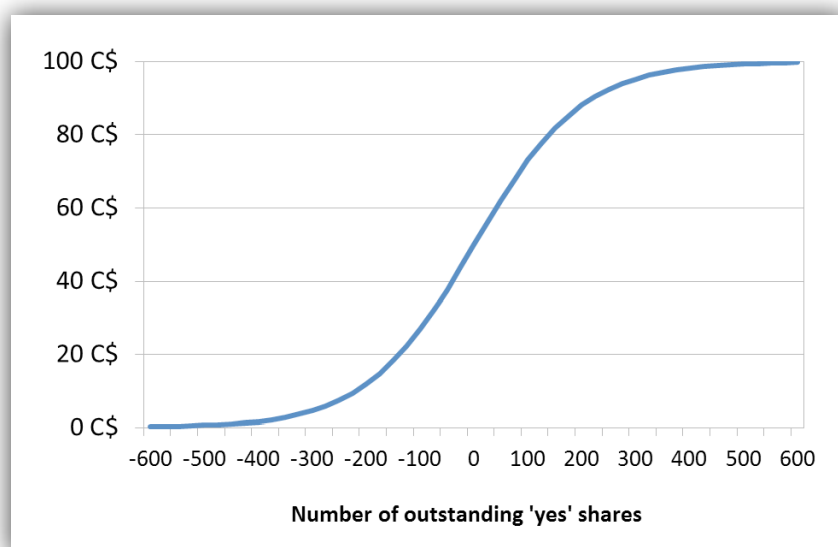
Prediction markets are used to predict election outcomes, the Oscars, and other popular events. The main reason why PMs are used is that they provide forecasting accuracy which is superior to that of normal polls, surveys, and other prediction methods. Some striking examples of this can be found below.

Crowdpark's **Dynamic Betting** technology is based on one popular prediction market algorithm, the logarithmic market scoring rule (LMSR) by Hanson (2003, 2007). The LMSR is a scoring rule which is designed to incentivize a player to reveal his true information. This is done by promising a payout to a player based on the marginal information which the player contributes, if the information turns out to be correct. If incorrect, the player receives a pay-out of zero.

Hanson extended this basic idea to markets and enabled the use of scoring rules in a multi-player context. The core of the LMSR is a price function like the one shown in Equation 1. This function quotes a price for one share. The share price is based on the information, which already is priced into the market at the time. Figure 1 illustrates this basic idea for a simple Yes/No event.

Traditional Betting	Dynamic Betting
One-shot bet	Multiple bets possible
Cannot undo a bet	Cash-out a bet anytime at current value of the bet
Odds made by bookmaker	Odds made by the crowd
Secretive: Players don't see what others do	Social: Players interact with other players

**Table 1:** Comparison: Traditional vs. and **Dynamic Betting**



**Figure 1:** The LMSR price function: Price for one 'yes' share as a function of the total number outstanding 'yes' shares on the market, *y*. A negative value for *y* indicates there are more 'no' shares than 'yes' shares on the market.

A Yes/No event, also called a binary event, has two possible outcomes – yes or no. The line in Figure 1 shows the price function from Equation 1 for one ‘yes’ share. A ‘yes’ share is a share which pays 100 C\$ if the event occurs and 0 C\$ if the event does not occur. The ‘no’ shares work in an inverse way. Assume a player enters the market and finds that ‘yes’ shares currently cost 50%. If he thinks that the event will occur and he knows that in such a case a ‘yes’ share will pay-out 100 C\$, then the player will want to buy ‘yes’ shares for 50 C\$ per share now. The ‘yes’ shares, which the player buys increase and are added to the total number of outstanding ‘yes’ shares. The LMSR then calculates a new price for ‘yes’ shares, which will be higher, because the purchase of ‘yes’ shares increased demand for such shares, which by the law of supply and demand raises the price for these shares.

So far this looks like a normal financial market. However, the stock mechanism is only a device for extracting truthful information from players. Our player from the previous paragraph’s example believed the event will occur. He revealed this information to the market by his purchase action. He has an incentive to do so since he will make a profit if his belief turns out to be correct. As such the LMSR functions like a traditional scoring rule, as explained above.

Since the LMSR is capable of multiple players, other players can contribute their knowledge by buying or selling ‘yes’ shares. The LMSR updates the share price continuously, which give players a lot of signals about what other players are doing and thinking. To transform the information, which is embodied in such a prediction market into a forecast, consider the following: The price of a share is always between 0 C\$ and 100 C\$, it is not allowed to go outside these bounds. Therefore, the price of ‘yes’ shares can be interpreted as the probability of the underlying event to actually occur. Below you will find some remarkable examples of how the predictions which are derived from PMs have outperformed traditional forecasting methods and experts. Of course, the LMSR is not limited to Yes/No events. It can also be applied to multi-binary events, where more than two outcomes are possible. Further extensions of the scoring rules allow for usage in non-binary events, e.g. forecasting a number like the number of cars of a certain model sold in the next quarter.

For further information on the fascinating topic of prediction market, please refer to some of the materials in references section. In the next section, we shall show how we have transformed classic prediction markets (PMs) into an engaging social game.

## Dynamic Betting in Social Games

The prediction market mechanism described in the previous section is far from being a social betting game. A major step towards Crowdpark’s **Dynamic Betting** technology is the conversion of shares into bets. This is done with proprietary algorithms developed by the Crowdpark team.



Figure 2: Game Logo for Crowdpark’s *Bet Tycoon*

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As a Crowdpark's social betting engine combines the simplicity of betting with the engagement of stock trading. As described in the first section, **dynamic betting** allows players to make a stake and cash out the stake anytime, like stock traders would buy and sell a share. Players find this aspect makes the game so much more engaging.

Crowdpark's *Bet Tycoon* is the first Social Game on Facebook to utilize Crowdpark's unique **Dynamic Betting** technology. With the push of a button a player can place a bet in *Bet Tycoon* and cash it out later. Our social betting engine does the math in the back. Players can fully focus on the live bets and follow the value of their stakes as real-life underlying events transpire on the 'first screen'. When used as a second screen game, players watch a live event, e.g. an episode of "American Idol," while following the value of their stakes on the second screen. For instance, after each performance, players can bet or cash out if they have changed their minds about who will win. In contrast, when a player places a traditional bet, the stake is gone and cannot be changed anymore until the actual outcome has materialized. **dynamic betting** provides a much more engaging and deeper interaction.

Because *Bet Tycoon* is a social game it adds a gaming layer to **dynamic betting**. Competing with friends on Facebook: Players can compete with friends who will achieve the largest winnings on a certain topic. As players progress in the game they collect trophies, purchase virtual goods and advance through the levels of the game based on their winnings.

## Dynamic Betting in Business

While **dynamic betting** is an engaging technology for games, its core prediction markets has proven its usefulness in serious games, i.e. in business forecasting. Companies use PMs to forecast various business key performance indicators (KPIs) with higher accuracy than before. The following paragraphs provide examples of how PMs have performed within companies.



**Example: Predicting Game Launch Dates.**

EA management uses PMs inside the company to let employees bet on project launch dates and product quality. The internal PMs of EA have a 50% smaller error than internal forecasts (see Fogarty, 2007).



**Example: Screening new product ideas.**

Since 2005, Google has used its internal PMs to let employees bet on new ideas. Google Maps was one of the new products, which came out of Google's prediction markets. Currently, it is one of Google's biggest services (see Cowgill et al., 2009).



**Example: Forecast sales of consumer goods.**

Global consumer goods firm Henkel uses PMs to forecast sales of its products such as LOCTITE™, Purex™, and Zout™. The PM have a 22% higher forecasting accuracy than Henkel's internal methods (Ivanov 2010).

## Conclusion

More than 1M players on Facebook have now experienced the excitement of **dynamic betting** through their bets placed in *Bet Tycoon*. Players bet, cash out, and compete with friends to become the *Bet Tycoon*. Players can change their bet at every turn of an event. This engages players more deeply and much longer than traditional one-shot betting, both on first or second screens. All betting is done with virtual money and is, therefore, 100% legal.

## References

Bo Cowgill; Justin Wolfers; Eric Zitzewitz (2009): *Using Prediction Markets to Track Information Flows: Evidence from Google*

Aleksandar Ivanov (2010): *Improving sales forecasts/sales planning for consumer goods*, CrowdWorx Case Study

Mat Fogarty (2007): *Expert Predictions*, Conference on Corporate Applications of Prediction Markets, Kansas City

Robin Hanson (2003): *Combinatorial Information Market Design*, Information Systems Frontiers, 5/ 1, Kluwer Academic Publishers, Fairfax, 107–119

Robin Hanson (2007): *Logarithmic Market Scoring Rules for Modular Combinatorial Information Aggregation*, The Journal of Prediction Markets, Vol. 1, No. 1, Buckingham University Press, Buckingham, 3–15

Rietz et al. (2003): *Accuracy and Forecast Standard Error of Prediction Markets*, University of Iowa, Working Paper

## Contact

Crowdpark offers several social betting and casino game products on a cross-platform basis based on collective intelligence and state-of-the-art algorithms. For more information on Crowdpark please write to [info@crowdpark.com](mailto:info@crowdpark.com) or contact an office near you.

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