Horyzonty Polityki
2019, Vol. 10, Nº 31
OPEN ACCESS

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DOI: 10.35765/HP.2019.1031.05

Learning by Doing Nasdaq FaceBook Experience

Abstract

RESEARCH OBJECTIVE: The future of financial economics development belongs to the capital market solutions – an alternative source of effective financing. The purpose of the article is an attempt to make a glance for teaching experience based on new financial pedagogy, factual on learning by doing and simulating – active decision making in the process of choice the financial instruments from capital market solutions.

THE RESEARCH PROBLEM AND METHODS: The world of stock exchanges is dominated by 16 major players, whose total market capitalization exceeding USD 1 trillion in which the United States represents 40.01% of the global market capitalization. All recognizable brands, such as: Apple, Google, Intel, Microsoft or FaceBook are listed on the NASDAQ stock exchange. Looking for a suitable example that would allow students to be creatively involved in learning through new financial pedagogy, the FaceBook were choose.

THE PROCESS OF ARGUMENTATION: Facebook is a reliable – in terms of capitalization and market value – listed company, which is also a global leader in social networks. Two-minute real calls were used to show the opportunities and threats arising from stock market investments. The received effects of students' inference were compared with the knowledge they acquired after using traditional teaching materials.

RESEARCH RESULTS: Authors present in the article mechanisms functioning on the capital market and the inference process, enabling profitable decisions to be made a few days before the expiry date of the option, as well as

Suggested cittation: Vila Biglieri, J.E. & Małecka, J. (2019). Learning by Doing Nasdaq FaceBook Experience. *Horyzonty Polityki*, *10*(31), 81-102. DOI: 10.35765/HP.2019.1031.05.

the limitations resulting from the use by students' traditional textbooks and the knowledge transferred through them.

CONCLUSIONS, INNOVATIONS, AND RECOMMENDATIONS: The study covered the results of efficiency and the ability to avoid inhibiting the development of student learning in the field of capital market instruments through direct action and involvement them in decision making processes.

Keywords:
financial economy, economy, learning by doing, NASDAQ, FaceBook

INTRODUCTION

The Amsterdam Stock Exchange, which dates back to 1602, was the first in Europe which the importance still is growing exponentially (tretopalm.com, 2019). As a part of Euronext, it belongs to the top European stock exchanges, which has been owned by NYSE since 2006. The future of financial economics development belongs to the capital market solutions, which are increasingly being considered as an alternative source of effective financing. Nowadays, there are 16 stock exchanges in the world with a market capitalization of more than $1 trillion. The United States represents 40.01% of global market capitalization (seekingalpha.com, 2019) and maintains slow-but-steady growth from 2009 as the longest period in American history (edition.cnn.com, 2019).

From 1971 it was establish stock exchange in United States, which is the first in a completely electronic trading system – *National Association of Securities Dealers Automated Quotations (NASDAQ).* NASDAQ is the World Number Four in market capitalization, having all corporate and companies listing, relevant financial information, a portfolio tracker on a customizable web page. Nowadays, it is technology powers more than 70 marketplaces in 50 countries, and 1 in 10 of the world's securities transactions. NASDAQ is home to more than 3500 listed companies with a market value of over $9.1 trillion and more than 10 000 corporate clients (nasdaq.com, 2019). NASDAQ

"never sleeps," providing information quote and financial analysis 24 hours a day and dedicated investment channel wherein provides IPO analysis, broker comparison, investment basics, etc (see also: Małecka, 2016, pp. 91-122; Małecka, 2015, pp. 349-362).

Financial teaching, mainly used financial books, are written by people with only theoretical background. Without starting to discuss the differences between theory and practice, attention was paid to the construction of the financial market and the ability to distinguish its individual markets. It was noticed that the money market is treated by most users as the main financial market and not only a part of it – often even as a synonym (figure 1).

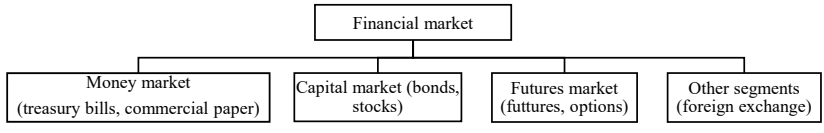


Figure 1. Structure of the financial market in Poland.
Source: Małecka, 2015, p. 351.

Hence research in this area are interesting and important, especially in terms of future qualifications and competences of people who graduate from universities and have finances in their curriculum.

Access to information about the capital market – and especially to its most important institution, which is the stock exchange – is done via the Internet, mainly on-line. That is why the implementation of platforms enabling on-line simulations – even free ones – for teaching finance and understanding the mechanisms of capital market instruments is becoming so important. And that is the mainly reason why learning by doing is so relevant, special in the aspects of stock exchange and implementation capital market solutions.

Comparing four teaching techniques overall scores between 0 and 1, Lecture mean was 0.64, Demonstrations 0.79, Discussion 0.82 and In-class activities 0.89 (Hackathorn, Solomonh, & Blankmeyer, 2011, p. 48; see also: Jaber, March, & Zanoni, 2019, pp. 627-639; Gibbs, 1988). This an empirical study which highlights the In-class activities importance to learn. Experience makes perfection. Supporting this idea, Learning is a product of experience (doing). Learning can only

take place through the attempt to solve a problem and therefore only take place during the activity (Arrow, 1962, pp. 155-173).

Several activities were developed using Learning-by-Doing, (LbD) on several sectors. As a complete list can be unaffordable, we will give some examples; United States Air Force and Intel (Lesgold, 2001, pp. 964-973), Chemical Engineering (Felder & Brent, 2003, pp. 282-283; Felder & Brent, 1994), welding, biology, nursing, etc. (Gibbs, 1988), LbD with Australian scholar-activism (Thompsett, 2016, p. 65) and the latest, applying LbD to elite FIFA referee technical instructors (Armenteros, 2019, p. 395). Using this LbD cases in the stock markets courses – even the two hours weekly like it is at the universities – the basic knowledge is given which is designed for every people. In this two hours, the differences between students with previous traditional financial knowledge and people without it are not able to distinguish – this is a Lecture basic characteristic, almost all knowledge is completely forgotten.

Such attempt to create a special courses in this issue should be done. Professors are controlling the student work, asking if they understand each task or they have any difficulties. This activity broke the ice, building a pattern of behaviour conducive to asking more questions what satisfied both sides, special when the real understanding appears. This is the way in which the new financial pedagogy should be work. Professors are learning-by-doing too, making suggestions to improve the teaching each course.

This article is an attempt to shows a teaching experience based on ne finantial pedagogy on psychological Learning-by-Doing which proposes a theory of the processes that enable a student to learn while engaged in solving a problem (Johnson, Johnson, & Smith, 1988; Yuichiro, 1979, pp. 124-140). As a results shows, in this way students gets engaged easily with the stock market because their economic and financial relevance from, capital market solutions.

METHODOLOGY

Looking for a suitable example that would allow students to be creatively involved in learning through new financial pedagogy, the Face-Book were choose a well-known and stable brand, leader on the social

media market. To compare the achievable learning outcomes, a free, publicly available simulation platform was used – "INVESTOPEDIA" – using two types of call options and linear regression principles (https://www.investopedia.com/best-online-brokers-4587872).

Investopedia includes Interactive Brokers (IB) on the top 5 worldwide brokers on line. IB Brokers has a wealth of tools for sophisticated investors. The firm makes a point of connecting to any electronic exchange globally, so the trade equities, options, and futures from all over the world and around the clock could be used during the lectures, on student's desktops or mobile devices. Interactive Brokers has been adding features to attract more assets and help newer investors, including its own robo-advisory (https://www.investopedia.com/best-online-brokers-4587872).

At the course, a paper account in Trader WorkStation (TWS) were used. This software allows to trade as a professional, including multimonitor presentation. Classic TWS view makes trades easy in an old-fashion-way platform, but the TWS Mosaic view is 100% customisable, allowing market scanners, graphs, data, news, performance, prices, etc. to be shown according to the trader requirements and abilities. Moreover, TWS is continuously improved and its tools are increasing in performance and innovation – by example, probability lab allows to establish the investors future predictions and check thousands and thousands options combinations in real time, showing each within estimated profit and probability. Probability lab has customizable number of legs, including stock or delta zero strategies. When trader select the most profitable, only one click send the order to market to be fulfilled.

The LbD technique, presented in the article continue with a lot of common sense, but frequently, common sense is the least common of senses. There were presented trading activities to do with real data in a paper account. The most frequently question that have appear between students was about how the loses could be avoided, special in such simulating environment where they could forgetting that the no real money are used during learning process. The stock market course duration is twenty hours. It is mandatory to do a presentation and ask questions. At the end of all course – what to confirm the evaluation results – an exam were done, to create the date for describing and presenting in the article.

In the course participate 150 students with course of Finance in Spain and Poland separately, which took place in the second semester of the 2018/2019 academic year (February–June 2019). The course included 5 hours of classes per week in Spain (50 students), and 6 hours of classes per week in Poland (100 international students), excluding public holidays. The third March Friday is called triple hour witch because is the day when futures, futures options and stock options expires. This is a trimestral issue which happens on March, June, September and December.

To obtain the results, mathematical analysis tools and elements were used – the results are presented in tables and graphs and are based on calculations performed with the real data and simulations with the Big Data database, where the statistical and mathematical analysis tools were used.

As an example taken from the last course, the FaceBook was used. FaceBook's mission is to give people the power to build community and bring the world closer together (facebook.com, 2019; see also: Cvijikj & Michahelles, 2011). Nowadays, FB become the most popular social media platform. Additionally, FB is an important factor on the transition to the Post-true era, in which emotional and ideological appeals are more influential in shaping public opinion than objective facts (Barfar, 2019, pp. 173-179).

There are several articles and publications about the FB importance – some of them will be highlighting. First of all (1), articles which explains how FB is essential on people lives, in which their authors describe the findings identifying FB as a useful tool to fulfil human needs and satisfaction with life (Hougton, Pressey, & Istanbubullouglu, 2020). Other relevant aspect is the interactivity on FaceBook which influences user engagement in terms of like, comments, and sharing (Luarn, Yu-Fan, & Yu-Ping, 2015). Second of all (2), the economic FB relevance in marketing is describe in an article which explain how brands participate in social network sites (SNSs) and investigates both the different strategies they adopt and the factors that influence these strategies (Murphy, Patterson, & O'Malley, 2019, pp. 425-445; Araujo, 2012, pp. 626-640). In third place (3), polemic issues like Cambridge Analytica, a marketing firm that illegitimately acquired (because a FB's API weakness) data on millions of FB users and used them to contribute to Trump's campaign (Venturini

& Rogers, 2019, pp. 532-540). The last but not least issue (4) is digital coin Libra which will have the power to pay directly on WhatsApp and Messenger. Association Libra was created by the 21 members on October, 15, 2019 (lavanguardia, 2019).

The FB stock market performance is in the main center of interested. The main FB business is advertising on social networks. FB is a well-known and stable company without dividends distortion with a market capitalization of 552 American billion dollars on October 30, 2019. FB allows students to be creatively involved in learning through this new financial pedagogy, because all of course attendant use it few times daily.

FINANCIAL DERIVATIVES

Options become popular in 1990 (Bachelder, 2014). Option definition is the temporary acquisition of a right, after paying an established price, which give approval to realize or not the option of trade. American option can be executed any time, but European only at expiration date. Options are equivalent to 100 shares. There are two types of options: Call (I) and Put (II).

I Call options are contracts which give to buyers the right but not the obligation, to BUY a shares of the underlying asset (UA) at a predetermined price (ST) at the expiration date. The buyer of the Call option pays the premium price (P) which is received for the seller.

At expiration date,

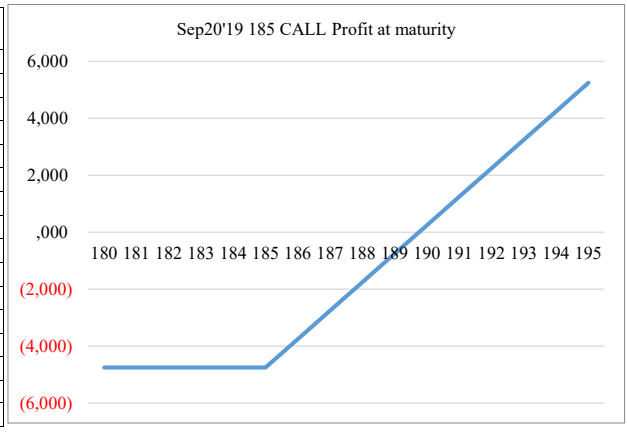
- if the UA market value is less than ST, the contract value is –P
- if the UA market value is greater than ST, the contract value is increasing. Profits will start when the UA market value is greater than ST+P. Profits are infinite.

However, when making a detailed analysis, the differences between text books explanation and real data explanation will be shown. As it is shown on traditional text books and coursebooks, the profit graph requires a purchasing date, by example, 2019-9-9 15-57-24.

The Sep20'19 185 CALL ask price is $8.40. The profit table at maturity (in US dollars) should look like table 1.

Table 1
Sep20'19 185 CALL

Underlying asset price	Profit
180	(4.75)
181	(4.75)
182	(4.75)
183	(4.75)
184	(4.75)
185	(4.75)
186	(3.75)
187	(2.75)
188	(1.75)
189	(0.75)
190	0.25
191	1.25
192	2.25
193	3.25
194	4.25
195	5.25



Source: own elaboration of option data (access: 20.09.2019).

The option CALL became profitable only if FB price goes up to 190 (table 1). The expression this CALL in the money means FB stock price is up to $185 dollars and out the money if the price is lower than $185. However, data analysis on real data explanation is shown in figure 2 – instead of an only price of text books – that the real data contains bid (the price fixed by buyers) and ask (the price fixed by sellers).

The high difference between ask and bid (called spread) on 2019-9-20, at 20:28:31 is noticeable by using 1.492 observations (one each 2 minutes). Americans stock market starts at 9:30 and end at 16:00 (six hours and a half). Real data time is in Europe and starts at 15:30 and ends at 22:00. There were a 15 minutes delay because of free data use produces market opening at 15:45 and closing at 22:15. CALL Bid price was higher than $4.75 on 31 percent of observations. The detailed analysis showed that the profit of the operation depends on the purchase price (ask). The best performance ($5.46) is buy at minimum ask price, $2.24 and sell maximum bid price, $7.70.

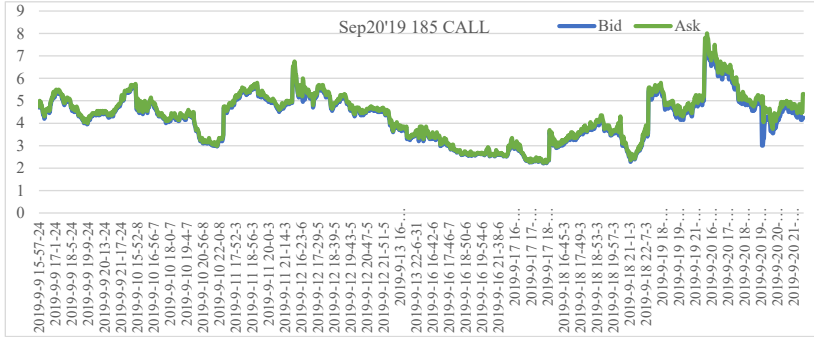


Figure 2. Sep20'19 185 CALL.
Source: own elaboration base at the NASDAQ data base, real data (access: 20.09.2019).

In order to understand the huge increase of 185 CALL at 2019-9-20, 16:22:31, FB stock prices graph were analysed, as a consequence of the stock price increase on 2019-9-20, at 16:4:1 (figure 3).

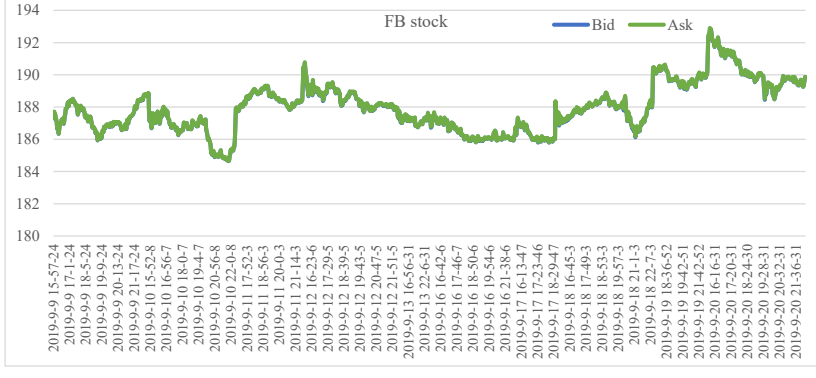


Figure 3. FB stock prices.
Source: own elaboration base at the NASDAQ data base, option data (access: 20.09.2019).

II Put options are contracts which give to buyers the right but not the obligation, to SELL a shares of the underlying asset (UA) at a predetermined price (Strike or ST) at the expiration date. The buyer of the Put option pays the premium price (P) which is received for the seller.

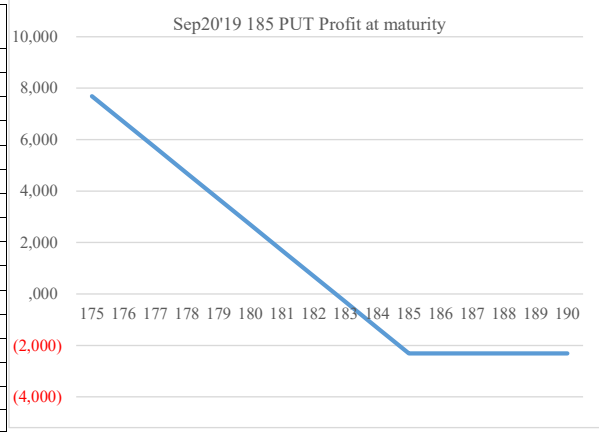
At expiration date,

- if the UA market value is greater than ST, the contract value is –P
- if the UA market value is less than ST, the contract value is increasing. Profits will start when the UA market value go below than ST-P. Maximum profits will occur when UA market value reaches 0.

In this case, the detailed analysis about differences between text books explanation and real data explanation will be carried out again. The traditional profit graph requires a purchasing date, by example, 2019-9-9 15-57-24. The Sep20'19 185 PUT ask price is $2.31. The profit table at maturity data are representing in table 2.

Table 2
Sep20'19 185 PUT

Underlying asset price	Profit
175	7.69
176	6.69
177	5.69
178	4.69
179	3.69
180	2.69
181	1.69
182	0.69
183	(0.31)
184	(1.31)
185	(2.31)
186	(2.31)
187	(2.31)
188	(2.31)
189	(2.31)
190	(2.31)



Source: own elaboration of option data (access: 20.09.2019).

The option PUT became profitable only if FB price is less than 183 (table 2). The expression this PUT is in-the-money means FB stock price is less than 185 dollars and it is out-the-money if the price is higher than $185. However, data analysis on real data explanation is shown – instead of an only price of text books – real data contains bid (the price fixed by buyers) and ask (the price fixed by sellers). On 2019-9-18 22:07:03, the market reach the expectation about it is impossible to FB to go down 185, the PUT prices fall close to 0. Sep20'19 185 PUT's bid price worth more than 2.31 on 11.72 percent of cases is shown at

figure 4. Better PUT performance ($14.40) is sell first at $14.40 and buy later at $0. Selling first and buying later is known as Short strategy.

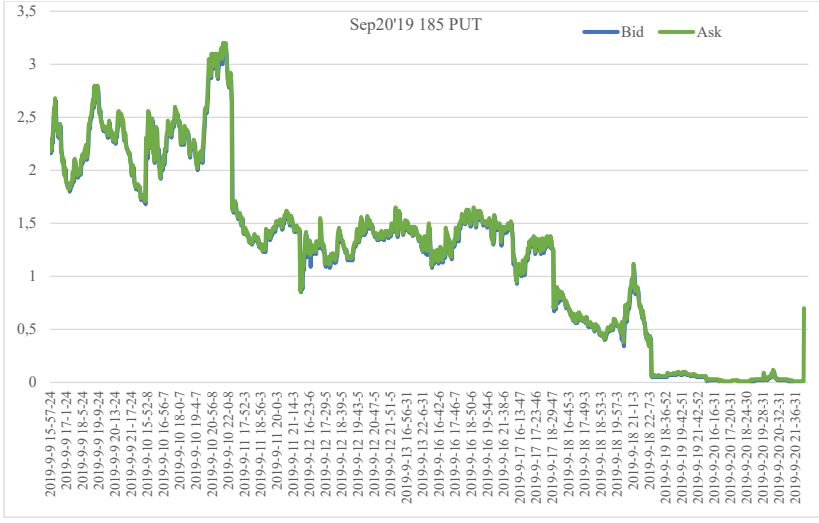


Figure 4. Sep20'19 185 PUT.
Source: own elaboration base at the NASDAQ data base, real data (access: 20.09.2019).

STRANGLES AND STRADDLES

Strangles (a derivative compound by buying a put and a call a different strikes) become popular in the 2000. Trading with brought strangles is called long strangles. It is mean that the seller is wanted to buyers existence – algorithm (more of 70% trading operations are done by computers) or human being – in this case how sell the strangle is in a short position. There are several combinations including buy (long) or sell (short) options, different strikes and different expiration dates and buying or selling underlying with particular names (Iron Condor, Butterfly, etc.). A particular case of strangle is when CALL and PUT has the same strike, and it was call Straddle.

The analysis of long out-the-money and in-the-money strangle will be done, to make observation about this phenomenon. Out-the-money strangle consists on a Sep20'19 195 CALL and a Sep20'19 185 PUT – maturity profit graph (table 2 and figure 5).

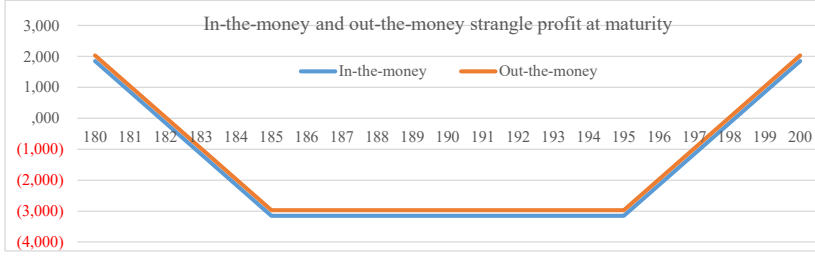


Figure 5. In-the-money (lower line) and out-the-money (upper line) strangle profit at maturity.
Source: own elaboration base at the NASDAQ data base, option data (access: 20.09.2019).

Noted the in-the-money strange ask price was $13.15, but the CALL and PUT configuration makes mathematically impossible to loss more than $3.15 ($1 315-$1 000) (figure 5). The out-the-money strangle ask price was $2.97 and there occur the lost all the premium because FB finish at 189.88. Completing the out-the-money strangle with real data, we are including from the Sep20'19 195 CALL (figure 6).

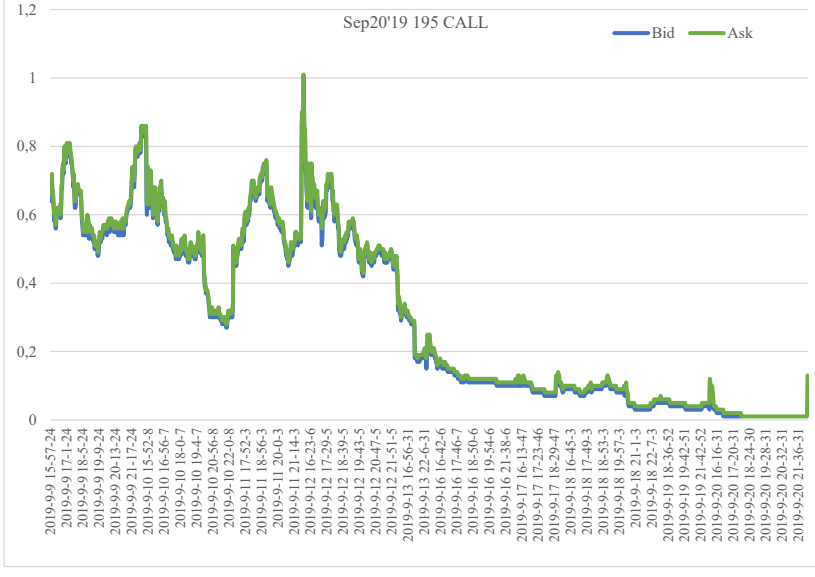


Figure 6. Sep20'19 195 CALL.
Source: own elaboration base at the NASDAQ data base, option data (access: 20.09.2019).

The analysis with real data were done – the evolution of out-the-money strangle (figure 7).

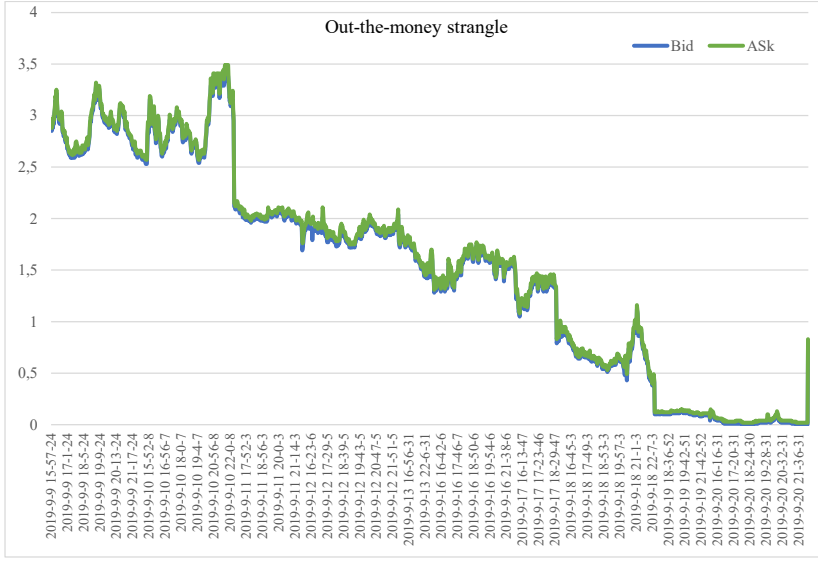


Figure 7. Out-the-money strangle profit at maturity.
Source: own elaboration base at the NASDAQ data base, real data (access: 20.09.2019).

The analysis carried out of out-the-money showed strangle huge price variations. These variations allows to be profitable. The best opportunity happens if brought act has place at 19:00 on 2019-9-10 by $2.5 and sold act has placed at 21:32 on 2019-9-10 by $3.5. This profit was $1, the return of investment is 40% and it takes an hour and 32 minutes.

On the market, nobody knows what will happen, but the adagio is to buy cheap and sell expensive. It means that transaction of buying should took place when the price is low and hope a huge change on FB stock price. Strangles are profitable when FB stock price went down because the PUT and when FB price went up because the CALL. It make this instrument valuable for the FB price direction, in environment where the volatility exist. Special cases are Earnings Announcements because the market has an expectation of Earnings per share (EpS). FB published last 2019 third quarter profits on 2019-10-30

and the market expected and EpS of $1.91, but real EpS was $2.12, and the surprise was 10.99%. During the 2019-10-31 session, FB stock price increase more than $9 dollars.

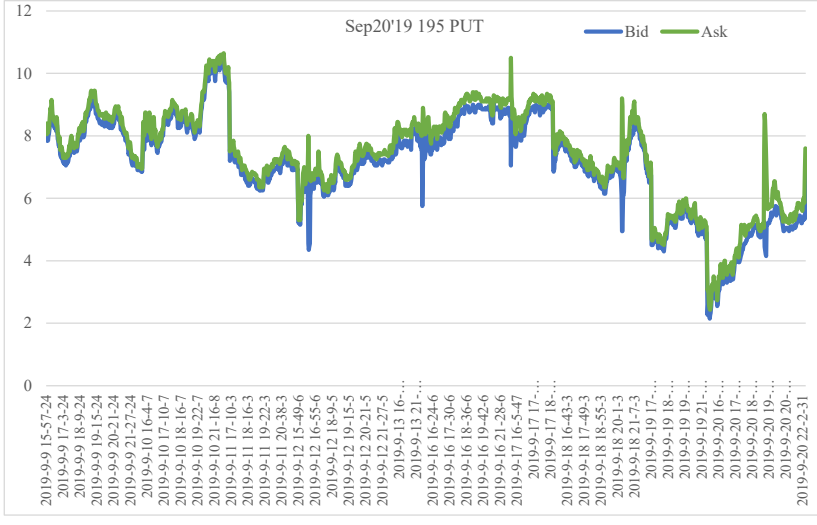


Figure 8. Sep20'19 195 PUT.
Source: own elaboration base at the NASDAQ data base, real data (access: 20.09.2019).

At maturity, the profit graph is being shown at figure 5 (blue line) – real data with the evolution of this strangle (figure 9).

Noted the difference between Bid (blue line) and Ask (green line). It means buyers and sellers does not agree about the interchange price and it make this strangle less liquid than out-the-money strangle. The best investing opportunity happens at similar time as out-the-money strangle, but Ask price was 12.7 at 19-14-7, day 2019-9-10, and maximum Bid price was 13.39 at 21-54-8, day 2019-9-10. Total profit was 0.69 dollars, the return of investment is 5.43%, far away of 40% reached for out-the-money strangle (figure 9).

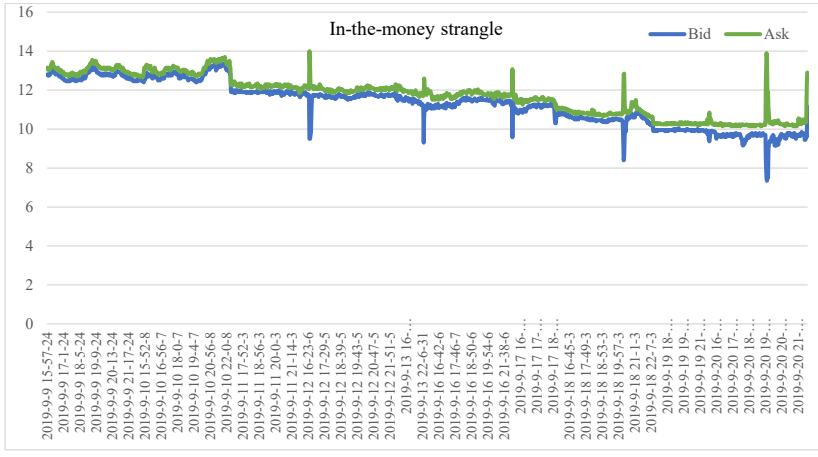


Figure 9. In-the-money strangle profit at maturity.
Source: own elaboration base at the NASDAQ data base, real data (access: 20.09.2019).

FEEDBACK FOR STUDENTS

The differences between text books explanation and real data explanation was shown. Students have had mostly financial subjects with the traditional Lecture way of teaching. The phenomenon of forgetting almost completely and they unable to trade with traditional knowledge was establish (see also research: Chi et al., 1989, pp. 145-182). The describing course give them the opportunity to check the market, trade and do questions individually. On the computer's room, students are trading and performing at their own pace. Professors are checking their advances and answering questions in a continuous way. This Learning-by-Doing paradigm with a motivation scheme, allows to improve student competences quickly by new financial pedagogy, looking for a suitable example that would allow students to be creatively involved in learning (see also: Coyle & Thorson, 2001, pp. 65-67). To compare the achievable learning outcomes, a free, publicly available simulation platform was used, using two types of call options and linear regression principles. Students through commitment in a competitive game among their colleagues, embracing themselves to find profitable investments. Also,

they do presentations based on several investment aspects to the rest of colleagues improving communication capabilities. (see also: Vila, Salinas, & Mistretta, 2018a).

The results presented in the article concerning the mechanisms functioning on the capital market and the inference process, enabling profitable decisions to be made a few days before the expiry date of the option, as well as the limitations resulting from the use by students' traditional textbooks and the knowledge transferred through them. During all program over a dozen courses have been analysed by students, related to trading with options as well as literature review (Xiao & Mau, 2019, pp. 297-310; Strow & Strow, 2006, pp. 323-330; Yoder & Hochevar, 2005, pp. 91-95). Even at Polish stock market course – most traded company was Nvidia with most profitable operation at position $73 282.27 on Tesla, and the most loser investment was (2 084.87) on G-III Apparel Group, Ltd, all of them are NASDAQ companies. At Spain stock market course, there is no most trading company because there are several with maximum trades. Most profitable operation was 3 580.84 on NVidia, NASDAQ company. The most loser investment was (2 856.50) on Qualcomm, another NASDAQ company.

PERFORMANCE ANALYSIS OF STRANGLES

As it is shown on strangle graphs, there are few opportunities to be profitable on in-the-money strangle. On the out-the-money one, there are several opportunities if the ability to buy exist in the relative minimums. The absolute minimum occurs on 2019-9-16 at the market closing, occasion to buy in-the-money strangle by ask price 8.63 dollars. At the next day, in-the-money strangle becomes profitable and the maximum selling price (bid) is reached on 2019-9-20 15-58-31.

In order to summarize and enable analysis of the data obtained, substitutions have been made to allow clear inference in-the-money strangle components (table 3 and 4).

Table 3
In-the-money strangle components at expiration date

	Sep20'19 185 CALL	Sep20'19 195 PUT
Long option closing Price (bid) [1]	4.25	5.35
Strikes	185	195
Calculated closing value [2]	4.88	5.12
Closing value of FB at September, 20th	189.88	189.88
Difference between [2] and [1]	0.63	(0.23)

* at market closing (22:15) in September, 20th
Source: own elaboration.

As NASDAQ is a physical delivery market, compensation chamber will assign us

Table 4
Cashflows with the In-the-money strangle components at expiration date

	Cashflow [A]	Actual Price (100 shares) [B]	Inflow (100 shares) [A-B]
For the long call, we will recibe 100 shares of FB at 185	(18 500)	18 988	488
For the long put, we will sell 100 shares of FB at 195	19 500	18 988	512
Inflow at the expiration date			1 000

Source: own elaboration.

This $1,000 is the strangle inflow at maturity as it is shown in text books, receiving $4.88 (189.88-185) dollars with the call execution and $5.12 (185-189.88) with the put execution. With real data, there are several opportunities to buy strangles, but, at maturity, both of them are unprofitable. In order to be profitable, in-the-money strangle, should be brought below a 1 000 and it never happen. On the out-the-money strangle, put and call finish with no price. To be profitable, out-the-money strangle should be brought below zero, and this happens on special situations on market, like Fridays when the market is closing.

CONCLUSIONS

Traditional finance books and classes are not efficient to teach options trading as the real market simulation. Participating students forgot almost all financial knowledge and they are embarrassed when the questions about some financial basics occurs. A lack of students' confidence was detected.

The study covered the results of efficiency and the ability to avoid inhibiting the development of student learning in the field of capital market instruments through direct action and involvement them in decision making processes. Enabling to students' possibility to learn about trading platforms and analysing real stock cycles, both reduces their fear of losing funds invested in the stock market and increases their efficiency in understanding how global financial markets work, as well as become successful traders.

In the article all analysis were shown a real data stock market experience updated to September, 2019. The real situation about 11 trading days was a clear background to made real data market decision with real emotions, but without real money risk.

Nevertheless, when students are trading and they are guessing what will happen with the prices, their stress increased like in virtual game adding the pain of losing money. Therefore, one of the strongest factors supporting effective learning – commitment – begins to work. There is no traditional knowledge to use on those situations, they only can relax, increase self-confidence and making decisions. Sometimes it will be right, sometimes it will be wrong. This happen to all Wall Street investors each single day and it is normal uncertainly situation on capital markets. It is important to learn by making mistakes, try to develop personal and inimitable way to trading, check profitability and continue with real money only by checking trading method several years and the overall result is profitable. Student can change between almost infinite stock market trading methods.

Any experienced trader knows long option positions lost value by time decay, reducing the option price exponentially at the expiration date, what was shown highlighted by comparing the data in each step of article. At maturity date, if the market was wrong when the options was brought, both strangles are profitable if FB prices are lower of 182 or higher than 198. The probability of those FB events are low if

we can assume FB prices are ruled by a Gauss Bell distribution. The only way to be profitable is to bet the market with prices outside the market expectations.

The collected data and the conducted analysis opens up further research possibilities to expand this stock market courses and case studies, to increase investigation about special simulation to be more effective in building capacities or to rule more market situations or trend prediction methods like the Japanese Ichimoku. The authors mission is increase and improve the financial instruments knowledge and online tools for students and non-financial people in the new financial pedagogy way based on Learning-by-Doing.

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