Economics of Chess Investment Based on Secondary Analysis of YouTuber Videos

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Received: 26 April 2024; Revised: 3 July 2024; Accepted: 11 July 2024
Published online: 26 December 2024

Abstract

This qualitative research study investigates the question about the most economical way of investing time and money in both the career and hobby of chess and to evaluate their opportunity costs. Using reflexive thematic analysis on secondary data of global chess industry experts' commentaries and discussions on YouTube revealed 9 themes that are related to making economical investments on chess as a career or a hobby. Having a career in chess is strongly not recommended because it is filled with high risks and uncertainty that involve unstable net income, prize winnings that heavily favor the top winners, negative mindset, extra work, and marketing challenges. In contrast, in order to make economical investment in chess as a hobby, learning and becoming better at playing chess can be optimized through cost-effective self-study, interactive learning, playstyle focus, and waste avoidance. The opportunity cost of heavy investment in a chess as a career is very high which is any easier career that provides stable and higher income while the opportunity cost of minimal investment in chess as a hobby is relatively low considering the cognitive and psychological benefits of playing chess. The findings of this study revealed how to make the most economical decisions to invest time and money in the game of chess which can be applied other hobbies. The ability to make economic decisions can positively spillover to other areas of everyday life to continuously optimize the use of scarce resources, avoid unnecessary waste, and always consider opportunity costs.

***Keywords*:** Chess, Economics, Hobbies, Investment, Qualitative research

I. INTRODUCTION

Not everyone may enjoy working in their daily jobs, but everyone certainly enjoys spending time on their hobbies. Unlike work, everyone is free to choose whatever hobby they want to pursue during their free time on a regular basis. There is a wide variety of hobbies to choose from, ranging from creative or intellectual activities to physical or relaxation activities. Hobbies, which are also known as leisure activities, are known to have positive effects on mental health by developing useful skills, making social connections, and helping people recover from the stresses of daily life. The choice of a hobby is also influenced by various reasons other than interests, such as personality, culture, and available resources. Work can often become very stressful and must be completed to meet deadlines without much choice, but hobbies can be changed voluntarily whenever the experience is no longer enjoyable.

According to Statista Search Department (2024) in the United States, the top 5 most popular hobbies and activities were cooking or baking, reading, pets, video gaming, and outdoor activities while in Japan, the top 5 most popular hobbies and activities were traveling, reading, cooking or baking, video gaming, and doing sports and fitness. Some people may even enjoy their hobbies so much that they are willing to try to pursue a career based on their favorite hobbies, which is the case of what happened with some famous celebrities such as popular sports athletes, singers, and chefs who were so skilled and talented that they have turned their hobbies into profitable professions. While the choice of a hobby depends mostly on personal preferences, it may also be constrained by limited resources of time and money. Some expensive hobbies such as international traveling, cave diving, or golf can consume a lot of time and money while other affordable hobbies such as reading books, video gaming, or yoga consume much less resources comparatively. With such a wide variety of hobbies being enjoyed by millions of people all over the world influenced by cultural preferences, it is important to be careful not to overspend resources when engaging in these hobbies either for leisure or career attempt. Similar to how people try to maximize benefits at minimal costs from their careers, hobbyists should also try to maximize benefits at minimal costs from hobbies as well. The ability to have economical decision making even for free-time activities is always beneficial for everyday life and is applicable to every person living in this world because it helps to reduce waste of resources which is an important reason to why this research study is needed.

Another hobby that has recently become popular during the COVID-19 pandemic is chess, more specifically, online chess to avoid risk of infection. Statistics provided by Chess.com revealed that in 2018, they had about 25 million members but in 2022, that number jumped four times to 100 million (ChessCom, 2022). In March 2024, the number of Chess.com members currently stood at over 160 million. Online chess has been growing in popularity despite heavy competition in the online gaming industry and many chess players may be interested to invest resources in the game of chess. There are many useful skills that playing chess can develop, especially cognitive benefits (Aciego, García, & Betancort, 2012) and psychological benefits (Cibeira et al., 2021) that can be applied to everyday life. Cognitive benefits of chess consist of problem solving, strategic thinking, memory, concentration, spatial reasoning, visualization and specific types of academic performance such as mathematics and logic. Psychological benefits of chess consist of higher self-esteem, confidence, improved decision-making, stress management, emotional regulation, and sportsmanship despite frustration from losing. By investing valuable resources, particularly time and money, chess players can improve their skill level and later join competitive events to earn prize money.

The types of investment chess players can make range from simply playing online chess for many hours a day at no cost to paying monthly subscriptions on chess education websites for skill improvement, buying and reading quality chess books, and training under experienced chess coaches. Learning chess has also never been easier or cheaper with so much free educational content on the internet. In fact, some of the computer and internet supported chess instruction is even more effective and efficient compared to traditional methods (Arabacı, 2009). Once a chess player becomes skilled enough by becoming a grandmaster with a FIDE rating of at least 2500 points, several options of making money from chess can emerge, but the sustainability of having a career in chess is uncertain.

One viable option for chess masters to make money is through social media platforms such as YouTube. A study by Han (2020) about how YouTubers make money revealed that the number of views, the after-view comment rate, and the after-view attitude expression rate all have significant positive effects on a YouTuber's year revenues while revenues drop as the age of their channels increase. Since YouTube is the most watched video and streaming platform in the world, it makes sense for some chess masters with unique personalities and professional experience to build their own YouTube channels by providing educational and entertaining content for their viewers. This competition between chess content creators to maximize view count on YouTube has conveniently created valuable secondary data on relevant topics that can be used for this research study.

To fully understand the decision-making process that goes into choosing and investing in a hobby such as chess requires a brief overview about the study of economics. Economics is essentially about how individuals and societies make decisions in a world where there are limited resources, which require careful choices to be made about how these resources are allocated. For every choice that is made, there is a trade-off which means that for every decision that a person makes about one thing, that person is also giving up or sacrificing something else. Trade-offs are evaluated based on their opportunity cost, which is the value of whatever is lost when choosing one thing over the other. Opportunity cost can be defined as the value of the second best-valued alternative use of that resource. For example, many young adults are willing to spend high tuition fees to study for an undergraduate degree for four years. Their opportunity cost of studying four years in college is the money they could have made if they worked for four years with a high school diploma instead. Since every decision made by any individual always has an opportunity cost, the same assumption can be applied to the decision to engage in a hobby such as chess.

There is a current knowledge gap in the economics of investing in the hobby of chess which is evident by the lack of available research done on this topic. Most of the previous research literature did not focus on the business or economic aspects of hobbies because they are considered to be just free-time activities that don't produce anything of value compared to the complex operations of international companies that seek to maximize profits under management pressure. Instead, research about hobbies generally focused more on mental health aspects while research about chess generally focused more on educational aspects. In fact, online chess only just became popular recently in the past five years with unexpected help from COVID-19 so research literature has yet to catch up on this niche market of online gaming. This study will fill a knowledge gap by relating the study of economics to investment in chess and fill in the gap with knowledge about how to make the most economical decisions when investing scarce resources such as time and money in chess. The wisdom from this new knowledge about being efficient and not overspending resources can then be easily applied to other hobbies that are enjoyed by billions of people around the world.

This research study is an exploratory research to investigate the marginal analysis of chess investment as either a career or a hobby as well as chess players' opportunity cost of chess investment. The main resources that chess players spend to study chess and become more skilled are time and money. Can chess players benefit from spending an additional hour of studying chess per day compared to the cost? This research study will attempt to answer this question about the marginal analysis of chess investment by dividing this question into two parts in which the first question focuses on the economics of chess investment for a chess career and the second question focuses on the economics of chess investment as a hobby. To avoid confusion, the three questions are explained in greater detail. The first question asks if a chess player spends up to nine hours per day studying and playing chess like a normal working job with the intention of competing seriously in professional tournaments to win prize money or generate other viable income as a career, what is the most economical way to invest and benefit from it? The second question asks if a chess player spends not more than one hour per day studying and playing chess as a hobby for relaxation, what is the most economical way to invest and benefit from it? The third question asks what is the opportunity cost of investing in chess as a career as well as what is the opportunity cost of investing in chess as a hobby?

The purpose of this research study is to investigate the most economical way of investing time and money in both the career and hobby of chess and to evaluate their opportunity costs. Research objectives are to fully answer all three of the following research questions that are illustrated by a conceptual framework.

1. What is the most economical way to invest in chess for a future career in chess by making heavy investment to maximize income?

2. What is the most economical way to invest in chess as a hobby by making minimal investment to maximize benefits for life?

3. What is the opportunity cost of investing in chess?

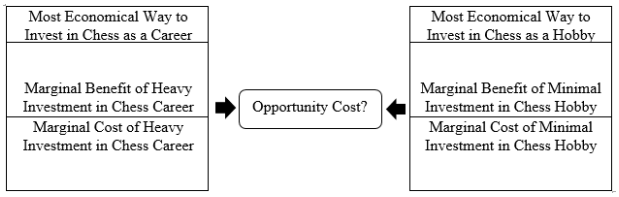

Figure 1: Chess investment economics conceptual framework

II. LITERATURE REVIEW

Previous literature about hobbies and their benefits on mental health especially on elder people is discussed. A study (Saihara et al., 2010) about how enjoying hobbies is related to desirable cardiovascular effects revealed that enjoyment of hobbies reduced the chance of heart problems. Similarly, participating in reading and other hobbies for one hour a day also reduces the risk of dementia (Hughes, Chang, Vander Bilt, & Ganguli, 2010) while retired individuals who participate in hobbies or leisure activities experienced higher life satisfaction (Nimrod, 2007). Women who engage in the creative hobby of quilting experienced enhanced well-being with creative skill development and formation of strong friendships with other quilters (Burt & Atkinson, 2012). Leisure activities appeared to benefit mental health status among middle-aged adults especially when others are present whereas specific social activities do not (Takeda, Noguchi, Monma, & Tamiya, 2015). When middle-aged and older adults engage in the hobby of arts and crafts creation, their cognitive performance and neural efficiency improved, leading to more life satisfaction and healthy ageing (Adams-Price & Morse, 2018). Drawing is also another hobby that relieves stress, especially during the COVID-19 pandemic (Hartono, 2022). In another study about hobby engagement and mental wellbeing among people aged 65 years and older in over a dozen countries (Mak et

al., 2023), the results revealed that hobby engagement promotes healthy aging regardless of country of origin.

A study on Shanghai employees in China (Li et al., 2019) revealed that having daily hobbies can help to mitigate the adverse effects of long working hours on workers' depression and well-being. Furthermore, the majority of health care physicians who experienced burnout reported that outside interests or hobbies was a substantial mitigation factor for burnout and disengagement (Li, Lai, Friedrich, Liu, & Popkin, 2023). Hobby engagement with organized activities also creates social benefits and improved peer functioning for adolescents, especially youths with family and neighborhood disadvantages (Steinberg & Simon, 2019). The findings of a study by Davis, Hoisl, and Davis (2014) that explores the link between employee leisure time activities and the value of their creative output showed that diversity, social orientation, and more focused hobbies is positively related to higher invention value. In a study about the benefits of creative hobbies on middle-aged and older adults (Israel, Adams-Price, Bolstad, & Nadorff, 2022), the findings suggested that receiving recognition from others for engaging in creative hobbies may provide a greater buffer to depression than do age and self-perceived creativity.

As shown by research studies done on a variety of hobbies, there are numerous mental health, physical health, cognitive, and social benefits that are associated with habitual hobby engagement. Chess is not unlike any other hobby, but since it has a defining feature of requiring certain intellectual abilities in order to win the zero-sum game, people who play chess can receive more cognitive benefits than if they chose to engage in a less intellectually demanding hobby. Spending time and possibly money to play chess is essentially an investment so the benefits and rewards of playing chess should be at least equal or worth more than the resources spent.

Next, previous literature about chess investment and its benefits is discussed. Most previous studies focused on educational or psychological benefits of chess with few studies relating chess to business or economics revealing a significant knowledge gap. A study about strategic similarities between business and chess (Graber, 2009) revealed that chess rewards long-term overall thinking, assessing risk and rewards, forming backup plans, learning from mistakes, perseverance, patience, and other intellectual traits that can lead to business success. There is a strong correlation between chess skill and numbers of hours of practice, but for development of high-level performance in chess required reading books and using computer software of game databases (Campitelli & Gobet, 2008). However, chess players at the highest skill of grandmasters expended 5,000 hours on serious study alone during their first decade of serious chess play which is about five times the average amount reported by intermediate players (Charness, Tuffiash, Krampe, Reingold, & Vasyukova, 2005) which shows a huge difference in investment of time in chess between professionals versus amateurs. Unfortunately, not everyone is suitable to pursue a career in chess because a study by de Bruin, Kok, Leppink, and Camp (2014) indicated that at the early stages of expertise development, IQ and motivation influenced chess performance.

Chess training can either be used as a valuable learning aid for children with learning disabilities (Scholz et al., 2008) or for training gifted students to meet higher gifted program standards (Adams, 2012). Chess training can also be used to develop leaders' cognitive skills (Hunt & Cangemi, 2014). A study by Sala, Gorini, and Pravettoni (2015) showed that a strong correlation between chess and math scores and that even a short-time practice of chess in children can be a useful tool to enhance their mathematic abilities. The effect of chess training on mathematical problem solving was also confirmed by Meloni and Fanari (2019) with no effect on meta-cognitive

abilities and other academic performance such as written text comprehension and recall. Neuroscientific evidence suggested that chess can even be a tool to improve academic performance especially in math and reading for school-aged children (Ortiz-Pulido, Ortiz-Pulido, García-Hernández, & Ramírez-Ortega, 2019). Besides math, chess training can also improve working memory and concentration (Atashafrouz, 2019). Chess was also suggested to have a protective factor against dementia for elders due to its cognitive benefits (Lillo-Crespo, Forner-Ruiz, Riquelme-Galindo, Ruiz-Fernández, & García-Sanjuan, 2019). In another study by Islam, Lee, and Nicholas (2021) to investigate benefits of chess training on primary school students, the results revealed that chess training reduces the level of risk aversion for almost a year, improves math scores, and reduces time inconsistency. Further evidence from an experimental study by Mel (2021) demonstrated that students in the experimental group who played chess showed significantly higher mathematics improvement than the control group. The results of a recent study by Rimban (2023) that explored the impact of chess strategies on the development of constructivist thinking revealed that the cognitive benefits of chess which includes critical thinking, problem-solving, and decision-making, are transferable and relevant to various life domains. The importance of patience and deliberate thinking was emphasized in chess strategies with broader implications for cognitive development.

Few if any relevant studies were found that related chess specifically with economics, opportunity cost, and marginal analysis so the scope was expanded to hobbies. There are some previous studies that related hobbies with the relevant topics of economics and opportunity cost for the purposes of this study, but there is a lack of studies that related hobbies with marginal analysis revealing another knowledge gap.

First, some research studies related hobbies to economics. A model about the incentives to invent hobbies and to acquire hobby skills may explain the economic origins of culture (Sallstroem, 2007). In a study by Kwapisz (2019) about how startup team characteristics correlate with a hobby-based entrepreneur forming a new profitable firm, the results revealed that new firms are less likely to be formed if teams are bigger or more functionally diverse. Ignoring the financial focus of professional artisans, a study about hobbyist artisans (Lin, 2019) revealed a hidden economy among the hobbyist craft community that includes transfer of knowledge from instructors to newcomers and innovation to create new, unique products. In another study about hobbyist collectors (Kleine, Peschke, & Wagner, 2020), the collectors who are mostly male with above-average education and income, considered their activity as investment and their personalities are characterized by low agreeableness and high openness. Hobbies of entrepreneurs can also directly affect the risk preference of entrepreneurs with risky hobbies having a positive correlation with corporate risk taking (Song, Nahm, & Song, 2021). Well-educated hobby farmers in South Australia invested capital in rural areas to pursue new lifestyles focused on environmental or horse-related activities (Song, Robinson, & Bardsley, 2022).

Next, some research studies related hobbies to opportunity cost. In a study by Haghpour, Sahabeh, and Halvari (2022) about opportunity cost in consumer behavior, the results showed that opportunity cost consideration does not always lead to positive outcomes and may lead to more choice discomfort, regret, and dissatisfaction. Opportunity cost tends to be neglected in decisions about public policy while opportunity cost is not neglected in private consumption (Persson & Tinghög, 2020). In a study by Wallrodt and Thieme (2023) from Germany, the findings suggest that the opportunity cost of volunteering are related to family activities instead of paid work which implies that volunteering activities generally compete with family activities rather than with paid work. Informal

caregivers face additional opportunity cost compared to non-caregivers because they spend more time multitasking, experience more stress and fragmented time (Urwin, Lau, & Grande, 2023). Gamers who enjoy playing video games as a hobby may be interested to pursue gaming as a career but a study by Cardenas (2023) revealed that pursuing a career in electronic sports has a high opportunity cost and is not a practical substitute for traditional higher education and established career pathways. The pursuit of meaning causes consumers to consider their opportunity cost or how they can otherwise use their money, which in turn leads to a preference for less expensive goods (Mead & Williams, 2023). Children also have opportunity cost too as shown in the results of a study by Caetano, Caetano, and Nielsen (2024) which indicated that the last hour of enrichment activity aimed at skill development has a negligible effect on cognitive skills and negative effect on non-cognitive skills.

A review of recent literature about the benefits of investing in hobbies and chess as well as the economics and opportunity cost of engaging in hobbies has been provided. While there were previous studies about the educational or psychological benefits of chess, few studies related chess to business or economics which is a significant knowledge gap. This research study will contribute to research literature by providing new knowledge that relates the hobby of chess to the field of economics with findings that are applicable to decision making about time and money investment in hobbies.

III. RESEARCH METHODOLOGY

The purpose of this exploratory research is to investigate the research questions about the most economical way of investing time and money in the hobby of chess and to evaluate its opportunity cost. Qualitative research was the methodology that was used to answer the research questions, which involves collecting non-numerical data and identifying patterns in language, theme, and structure in order to understand human experiences. In this particular research study, the human experience of playing chess professionally was a required dataset which can only be obtained from chess experts. The reason qualitative research was used for this study was due to a lack of research literature about the niche market of chess in the global hobby industry while there is a massive amount of easily accessible data on YouTube provided by chess content creators that are available for analysis by online gaming researchers. Quantitative research cannot be used for this exploratory research because numerical responses do not give sufficient details and context than what is required for answering the research questions. Detailed analysis of audio transcripts provided by chess experts describing their lifelong experiences about playing chess professionally as well as their insightful understanding about the economics of chess. There is probably no other group of people in the world who are more qualified to give advice and information about the economics of chess other than chess YouTubers who have the necessary relevant experience and expertise. These chess YouTubers make a living off social media and have a strong incentive to give honest and accurate assessments about the economics of chess investment to maintain their reputation and viewership.

The secondary data was collected from YouTuber videos that are either commentating or having a group discussion about the economics of chess. While searching on YouTube using the key words of chess, economics, and investment, the results displayed a long list of unrelated videos, videos containing inaccurate or wrong information which was fact-checked by the researcher, videos that were too short and did not provide enough data, videos with unknown creator and low view count, and outdated videos. The researcher had to carefully watch and filter through dozens of unqualified videos before narrowing down to the five best videos that contain the most suitable data and context for answering the research questions.

These five videos had to be thoroughly analyzed and re-watched several times by a single researcher which took dozens of hours so due to resource constraint, only a total of five videos was analyzed for this study. However, the five videos came from different sources of chess YouTubers which can be used for data source triangulation to reduce bias (Jonsen & Jehn, 2009). Determining adequate sample size in qualitative research is ultimately a matter of judgment depending on research requirements according to Sandelowski (1995).

After meeting the two required conditions of having relevance to answering the research questions and recentness with the oldest video being published about two years ago, the sample was conveniently selected based on the popularity of the YouTube videos, channel, and reputation of the YouTubers. Each video had a minimum of 10,000 views which shows their reach while videos with more views were considered to have more impact and carry more weight. The target population are chess industry experts, particularly chess grandmasters (with a minimum FIDE rating of over 2500 to signify mastery over chess and considered to be the highest attainable rank other than world champion) and international masters (with a minimum FIDE rating of over 2400 and considered to be the second highest attainable rank), who are very familiar with and deeply involved in the chess industry for at least the past ten years. The samples consist of Hikaru Nakamura, Eric Hansen, Levy Rozman, and ChessDojo chess masters who specialize in coaching. Hikaru Nakamura is a Japanese-American who is currently one of the best chess players in the world with a FIDE rating of consistently over 2700 and is also a popular YouTuber that creates regular content about chess. Eric Hansen is a grandmaster of the popular Chessbrah YouTube channel and Levy Rozman is an international master of GothamChess YouTube channel who describes himself as the internet's chess teacher with over 4.7 million subscribers. ChessDojo YouTube channel consists of grandmaster Jesse Kraai, international master David Pruess, and international master Kostya Kavutskiy, who help to create educational chess content together. This sample list, while small, offers immensely valuable data because of their background, experience and expertise in chess and qualitative analysis must be used to interpret the data with sufficient detail and context for answering the research questions. The secondary data for each of the five videos was recorded by chess YouTubers and uploaded onto the YouTube social media platform. Secondary data was used instead of primary data due to cost considerations, lack of personal accessibility to chess experts, and free secondary data on YouTube being sufficient enough to answer the research questions. Since the chess YouTubers are public figures that uploaded their videos on YouTube for public dissemination to earn money, there should be no ethical concerns or expectations of privacy when using this secondary data for research purposes and not for profit. Since the data is of a secondary type, there was no control over the questions asked or answers given, but by examining specific parts of each audio transcript, possible relevant answers to answering the research questions can be collected and analyzed.

Secondary data from five videos on YouTube that includes a mix of commentary and group discussion were selected for this research study. The YouTube videos are arranged chronologically in order of date published from oldest to newest, with the oldest video being published about two years ago and the most recent one being published in March 2024. The first YouTube video (Nakamura, 2021) dated March 29, 2021 with over 120,000 views was Hikaru Nakamura making a commentary about how to earn a living playing chess. The second YouTube video (Hansen, 2023) dated November 12, 2023 with over 43,000 views was Eric Hansen making a commentary about why chess grandmasters are poor. The third YouTube video (Nakamura, Kraai, Pruess, &

Kavutskiy, 2023) dated November 21, 2023 with over 21,000 views was Hikaru having a group discussion with Jesse Kraai, David Pruess, and Kostya Kavutskiy about professional chess economics. The fourth YouTube video (Rozman, 2024) dated January 31, 2024 with over 200,000 views was the popular Levy Rozman making a commentary about whether chess is a waste of money. The Fifth YouTube video (Kraai, Pruess, & Kavutskiy, 2024) dated March 2, 2024 with 13,000 views was a group discussion with Jesse Kraai, David Pruess, and Kostya Kavutskiy that ranks the best and worst ways to spend money on chess. These five videos were considered to be sufficient data and no other video samples were needed because the previous sources already included the two most popular chess YouTubers Levy Rozman and Hikaru Nakamura, along with several other knowledgeable chess experts who are very familiar with the economics of chess investment. Transcripts of these video recordings are auto-generated by YouTube with some errors that require further proofreading to remove filler words, grammar mistakes, and typos before the data can be analyzed.

Thematic analysis was the qualitative research method that was selected to investigate the most economical way of investing time and money in the career or hobby of chess and to evaluate its opportunity cost. Thematic analysis is a data analysis process that involves examining through a data set to identify patterns, systematically coding and deriving themes to create a narrative. In this exploratory research study, an inductive approach was chosen to derive meanings and themes without any preconceptions, allowing any codes or themes to emerge from the data. This specific type of thematic analysis that uses the inductive approach is called reflexive thematic analysis. Reflexive thematic analysis was first developed by Braun and Clarke (2006) initially for psychological research but due to its flexibility, this research method became popularized in other social science fields.

Data analysis was analyzed manually by hand using reflexive thematic analysis. A qualitative description based on observation about overall content was created for each of the five YouTube videos, which was followed by a table that displayed meaningful, quoted excerpts with their related codes for each YouTube video. All the codes are then grouped and organized into themes. After important themes are developed and explained in separate tables, narrative analysis involving two imaginary characters was used to demonstrate how to be economical with chess investment. The first imaginary character called Character Alpha is making a heavy investment in chess in order to pursue a professional career in chess. The second imaginary character called Character Beta is making a minimal investment in chess as a hobby to maximize benefits for life. An imaginary story was created for each of these two characters to illustrate their most economical choices with associated opportunity costs and demonstrate how to maximize their marginal benefits relative to their marginal costs. Two types of triangulation were used to enhance validity and credibility while limiting possible biases in this qualitative research study. Data triangulation was reached with multiple data sources from 5 YouTube videos which were each published on different dates ranging from March 2021 to March 2024. Within-methods triangulation was done with the two qualitative research methods of thematic analysis and narrative analysis. Based on the results, valuable insights can be provided about the economics and marginal analysis of chess to answer the research questions about the most economical way of investing time and money in the career or hobby of chess and to evaluate its opportunity cost.

IV. RESULTS AND DISCUSSION

Quotes from the video transcripts that provide the most relevance to answering the research questions were carefully chosen and then changed into numerous

codes that were organized and grouped into themes for further analysis. Each descriptive code is followed by a condensed description of what the code means. Initially, five tables containing detailed excerpts and codes of each video transcriptions were arranged in chronological order of YouTube video publish date. Unfortunately, lengthy quotes from the video transcripts and their associated codes that form an essential part of the initial coding and analysis process were cut out and not included in the results due to size limitations of this research paper. The codes created from the video commentary and discussion transcripts are subsequently organized under various themes which are then divided into two separate tables to answer the research questions about the most economical way of investing in chess as a career or a hobby. The first group of themes are considered to be factors relating to economical investment in chess as a career as shown in Table 1 and the second group of themes are considered to be factors relating to economical investment in chess as a hobby as shown in Table 2. The codes for each theme were subsequently gathered and arranged together methodically to provide a clearer explanation of what each theme means. Each theme represents an important factor that is related to economical investment in chess as a career or a hobby.

Table 1: Definitions and labels for themes about chess investment as a career

List of Themes about Chess Investment as a Career
1) Unstable Net Income: The prize amount for winners of chess tournaments can sometimes seem high but the number can be misleading because it does not include tax deductions and other necessary expenses that have to be paid such as for travel, hotel, and training partner fees. The earnings can also be unpredictable because sometimes prizes have to be shared with others whenever the results are tied and not to mention that the margin of winning can be very narrow. Being a strong player does not guarantee consistent earnings, sometimes not even breaking even. Young chess grandmasters receive parental financial support for playing competitive events but after they turn 18 years old, they have to start worrying about expenses other than just focus on chess. With the exception of India and a few other countries like Uzbekistan, chess grandmasters have a lack of sponsorships from their governments or big businesses which make them very dependent on prize winnings and other income sources. 2) Top Heavy: A non-top 10 grandmaster based on FIDE rating has much less earnings potential due to not being invited to the Grand Chess Tour so there is high pressure for a top 10 grandmaster to maintain FIDE rating of at least 2700 to keep his yearly income viable. The prize pools of competitive events also heavily favor the top winners while the bottom half usually gets nothing like in the case of FIDE Grand Swiss 2023. 3) Negative Mindset: It can be a depressing and stressful experience to play chess in competitive events especially when the results are poor. For example, in the FIDE Grand Swiss 2023 that took place over a 3-week period, being in the top 46 out of 114 only gets $2,000 which has a high opportunity cost since the 3 weeks spent playing chess with a high chance to win nothing could have been used to do something else more productive. While the number of competitive events have increased recently leading to more income potential, too much competition creates fatigue for grandmasters which leads to gradual loss of their enjoyment in chess and reduces game quality. Some grandmasters also have a negative feeling that luck plays an unusually big role in deciding the winner of some important tournaments such as the Candidates tournament which decides the challenger to the World Championship because they have a lack of control over how others play. 4) Extra Work: More people are playing chess now than ever before leading to more competition especially from kids who are quickly getting better at chess in the modern era to compete with the jobs of older grandmasters. Older grandmasters have to study, train, and prepare harder just to keep up with younger generations. Since prize winnings are not guaranteed, grandmasters have to pursue other income sources such as content creation on social media or teaching chess. Current young and promising grandmasters need to start using social media more to maintain public interest in chess and eventually replace the aging chess celebrities such as Magnus, Hikaru, and Levy.

Table 1: Definitions and labels for themes about chess investment as a career (Cont.)

List of Themes about Chess Investment as a Career
5) Marketing Challenges: Chess might not be as viewer friendly as some other video game tournaments because most top chess tournaments are played in classical format where both players have more than one hundred minutes each to make all their moves per game. Each game takes up to six hours which is too long for viewers and there is also a high chance for each game to end up with a boring draw because grandmasters don't lose easily. This viewer unfriendliness of chess presents a significant marketing challenge for tournament organizers leading to stagnation in prize pools and lack of profitability for organizers who often work in a thankless environment with lack of motivation to change.

Table 2: Definitions and labels for themes about chess investment as a hobby

List of Themes about Chess Investment as a Hobby
6) Cost-Effective Self-Study: To become better at playing chess requires some study time and there are several cost-effective ways of studying chess by one's self. Before making any significant investment into study materials for chess, a chess student must first discover their proficiency level which can be done for free by playing a minimum number of games on Chess.com website which will assign an Elo rating depending on one's performance, which can be categorized as beginner, intermediate, advanced, or expert. The most cost-effective investment would be to focus only on level appropriate study materials. For example, beginners should only buy chess books of beginner difficulty and advanced players should only buy chess courses of advanced difficulty or otherwise the mismatched study materials would be either too easy or too difficult which will not optimize learning effectiveness. Chess books are considered to be very cost-effective for studying chess by one's self because they give a lot of information compared to their cost, can be studied for months, and can be stored permanently for future reuse. However, chess books are not user friendly to the more digital reliant younger generations. Another very cost-effective way for studying chess by one's self is a yearly premium subscription on Chess.com which allows online users to gain access to thousands of hours of chess educational content provided by hundreds of trainers at a fraction of what it used to cost before Chess.com existed. 7) Interactive Learning: Besides self-studying chess which can be lonely or boring, there are other cost-effective options for studying chess that involve knowledgeable interactions with trainers and other chess players. Playing in chess tournaments is actually the best way to become better at chess because there is no other substitute for the valuable experience of competing to win a prize under competitive pressure. During downtime from tournament play, there is the cost-effective option of engaging in interactive online training programs with experienced trainers who can point out mistakes and other ways for improvement that are specifically customized to each individual. Joining local chess clubs to practice with nearby players is also cost-effective for studying chess while fulfilling a social purpose and having the opportunity to participate in various chess-related activities. 8) Playstyle Focus: With discretionary income, spending some money goes a long way to helping one improve at chess quickly compared to spending no money at all, but it must be quality and specialized investment. For example, instead of buying six opening courses, it's more optimal to just buy one opening course and specialize to gain the most value for money. One should focus money on a course that teaches a specific playstyle such as pawn gambits or positional play that fits one's certain playstyle and preference. Investing money in and studying to match a specific playstyle preference will optimize chess learning and maximize enjoyment compared to being forced to study other playstyles that one finds to be boring. 9) Waste Avoidance: One main advantage of taking chess as a hobby is that it is very affordable and does not require much money to start playing. Not only is it possible to play online chess totally for free, other necessary expenses would just include finding people to play with and spending a little bit of money on buying a durable chess set which costs less than a monthly streaming subscription or required tools for other more expensive hobbies. Besides making cost-effective investments in chess, it is also important to avoid wasting resources on materials that will not be optimally used. Examples of wasteful investment include not studying accurately, buying level inappropriate study materials, and cheating. Finally, it is possible to learn chess for free from YouTube, but there is a time cost because it costs valuable time to filter through the oversupply of content, lack of structure, and clickbait.

Based on the development of these 9 themes, two chronological narratives were provided to further illustrate the economics of chess investment as a career and as a hobby. The first narrative analysis is an imaginary story that involves Character Alpha who is making a heavy investment in chess in order to pursue a professional career in chess. Character Alpha's most economical choices are suggested based on the themes revealed by previous thematic analysis of chess investment as a career. Due to the top heavy nature of competitive chess where only the absolutely top 10 grandmasters can earn significant prize winnings while the rest cannot make a viable living from chess, Character Alpha must be identified as a chess prodigy at a very young age and receive parental or sponsored training and support to become a future grandmaster who can compete with the best players at the highest level. Without natural chess talent identified at a very young age, it would not be economical to invest in chess as a future career due to the intense and ever increasing competition where failure to become the best would be a huge opportunity cost. Even assuming that Character Alpha is a chess prodigy, she would still need to invest many childhood and teenage years in studying, training, and playing chess in many tournaments in order to remain competitive. All this resource investment in mastering chess during childhood and teenage years could become a sunk cost or simply wasted if playing professional chess is not pursued as a career during adulthood as the logical next step. Even if Character Alpha turns out to be one of the world's best chess players, the yearly net income is unstable because of unpredictable results, possibly shared prizes, and high expenses that include travel, hotel, training partner fees, and even tax deductions. Character Alpha also needs to deal with negative mindset such as mental stress, depression, and fatigue during periods of poor tournament results. Unless lucky enough to be born in India where sponsorships by the government or big businesses is possible, she is also required to do extra work to maintain a safety net during times of poor performance, which is why alternative income sources must be explored such as content creation for social media or teaching chess. There is also the possibility that public interest in chess may fade away in the future unless new grandmasters such as Character Alpha engage in social media marketing to become popular and eventually replace aging chess celebrities. Faced with such a potentially stressful adult career in chess filled with high risks as well as the possible waste of resources in chess investment during childhood and teenage years which do not guarantee a promising career, Character Alpha and her guardian must reconsider whether to invest a significant part of her early life into chess when the resources could be better spent on somewhere else. Even an extra hour of study in chess per day does not necessarily guarantee more tournament earnings due to various unpredictable factors outside her control. Alternatively, Character Alpha can choose to significantly reduce the amount of her chess investment from nine hours of study per day (similar to a full-time job) to not more than one hour of study per day (similar to a hobby) to basically rethink of chess as a hobby rather than a career in order to be economical. The eight hours of study time per day that would have been spent on mastering chess could instead be used to do something more productive. Thus, the opportunity cost of heavy investment in chess as a career is the alternative use of resources that could have been spent to improve valuable skills during early life to prepare for getting into a good college and graduating into any stable job with a decent earning. In most careers, age and experience leads to higher salaries, but in a chess career, older grandmasters can often no longer compete with new and younger grandmasters for the top prize winnings.

The second narrative analysis is an imaginary story that involves Character Beta who is making a minimal

investment in chess as a hobby to maximize benefits for life. Character Beta's most economical choices are suggested based on the themes revealed by previous thematic analysis of chess investment as a hobby. Unlike chess investment as a career where only chess prodigies with natural talent have to be identified at a young age followed by years of training to even have a chance of making a viable career out of chess, there are no restrictive conditions such as age restrictions, natural talent, or even meeting a certain level of intelligence for chess investment as a hobby. The only requirement to playing chess as a hobby is enjoyment since it is a voluntary activity that can be done during periods of free time with no pressure to earn money since money is provided by either parents or a full-time job. In a plausible scenario, Character Beta is a 50-year-old man who used to play chess for fun as a teenager a long time ago, but became busy with work as an adult and has recently regained his interest in chess due to online social media marketing of chess. He likes to play online chess with strangers for not more than one hour per day and is interested to improve his chess skills without spending too much money. If he prefers to study alone, there are two economical options for cost-effective self-study which are chess books or a Chess.com yearly subscription that will give him the most effective outcome relative to the amount of money he spends. He also needs to study level appropriate materials that are suitable for his Elo performance level. If he prefers to study with other people which can also be effective but cost more, he can choose to engage in several economical options for interactive learning which are competitive pressure from tournament play, interactive online training programs with customized coaching, and local chess clubs to participate in various chess-related activities with other chess players. Since not many people have the time to study the thousands of chess opening ideas, positions, and playstyles with the exception of grandmasters, Character Beta should have a playstyle focus which is to specialize in one specific opening and playstyle that he is likely to face and put to good use in his games such as the Scandinavian Defense where Black plays pawn to D5 in response to White opening with pawn to E4. This quality and specialized investment allows him to focus his scarce time and money on only studying the Scandinavian Defense that he enjoys playing from cost-effective books, online courses, or Chess.com videos without wasting resources on studying other openings and playstyles that he finds to be boring. In addition to making cost-effective investments in studying chess, it is also important for Character Beta to avoid wasting resources on materials that will not be optimally used such as by not studying accurately, buying level inappropriate study materials, and cheating. While it is possible to learn chess for free from YouTube, it costs valuable time to filter through the oversupply of content, lack of structure, and clickbait which is not economical if Character Beta can actually afford to spend some money on quality materials to save time. Ultimately, Character Beta is just playing chess as a hobby so there is no need to overspend money or time on becoming better at chess when the purpose of a hobby is to just enjoy the free-time activity for relaxation. Not more than one hour of chess study or play per day is necessary since each extra minute or hour spent on chess per day has valuable alternative uses such as for work or family. Previous research has suggested that playing chess has cognitive and psychological benefits which is always useful for work and improving quality of life. Thus, the opportunity cost of minimal investment in chess as a hobby is any other hobby that could bring more enjoyment and relaxation without experiencing stress from competition with chess opponents minus the cognitive and psychological benefits that playing chess provides.

In summary, answers were provided to the research questions about the most economical way of investing time and money in the career or hobby of chess and to evaluate its opportunity cost. Having a career in chess is filled with high risks that involve unstable net income, prize winnings that heavily favor the top winners, negative mindset, extra work, and marketing challenges. Only chess prodigies at a young age should make a crucial life decision about whether to make a heavy investment in chess in order to pursue a professional career in chess while anybody else who are not chess prodigies should not even bother to consider the possibility of playing chess as a career due to the high opportunity cost of college education and alternative careers that offer more viable income with less risk. However, having chess as a hobby on the other hand, as long as it remains enjoyable, can be rewarding by providing both cognitive and psychological benefits which improve quality of life. In order to make economical investment in chess as a hobby, learning and becoming better at chess can be optimized through cost-effective self-study, interactive learning, playstyle focus, and waste avoidance. The relatively low opportunity cost of chess as a hobby is simply any other hobby that could bring more enjoyment and relaxation without experiencing stress from competition with chess opponents minus the cognitive and psychological benefits that playing chess provides.

V. CONCLUSION

Chess is one of the thousands of available hobbies that can be taken as a free-time activity to bring enjoyment and relaxation. Traditionally, it was played on a chess board between two players in a physical location but as the world became more digitally connected, millions of chess players over the world are now able to play online chess instantly and conveniently with both friends and strangers. As the global number of chess players continue to grow, it is important for every chess player to understand about the economics of investing their time and money into chess. Every minute and every baht that they spend on chess has an opportunity cost, which is the alternative use of their scarce resources. So chess players must gain as much value as possible out of whatever they put into studying and playing chess.

The results of this study strongly suggests to not make any heavy investment in chess in order to pursue a professional career in chess because a career in chess is filled with high risks that involve unstable net income, prize winnings that heavily favor the top winners, negative mindset, extra work, and marketing challenges. The only exception is if a chess prodigy is identified at a young age to potentially become one of the best chess grandmasters in the future and even deciding to go all-in on a chess career involves costly sacrifices and uncertainty. The opportunity cost of a chess career is simply too high, which can be basically a college education and alternative careers that offer more viable income with much less risk.

In contrast, the results of this study does suggest to make a minimum investment in chess as a hobby to maximize benefits for life. Obviously, anybody who is not interested to take chess as a hobby is free to choose any other hobby for enjoyment but for those who do enjoy playing chess, spending some money to become better at chess can have cognitive benefits and psychological benefits. Previous research already revealed cognitive benefits of chess on mathematical and academic performance while there were psychological benefits of chess on confidence, decision making, and stress management. In order to make economical investment in chess as a hobby, learning and becoming better at chess can be optimized through cost-effective self-study, interactive learning, playstyle focus, and waste avoidance. The opportunity cost of playing chess as a hobby is relatively low, which is simply any other hobby that could bring more enjoyment and relaxation without experiencing stress from competition with chess opponents minus the

cognitive and psychological benefits that playing chess provides.

This study revealed how to make the most economical decisions to invest resources in the game of chess and other hobbies. The ability to make economic decisions can positively spillover to other areas of everyday life to continuously optimize the use of scarce resources such as time and money, avoid unnecessary waste, and always consider opportunity costs. This study can serve as a warning to anyone who may be interested to pursue a career in their hobby. It is often very competitive with high risks while consistent winnings are not guaranteed to maintain a decent standard of living.

The findings of this research study can also be applied to other industries such as sports and gaming where people have to make risky, life-changing decisions about whether to pursue their hobbies as a profession or not. In a study (Drumm, 2014) about individuals who transformed their hobby into a profession, the results revealed that continued enthusiasm for their chosen activity persisted even when commercialized and relatively little research into business activities was undertaken by them before going professional, which may indicate hobbyists prioritizing passion over profit when pursuing a career. Another study (Ronkainen, Ryba, McDougall, Tod, & Tikkanen, 2022) about coaches in European sports clubs demonstrated that younger coaches thought of coaching as a hobby and placed more value on personal benefits while older coaches thought of coaching as a profession and focused on selfless values which showed that age may influence perceptions of hobbies. In a study (Bányai, Zsila, Griffiths, Demetrovics, & Király, 2020) about gamer motives to become professional, the results revealed that the gaming motivations of competition, skill development, and social motivations predicted career planning as a professional e-sport player with younger players more likely to seek career opportunities than older players. While economics should be considered in any decision to pursue a hobby as a career, other overriding reasons such as passion or reputation can end up playing the most important role.

The limitations of this study must be acknowledged. Firstly, the sample size was small and conveniently selected from YouTube based on relevance to answering the research questions so the population of global chess industry experts might not be accurately represented since a majority of them don't have social media presence on YouTube to provide possible alternative viewpoints. Secondly, while a lot of details and context were provided by this qualitative research study, there is a lack of generalizability and insufficient scientific evidence backed by quantitative analysis with numerical values. It is understandable that a research finding is more likely to be accepted as a factual if it is quantified, but overemphasis on numbers can lead to a biased and oversimplified view of the world (Greenhalgh & Taylor, 1997). This qualitative research provided answers to preliminary questions about the economics of chess investment, which can then be addressed by quantitative studies in the future. Thirdly, the source of data was secondary so there was a lack of control over the commentaries and questions asked during discussions. Future studies can improve the validity and reliability of this study by providing quantitative analysis of numerical data that involve surveys of hundreds of professional chess players about the economics of chess investment.

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