On the Inner Workings of the Southridge Stock Exchange: A Case Study Into High School Economics

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Abstract

Despite the importance of economics in the modern world, schools offer very little in the way of a hands-on approach to understanding investment and fund management. This can compromise an individual's certainty on economic topics in their future, and can cause them to invest rashly and without counsel, even when many retirement funds are linked to market shares. This disconnect from the reality of investments can severely traumatize some individuals and potentially leave them in a worse position than they started in. This paper aims to demonstrate a low-risk yet high-reward method of teaching students how to properly invest in stocks and manage funds before they are released into the world as adults. The current system set in place seems to be very lackluster and unable to properly educate the future of this country. The system proposed in this paper, however, should ideally offer an easily digestible yet accurate model that can be adapted to any classroom need. This paper concludes by outlining a possible experimental setup for the model and an accompanying pilot study that will measure the effectiveness of the new model against existing material.

Keywords: investment, fund management, market shares, disconnect from reality, educate, adapt to any classroom need

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According to a survey conducted by Harris Interactive, many have a poor grasp of basic economics. According to the survey, "about half of American adults did not know that if they kept their money at home, in cash, they were at greater risk of losing ground to inflation than if they invested it elsewhere" (Wash, 2005). Similarly, according to the P-Fin Index, in 2024, the financial literacy rate among American adults was 48%, identical to the value in 2023, and down 2 percentage points from the Index data from 2022, and between the years of 2017 and 2024, the highest recorded literacy rate was only 52% in 2020. To further test the financial literacy of American adults, professors Annamaria Lusardi and Olivia Mitchell designed 3 multiple-choice questions known as 'the Big Three.' Only 30% of Americans answered them correctly (Meineke, 2024).

This staggering financial illiteracy among Americans brings along with it several risks, both to the general economy and the financial future of the individual. Among young adults (ages 19-29), many do not have the necessary education to properly manage a credit card, frequently receive solicitations for credit card applications, and are unaware of the long-term effects of a low credit score. As a 2016 report to the NEFE puts it, "Not understanding the degree to which high interest rates can increase debt burdens can be costly" (Walstad et. al., 2016). A lack of financial literacy has been shown to lead to, among other things, debt accumulation or mismanagement, inadequate retirement planning, impulse spending and lack of budgeting, slowed career growth, increased vulnerability in tough financial times, and, importantly for this paper, missed investment opportunities (Francis, 2024). In terms of the effect of financial illiteracy on the economy as a whole, increased financial illiteracy can be correlated with increased economic inequality, and over time, as the generational wealth gap expands, financially illiterate populations lose access to wealth generation and

accumulation. This becomes especially clear after recessions, where financial literacy can often dictate who does and who doesn't financially survive (WealthWave, 2024).

Collectively, all sources suggest, and often highly encourage the presence of a financial literacy program, claiming that (1) "By addressing financial illiteracy, we can create a more financially resilient and equitable society," (2) "financial education can be effective in many ways across the broad landscape of groups and issues it covers," and (3) "Only through a commitment to financial literacy can individuals pave the way for a secure and prosperous future" (Francis, 2024; Walstad et al., 2016; WealthWave, 2024).

Learning proper investment strategies in particular is of great importance, especially as many retirement and pension funds are based on investments made into stock exchanges and indices (CFI Team, 2025). Being overly confident in a stock's future or not having back-up plans can lead to devastating, potentially irreversible consequences, as could be seen in the 2009 collapse of Nortel Networks, which continues to affect some individuals to this day (Hunter, 2018).

Furthermore, the use of models and hands-on activity in classroom setting has been shown to increase student participation and furthermore, it helps to communicate higher-level thinking, "Model-based instruction (MBI) that engages students in using, building, revising, and evaluating models can promote multiple dimensions of science learning, including both development of content understanding and skills." Students can also use models to test predictions and double-check their understanding of course material, and crucially, "Models can also support the development of systems thinking skills" (Wilson et al., 2020).

Regarding financial literacy, many critics of the subject, often cite the ineffectiveness of the current curriculums rather than the concept of financial education. Based on this, an assumption can be made that more engaging and age-appropriate teaching methods, especially ones that are hands-on and interactive would

not only increase financial literacy in the U.S., but also boost public support for financial education, especially in states where such courses are not mandatory for graduation (Money Vehicle Team, 2024).

Among the tools used for financial literacy education, hands-on activities, including stock market simulations, are some of the most recommended, even among large players in the finance sector such as banks (Office of the Comptroller of the Currency, 2025). However, existing models offer little in respect to customization which prevents teachers from altering the structure of the model to illustrate certain points or to help with teaching in general.

For this purpose, we as the authors believe that it is necessary for the future of financial literacy in the U.S. for there to be customizable, hands-on teaching and learning material for financial literacy courses in American schools. And a majority of Americans agree with this statement. In a 2022 survey, 88% of adults believed that high schools should require financial literacy courses. As of early 2025, over half of the states in the U.S. have integrated financial literacy education into their curriculums; 16 require financial literacy courses in order to graduate, and 11 allow for some graduation requirements to be switched for financial literacy courses (Excel in Ed, 2025).

Based on this end goal, and a visibly growing market and necessity for financial literacy education tools, a model stock exchange was developed and tested over the course of a little over two months with the intent of being a teaching aid in financial literacy courses.

Designing a Model

In order for a model stock exchange to both accurately real-world economics while also being digestible enough for high school students of all ages to use and understand, a few criteria have to be met. Primarily, (1) the act of buying and selling shares must be intuitive and clear-cut, (2) the price of a share must react in some form or another to real-world events, and (3) it must be able to teach investors something about financing.

The first criterion was satisfied by using an online survey form with simple and easy to understand instructions for buying and selling shares. Although the existence of a stockbroker has been omitted, it is a necessary sacrifice to make in order to not only give investors more financial freedom, and as such make the results of any observations more accurate, it gives investors instant gratification upon buying or selling shares instead of having to wait for a stockbroker to process their request.

The second criterion was significantly harder to satisfy. Although share prices are not directly influenced by real-world events such as the outcomes of sports games, they are still responsive towards investor habits. In this way, we hope that investors will buy and sell shares based on real-world events, although we also realize that many investors will likely ignore real-world events and simply buy and sell on a whim.

The third criterion was met by having investors wait and plan what investments they want to make. Furthermore, the system restricts an investor's actions when they go into debt. If an investor's bank worth drops to below 0, they can no longer purchase any new shares. If an investor's net worth drops to 0, they can no longer buy nor sell shares, and must rely on a bailout from a fellow investor by means of a share gifting.

This should hopefully teach investors to keep track of their portfolios, make wise investment decisions, and understand that they are not in a vacuum and that sometimes they may need the help of others.

Explaining the SSE

Given the importance of financial literacy, especially hands-on learning, a model of the stock exchange, albeit dumbed down and severely simplified, has been developed to help create a financial literacy program at Southridge High School, and importantly, track the investment patterns of teenagers ages 14-18. This model, known as the SSE, short for Southridge Stock Exchange, allows registered students to buy and sell fictional shares without the real-world risk of debt or bankruptcy.

Exchanging Stocks. The SSE uses a Google Form to gather and track the buying and selling of stocks. The data from the responses is stored in 3 main places: as an email verification to the investor, in the accompanying Google Sheet, and within the Google Form itself.

When an investor makes an investment by submitting the Google Form, their response is processed in two places. First, a set of functions within the accompanying Google Sheet compares the inputted values against an existing database and flags any relevant fraud, either identity theft, characterized by a wrong password, or financial fraud, characterized by the amount of shares currently owned being incorrectly reported. Investors are able to view how many shares they have, as well as their password, on their individual portfolio sheet that only they, as well as the developers can access. Developer access is necessary for the exchange code to function properly. At the same time, an external block of code processes the transaction, and given that no fraud has been detected, the investor's account and portfolio are accurately updated.

Opening and Closing the Exchange. Just like how real-world markets don't run indefinitely, the SSE too has strict operating hours. Specifically, the exchange opens at 8:35 am PST and closes at 2:35 pm PST based on an automatic system. The exchange remains closed on weekends and during summer break to mimic the school schedule as much as possible. The exchange usually reopens around the first week of August to let the price of shares fluctuate a bit before the school year starts.

If needed, the managers of the SSE have the ability to manually close the exchange for a period of time which prevents price changes, or freeze the google form which prevents investments from taking place. These actions are taken to test new features and ensure the exchange conditions remain stable and unchanging when pushing new updates, or when the exchange is closed for long periods of time like during summer.

Changing Share Prices. In order to provide a reason for investment, twice a day, once when the exchange opens, and once at noon, share prices change. In order to determine by how much prices change, an automatic system takes in the following inputs, grouped into two categories based on whether they track the exchange as a whole or an individual stock. In the first category, the algorithm tracks:

1. The evaluation of the individual stock based on Index A
2. The ratio between the average of Index B and the overall market average, with a higher ratio being better
3. How has the total market value recently changed, with a positive change being good and a negative or null change being bad

In the second category, the algorithm tracks:

1. Whether the share price is above or below the price bid.

   a. The price bid is the lowest bidding price selected by investors when they buy or sell that stock. If the bidding price is 0, an algorithm will semi-randomly select a price bid
2. Whether the share price is above or below market average. The algorithm will apply a negative evaluation if the share price is above the average in order to pull it down, and vice-versa
3. How the price of the share has changed over the past few market days. If the share price shows a positive trend, a positive evaluation is applied and vice-versa
4. How many shares of that stock are left in the market. The more shares a stock has left, the lower the evaluation applied. This reflects how stocks with high share counts (i.e., those that have recently been mass sold, or not bought in the first place) are likely to be doing bad
5. How many investors own shares of that stock. The more investors own a share of that stock, the higher the evaluation applied. This reflects how a stock is likely to be doing good if a wide variety of people own shares in it rather than if just one or two individuals own shares
6. What percentage of all transactions does this stock take up. For percentages higher than 7% and lower than 2.5%, a negative evaluation is applied. Otherwise, a positive evaluation is applied. This is intended to prevent a stock from becoming too popular while also ensuring that the market average isn't tied too strongly to one stock. The collapse of the Canadian company Nortel is a great example of why this can be bad. "Nortel's shareholders, employees and pensioners suffered enormous losses after the company filed for protection from its creditors in Canada, the United States, Israel and the United Kingdom," where during its peak, "Nortel's common shares reached a historic high of $124.50 on the Toronto Stock Exchange (TSE) and represented over 35 per cent of the value of Toronto's TSE 300 index" (Hunter, 2018).

Upon summing up the evaluation scores for both categories of inputs, the algorithm will randomly increase the value of a share with a higher evaluation score meaning a higher chance for the change to be positive and a higher maximum change.

The maximum amount by which a share's price can change is roughly equivalent to the value of the function $2arcsin(\frac{e_{valuation}}{62.1})$[Figure 1, 2], where the value of evaluation can be one of 1, 10, 20, 30, 40, 50, 60, or any of the corresponding negative numbers, with intermediary values treated as the previous multiple of ten. E.g., an evaluation of 15 is computed as an evaluation of 10; an evaluation of 37 is computed as an evaluation of 30. The arcsin function is used as its slope is not constant and changes over time, while also producing negative y-values when negative x-values, or in this case, negative evaluations are inputted. Cubics and other polynomials of an odd degree that have similar properties as in order for the change in share price to be reasonable at evaluations greater than 10, the share price must be lowered to less than a cent at some of the lower evaluations. The spacing for evaluations, wherein an evaluation is processed as if it were the previous multiple of ten is to ensure that the change in share price between each evaluation is high enough to allow for a noticeable difference and make sudden, large changes in share price feel more important, while also not being too big of a gap, which would lead to a lack of diversity in share price changes.

However, the price of a share is not always guaranteed to change as expected. Instead, a random integer is generated between 1 and 100, and if it is less than or equal to the approximate value of $\frac{(\int_{e_{valuation}}^{n_{extEvaluation}} 0.5arcsin(\frac{x}{60}))}{350} * 100$[Figure 3], such that P(share price updates as expected) $=\frac{(\int_{e_{valuation}}^{n_{extEvaluation}} 0.5arcsin(\frac{x}{60}))}{350}$, with P(share price updates as expected) = 0.99 when the evaluation is 60 or higher. If this value is not met, the

share price instead changes by $-0.5arcsin(\frac{e_{valuation}}{60})$[Figure 4, 5], where once again, evaluation can be one of 1, 10, 20, 30, 40, 50, 60, or the respective negative number. This function returns positive values for negative evaluations and vice-versa, ensuring that if a positively-evaluated stock fails to update as expected, it will crash in share price, while the opposite is true for a negatively-evaluated stock. If, however, the share price updates as expected, a random number between 0.01 and $2arcsin(\frac{e_{valuation}}{62.1})$ is generated to be used as the change in share price.

Using these formulas gives a situation where stocks with higher ratings are more likely to increase share prices by large amounts, but if the share price does not update as expected, the fallout is worse and the share plummets more. This mimics how in real-life, more successful companies are more reactive to shareholder actions and even the tiniest deviations in profit or performance, while smaller, lesser known companies are less likely to crash or go under in the event of underperformance.

If the activity a stock is connected to is inactive, that is, the season it is tied to is not the current season, the value by which the price changes will be 25-33% of the expected value. This is applied before the LSRL and Lagrange Polynomial.

Finally, the algorithm computes two estimates for the new price. First, it calculates the Least Squares Regression Line (LSRL)[Figure 6] for the price of the share, and second, it calculates the Lagrange Polynomial using the last 3 data points[Figure 7]. Based on where the final value lands in comparison to the two estimates, the share price can either increase, decrease, or remain unchanged. If the new value of the share is above both estimates, it is given a 1.2x boost. If the new value is above the Lagrange Polynomial but below the LSRL, it

is given a 1.05x boost. If it is above the LSRL but below the Lagrange Polynomial, no boost is given, and if it is below both estimates, a 0.85x change is applied[Figure 8].

Market Bubbles. Because the SSE only updates once a day, the amount by which a share can change in price is way higher than what would be expected from a real-life stock exchange. For example, while the price of a share is expected to go up only a few cents, maybe a dollar or two in the real world, in the SSE, the lowest possible increase in share price is 3 dollars, with an average increase in price closer to around 20 dollars. This creates a situation where the price of a share can easily reach into the hundreds, or even thousands of dollars within just a few days of activity. To combat this, a stock is evaluated and given a 'bubble rating' that tells if a stock is currently experiencing a market bubble, or if it should be updating like a normal stock.

In order to determine the bubble rating of a stock, the SSE takes into account the following factors:

1. The buy bid of the stock; how many times larger is the buy bid of the stock compared to what the final share price is. The higher the difference, the higher the rating.
2. The diversity of a stock; how many investors own a share of that stock. The more investors, the higher the rating.
3. What is the group bias of the stock on Index A. The higher the bias, the higher the rating.

This ensures that stocks with higher buy bids (people being willing to buy shares for prices significantly above baseline valuation), high diversity (a wide variety of people are investing in the stock), and high group biases (unproportionately high amounts of transactions compared to other stocks) are more likely to be classified as experiencing a bubble than other stocks.

Using the bubble rating of a stock, a random value is generated known as the bubble chance[Figure 9]. This will be used to determine how likely it is that the bubble will continue to grow before bursting. If the price of share exceeds $2,000, if a randomly generated number between 1 and 100 is less than or equal to the bubble chance, nothing happens. Otherwise, the new share price is recalculated as the previous value minus the calculated change in share price divided by 1.4. For $1,500, the penalty is the calculated change in share price divided by 2, and for $1,000, the penalty is the calculated change in share price divided by 2.4. This means that the higher the price of a share, the more it drops by if the bubble bursts.

It is important to note that in the SSE bubbles don't burst like they do in traditional markets. If on one day the price of share rapidly falls, it may still surge back up to $1,000, $1,500, $2,000, or even more the next. This system is designed only to prevent as many stocks as possible from having unrealistically inflated share prices. However, stocks that recently dropped in price are more likely to continue dropping, especially if they have low bubble ratings.

Indexes. As mentioned, the exchange is evaluated partially by two independent indices: Index A and index B

Index B is the simpler of the two to understand. The index tracks the top 8 valued stocks in the exchange by price, given that the stock is active. Every Monday, assuming the exchange is open and has updated, Index B updates.

Index A takes into account how much a stock's price has changed, what percent of the total transactions come from that stock, and how likely the business associated with the stock is to continue growing.

Designing a Study

Using the SSE as a model stock exchange, along with a set of rules for investment, and a way to track participant activity and overall change in financial literacy, it is possible to conduct a scientific study that (1) evaluates the effectiveness of the SSE as financial literacy tool, especially for High School students, (2) proves or disproves the need for financial literacy programs in U.S. High Schools and determines whether it is effective to invest resources in teaching High Schoolers how to manage finances or whether that role should be allocated to a different entity, and (3) tracks the differences between investment patterns in High School students and adults, High School Students and other High School Students of differing classifications, either wealth, grade, academics, or any other topic of interest, or any other combination of two distinct groups.

Spreading and Sharing of Information. Participants should be given a basic course on how to use the SSE as well as an explanation that this is a study and that their actual profits are not in danger. Those designing and tracking the study should be given as little access as possible to the names of the participants, and should ideally be unable to view the investment histories of the participants.

Distributing the Model

The visual part of the SSE that investors can see and to a degree interact with is comprised mainly of three separate items, those being (1) the main SSE sheet that visualizes changes in share prices, (2) the individual portfolios that each investor has, and (3) the Google Form used to track investments.

When setting up the study, give each participant access to the main SSE sheet, their individual portfolio, as well as the Google Form. Be sure to set up the code correctly.

Once all participants have received the model, the study can be performed without issue.

Optional Method of Distribution. With a large number of participants it can often become troublesome to individually make dozens of different sheets and make sure that errors don't arise. Because of this, for studies with a substantial number of participants, it is possible to forgo the use of individual sheets. Instead, give participants fake bills to pay with and assign one or more 'stockbrokers' that process the participants' transactions for them. Although this method is easier to set up, it requires participants to show up in person and is much more time consuming when it comes to running the exchange as you effectively remove 90% of the automation in the exchange and force it all on the hands of a few people. If this method is used, those in charge of processing transactions cannot analyze the data that comes out of the study due to possible bias.

Finding Participants

For the purposes of this study, a group of at least 120 individuals is needed to ensure a large enough sample size to accurately predict the population parameters for this study, with a maximum sample size of no more than 10% of the target population, whether that be all of America, all American High School Students, or some other target population.

Locating Interested Individuals. First, a brief overview of the goals of the study and the methodology that will be used should be published either in a newspaper column or some other publicly accessible place. Attached should be a phone number or email address by which interested individuals can contact the designers of the study.

Filtering Participants. Have all participants take a financial literacy test. Then, randomly select participants to take part in the final study such that the distribution of financial literacy scores in the final

group of participants is roughly uniform. The method of random selection or filtering of participants is up to the designers of the particular study.

Tracking Participants. Once the final set of participants has been selected, distribute the necessary materials and give instructions on how to properly participate in the study. Importantly, it is not allowed to guide the participants on what decisions they should or shouldn't make.

Running the Study

Starting the Study. Once all participants have been finalized, split the participants as evenly as possible into two groups, trying to maintain an equal distribution of financial literacy scores in both groups as much as possible. Both groups will take a weekly financial literacy course, with the caveat that one group will be given the SSE, while the other group learns exclusively through the provided course.

The Study. Over the course of a few weeks, periodically track the progress of the participants. The use of mini-tests or other tools with easy quantization of ability is recommended. Ensure that both groups are given the same course material and tests, and that the only difference between the two groups is that one has the SSE, while the other doesn't.

Completing the Study. Once the study is complete, have all participants take a final exam that should be structured similarly, if not identical to the pre-study knowledge test. Then, organize the scores into a chart, starting with the pre-study knowledge test on the left-hand side and ending with the final exam scores on the right-hand side*[Figure 10]*.

Processing Data. Give the data to either an independent research team with no affiliation to the study, or to researchers in the study who did not partake in filtering participants or otherwise actively helping with setup or management of the study. Once all data has been processed and evaluated by the appropriate people, format the findings of the study in an appropriate way, and if desired, publish the results.

Post-Study Options. After the end of the study, a second study can be conducted to ensure the stability and validity of the results. If the study was completed and did in fact show that the use of models such as the SSE helps improve financial literacy, it might be interesting to see how the SSE fares against other models, and more specifically, which type of model is best.

Variables

The number of participants needed for this study, *n*, should be around 120 (60 per group), or preferably higher, in order to reach a Cohen's d coefficient of around 0.5. In other words, if the difference between the two groups is moderate and not too extreme, which is what should be expected for such a study as the one proposed above, around 60 participants per group would be needed. "[If one expects a] medium effect size in a study examining differences between two groups (ie, using an independent samples t-test), the required sample size to achieve power of .80 with alpha of .05 is n = 64 per group when using Cohen's (1988) estimate of Cohen's d = 0.50." (Brydges, 2019).

The recommended significance level, α, should be the standard of 0.05. Because this is not a medical study, lower significance levels are not productive as the effect of a type-I error isn't as serious.

The response variable that the study is trying to measure is the mean difference between pre- and post-study test scores on financial literacy topics.

Expected Sources of Error

As with any study, errors are bound to occur. For the study detailed above, a list of possible errors have been compiled. The list is not guaranteed to be accurate or extensive to any degree. Any persons who wish to run a study on the basis of this paper must track possible sources of error themselves and not rely solely on the following list.

- Detachment from real-life money. *Because the SSE does not use real money for transactions, there may be some participants who are willing to invest more rashly due to the lack of genuine financial risk.*
- Communication with people outside of the study. *Communicating with non-participants, or even other participants for that matter may give some participants financial aid and advice that can tamper with the results of the study.*
- External teaching. *Similar to communicating with other people, participants may find it beneficial to watch instructional videos or read informational articles on financial literacy and management other than those provided by the study's course, thus tampering with the results of the study.*
- Poor retention of information. *Some participants may have a harder time retaining the information taught in the study's educational course.*
- Loss of interest. *Due to the long, and generally boring nature of the study, especially given its more academic structure, many participants may lose interest in the study and end up obfuscating data*

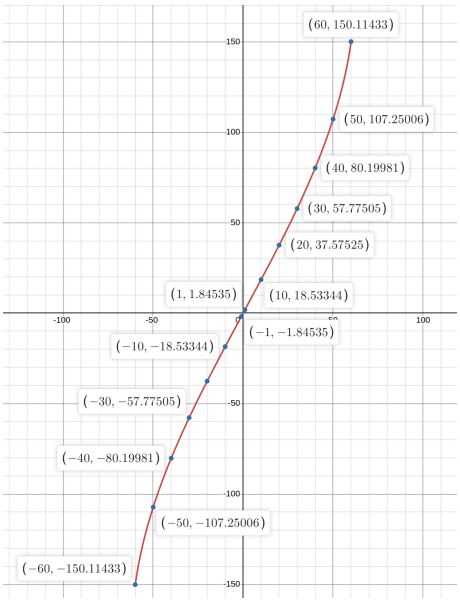
Conclusion

To summarize, we as the authors of this paper, given the levels of financial illiteracy found in the U.S. today, as well as the growing support for financial education and model-based instructions, believe it is in the best of interest of Americans to adopt models such as the SSE to help with teaching financial literacy and financial management to students of High School age. To this extent, we have documented the capabilities of the SSE as a model stock exchange and outlined a potential study that could be run on the basis of this paper and its claims. Furthermore, to test the capabilities of the SSE we allowed certain individuals early access to versions of the SSE, primarily for testing purposes, but we found that, even without an instructor guiding them how to use the SSE, and without any incentive in general, those who had access to the SSE showed high levels of interest in the project and were willing to continue using it even after the need for testers was large irrelevant. We hope that, although the model described in this paper may not reflect real-world economic transactions and stock exchanges or exchanges perfectly, it will still be able to serve as an engaging and fun educational tool to help increase the level of financial literacy within the US. We hope that this model, regardless of whether or not a study testing its capabilities as an educational tool is run, becomes used in classrooms as a way to teach financial literacy in a more hands-on manner where students get to experience firsthand their success and failures and as such, retain information on financial management at much deeper level.

Figures

Figure 1

Graph of the share price change function.



Source: https://www.desmos.com/calculator/bf35lmqysq, 'regular change functions' folder

Function: $2arcsin(\frac{e_{valuation}}{62.1})$

Figure 2

Table of values for share price change.

Evaluation	Change Range
60+	+$0.99 – $150.99
50 – 59	+$0.99 – $107.99
40 – 49	+$0.99 – $80.99
30 – 39	+$0.99 – $58.99
20 – 29	+$0.99 – $37.99
10 – 19	+$0.99 – $18.99
1 – 10	+$0.99 – $2.99
-1 – -9	-$0.99 – -$2.99
-10 – -19	-$0.99 – -$18.99
-20 – -29	-$0.99 – -$37.99
-30 – -39	-$0.99 – -$58.99
-40 – -49	-$0.99 – -$80.99
-50 – -59	-$0.99 – -$107.99
-60-	-$0.99 – $150.99

Figure 3

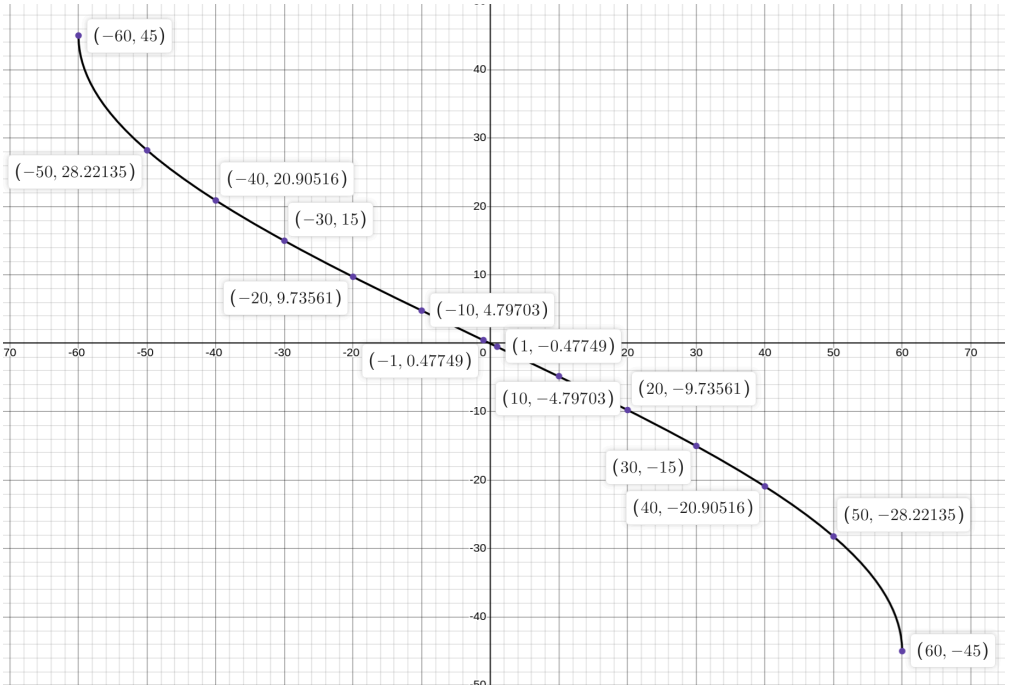
Probability of a successful change in share price given a certain evaluation.

Evaluation	Chance of success	Chance of success based on function
60+	0.99	UNDEFINED
50 – 59	0.97	.9680
40 – 49	0.7	.6967
30 – 39	0.51	.5108
20 – 29	0.35	.3523
10 – 19	0.21	.2071
1 – 10	0.07	.06769
-1 – -9	0.07	-.06769
-10 – -19	0.21	-.2071
-20 – -29	0.35	-.3523
-30 – -39	0.51	-.5108
-40 – -49	0.7	-.6967
-50 – -59	0.97	-.9680
-60-	0.99	UNDEFINED

Function: $\frac{\left(\int_{e_{valuation}}^{n_{extEvaluation}} 0.5arcsin\left(\frac{x}{60}\right)\right)}{350}$

Figure 4

Graph of backfired share price change function.



Source: https://www.desmos.com/calculator/bf35lmqysq, 'backfire functions' folder

Function: $-\ 0.5arcsin(\frac{e_{valuation}}{60})$

Figure 5

Table of values for a backfired share price change

Evaluation	Change Range
60+	-$45 – -$45.99
50 – 59	-$28 – -$28.99
40 – 49	-$21 – -$21.99
30 – 39	-$15 – -$15.99
20 – 29	-$10 – -$10.99
10 – 19	-$5 – -$5.99
1 – 10	-$1 – -$1.99
-1 – -9	+$1 – $1.99
-10 – -19	+$5 – $5.99
-20 – -29	+$10 – $10.99
-30 – -39	+$15 – $15.99
-40 – -49	+$21 – $21.99
-50 – -59	+$28 – $28.99
-60-	+$45 – $45.99

Figure 6

Least Squares Regression Line (LSRL) function for predicting future changes in share price.

$\hat{y} = a + bx$, where

$b = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$, where

n is the number of data points, and $\bar{x}$ and $\bar{y}$ are the x and y means respectively, where x is the market day and y is the price of a share on that specific market day.

a is calculated as $\bar{y} - b\bar{x}$

Function provided by: ChatGPT Model-4

Figure 7

Lagrange Polynomial function for predicting future changes in share price.

$f(x) = y_1 * \ell_1(x) + y_2 * \ell_2(x) + y_3 * \ell_3(x)$, where

x is the target market day for predictions, typically the next-most market day, and

$\ell_1(x) = \frac{(x-x_2)(x-x_3)}{(x_1-x_2)(x_1-x_3)}$, $\ell_2(x) = \frac{(x-x_1)(x-x_3)}{(x_2-x_1)(x_2-x_3)}$, and $\ell_3(x) = \frac{(x-x_1)(x-x_2)}{(x_3-x_1)(x_3-x_2)}$, where

x_1, x_2, and x_3 are the 3 most recent market days such that if x is market day 14, x_1, x_2, and x_3 are market days 11, 12, and 13 respectively. Likewise, y_1, y_2, and y_3 are the share prices at those particular market days.

Function provided by: ChatGPT Model-4

Figure 8

Change in share price based on the relation to expected outcomes using the LSRL and Lagrange Polynomial.

Relation to expected outcomes	New share price
Above LSRL and above Lagrange Polynomial	Calculated Share Price * 1.20
Above Lagrange Polynomial and below LSRL	Calculated Share Price * 1.05
Below Lagrange Polynomial and above LSRL	Calculated Share Price * 1.0
Below Lagrange Polynomial and below LSRL	Calculated Share Price * 0.85

Figure 9

Possible values for the 'bubble chance' variable given a stock's bubble rating

Bubble Rating	Bubble Chance
18+	80 – 100
14 – 17	70 – 90
8 – 13	60 – 80
0 – 7	50 – 70
-8 – -1	40 – 60
-14 – -9	30 – 50
-18 – -15	20 – 40
-19-	10 – 30

Figure 10

Example formatting of potential study data

Participant Number	Using SSE?	Pre-Study score	Week 1 score	Week 2 score	Week 3 score	Week 4 score	Final Score
1	No	50/100	60/100	65/100	73/100	79/100	82/100
2	Yes	60/100	63/100	70/100	77/100	85/100	90/100
…	…	…	…	…	…	…	…
n	--	--	--	--	--	--	--

Note: This data is purely theoretical. It is not from any study or pilot.

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