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EXPLORING CONCEPTUAL METAPHOR TYPES IN FINANCIAL MARKETS REPORTING: MAINSTREAM VS. SOCIAL MEDIA

Abstract

This study contributes to English for Specific Purposes (ESP) pedagogy by providing an updated examination of conceptual metaphor types (CMTs) employed in financial markets reporting. The investigation delves into the prevalence of CMTs in both social media and mainstream media contexts. Robust patterns were identified to distinguish CMT usage between mainstream and social media by leveraging big-scale data analysis, encompassing 38.6 million documents from *The Financial Times*, *The Wall Street Journal*, Twitter and Reddit. The data collection spans fifteen months during the COVID-19 pandemic (January 2020–March 2021), marked by socioeconomic upheaval and coinciding with a surge in retail investors using low or no-cost mobile financial trading applications. Examining the proportion of CMTs reveals that *war/combat*, *markets animate*, *markets inanimate*, and *health* metaphor types have strong associations with both social and mainstream media. The *gambling* CMT is predominantly linked to social media. In terms of metaphor density, the results indicate a higher concentration in social media compared to mainstream media. Texts sourced from social media, characterized by greater conciseness, emerge as a potential communication barrier. The findings underscore the importance of incorporating authentic texts from social media into specialized language courses, thus enhancing language learning experiences in the domain of financial markets reporting.

Key words

financial markets, conceptual metaphor, data analysis, metaphorical expressions, metaphor density, social media.

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1. INTRODUCTION

Financial news reporting has long been recognised by scholars to provide ample scope for identifying examples of Lakoff and Johnson's notion of the conceptual metaphor, which is based on the premise that metaphors are an aspect of thought rather than language (Lakoff & Johnson, 1980). According to Charteris-Black and Musolff (2003), a metaphor involves a meaning shift in the use of a word or phrase which happens when words or expressions are taken from one context and applied to another. The rationale for this transfer from one domain to another is the suitability of the attributes of a word in its original (source) domain to convey meaning in the new (target) domain. This shift over time can become conventional if frequently taken up in a language community or novel if restricted to the situation of use. For this study, we have identified the source domain of the metaphor as the literal use of the word. A generic example of this is when words normally associated with concrete physical phenomena are applied to abstract mental phenomena (Charteris-Black & Ennis, 2001). Situating this in the English for Specific Purposes (ESP) context, the importance of metaphor in economics vocabulary teaching has been well documented given the possible cognitive and pragmatic variations between languages in their use of metaphors in discourse, and how this can shape opinions (Charteris-Black, 2000). Moreover, the argument that foreign language learner speech may sound non-native because it lacks metaphor use (Danesi, 1994) further underscores the importance of raising awareness of metaphor use in ESP contexts so that ESP learners can understand and use appropriate metaphors that foster their inclusion among highly specialized professional communities, such as the investment community.

Monitoring metaphor use in financial reporting is useful for ESP in the sense that it contributes to ensuring that foreign language acquisition is dynamic and aligned with how metaphors may change over time or vary within different media. Moreover, monitoring metaphor patterns is also useful for identifying underlying viewpoints that enable the analysis of how language constructs ideology (O'Mara-Shimek et al., 2015). However, the use of conceptual metaphors in financial markets reporting on social media platforms is under-researched, despite being the key platform through which retail investor communities communicate with each other nowadays. It is useful for professionals involved in financial markets – investors, journalists, economists, and financial advisors alike and especially those for whom English is a foreign language – to know whether different conceptual metaphor types (hereafter abbreviated to CMTs) are used in mainstream or social media, what these metaphors mean, and what the typology may mean in terms of how users of these platforms perceive financial markets.

This study addresses the need for research-based language teaching grounded in an awareness of financial markets and the demands they place on English foreign

language learners. Moreover, as language learning is dynamic, ESP didactics encourages scholars to tackle novel challenges presented by real-world texts (Hyland, 2022).

Four considerations set the present study apart from the previous research cited in Table 1 (see Literature Review), which summarizes the main studies on metaphorical expressions observed in financial markets reporting. First, the time frame of the study – January 2020 to March 2021 – coincides with the devastating socioeconomic consequences of the COVID-19 pandemic. Simultaneously, there was an increase in retail investors exploiting commission-free trading apps such as Robin Hood or Trading 212 (Graffeo, 2021). According to the report titled "The future of capital markets: Democratization of retail investing", users of the major low and no-fee stock trading apps grew globally by 48%, from 61.9 million in 2019 to 91.5 million in 2020 (World Economic Forum, 2022). Moreover, tumultuous times in financial markets have previously been selected as worthwhile periods to study metaphors as evidenced by the work of White (1997), Rojo López and Orts Llopis (2010), Luporini (2013), Cardini (2014), O'Mara-Shimek et al. (2015), and Nerghes et al. (2015). Second, prior studies are not big-scale explorations, which is necessary for the discovery of reliable patterns for the proportions of CMTs detected, and they focus exclusively on the mainstream financial press. The present study's novelty rests in the exploration of CMT frequencies in social media sources, treating them separately from the mainstream financial dailies selected. The significance from a pedagogical perspective is that if the CMTs used in social media differ from those used in mainstream media, then university modules dedicated to the English language of financial markets and trading should reflect this. These courses should explore metaphorical expressions used and their meaning, ensuring ESP courses are inclusive of the growing community of retail investors and the metaphors they use to communicate. The previous studies were conducted before the rise of the retail investor and the corresponding rise of social media platforms through which these new communities formed and communicated. In the case of Reddit, the most active community during the period studied was r/WallStreetBets, with 13 million members (Reddit, 2022). Third, despite efforts to simplify stock trading through enhanced user interfaces (Sette, 2022) a heavy use of metaphors may create a communication barrier, especially for non-native English speakers. Our corpus will enable comparisons to be made between key social and mainstream media financial market sources to identify differences in patterns of CMTs observed between the two. The use of information processing tools enabled the processing of a huge corpus containing 2,327 news items from mainstream financial media and 38.6 million posts from social media sources. Fourth, the study proposes a set of descriptor categories that incorporate the source domains in the literature (Arrese, 2015; Charteris-Black & Musolff, 2003; Luporini, 2013; Oberlechner et al., 2004; O'Mara-Shimek et al., 2015; Rojo López & Orts Llopis, 2010; White, 1997). The goal is to offer some options for standardization of metaphor type descriptors, which would be useful for future analysis and identification of patterns in the data, as well as to discover new metaphor types that do not fit the existing conceptual categories.

The objective of this study is to explore the magnitude and nature of conceptual metaphors in the financial markets domain. The Wall Street Journal Eastern Edition (WSJEE) and the Financial Times (FT) were selected, hereafter referred to as mainstream media – MM, as well as the Twitter Profiles of influencers in the investment community and r/WallStreetBets, hereafter referred to as social media – SM. To meet this objective, we measured the proportion of CMTs between the social and mainstream media studied to detect variations between them. The study was conducted between 1 January 2020 and 31 March 2021 and will address the following research questions:

RQ1: What is the proportion of CMTs in mainstream media?
RQ2: What is the proportion of CMTs in social media?
RQ3: How does the proportion of CMTs change, comparing mainstream to social media?
RQ4: How does the proportion of each CMT vary monthly when comparing mainstream to social media?

2. LITERATURE REVIEW

Recent research within ESP has been directed towards addressing the learning challenges encountered by individuals enrolled in ESP courses and aims to enhance linguistic proficiency in specialized domains. Notably, several studies advocate for the integration of authentic texts in educational settings to ensure the continued relevance of ESP within dynamic linguistic landscapes. For instance, García-Ostbye and Martínez-Sáez (2023) explore lexical density, diversity, and readability within various categories of online medical corpora, revealing challenges for EFL undergraduates. Their findings assert the suitability of these corpora for tertiary education, albeit with the caveat that pedagogical facilitation is a requisite in some cases for their effective integration into ESP courses. Building on this, Villares (2023) underscores the utility of Twitter features as a beneficial tool to balance academic conventions with informal communication, thereby contributing to wider scientific knowledge dissemination by bridging the gap between formal academic discourse and real-world language use.

In a similar vein, Elkasović and Čolakovac (2023) explore how adapting authentic texts affects the retention of vocabulary among university students studying Maritime English. Their findings suggest that learners better retain new vocabulary when exposed to adapted texts that offer simplified contexts for applying the vocabulary. This emphasis on authentic text adaptation aligns with the broader discourse on the facilitative role of authentic materials in ESP learning, encouraging a nuanced, contextually relevant, and more engaging approach to language acquisition in specialized domains. The present study reflects the approaches taken in the previously mentioned literature. We utilized authentic texts

reporting on financial markets that were sourced from both traditional financial news media and social media platforms.

Turning to the use of metaphorical expressions in the ESP context, Navarro i Ferrando (2021) delves into metaphors in medical discourse, revealing divergent tendencies in metaphor use across research papers and press articles and identifying distinct patterns and cognitive functions in the two genres, validating their use in ESP pedagogy. In the legal context, Campos Pardillos (2016) recommends integrating metaphors into legal English teaching, underscoring their significance in expressing abstract legal notions and proposing exercises to enhance learners' understanding within Legal ESP. In a similar vein, Sánchez Pérez and Cortés de los Ríos (2015) analyze financial language in English and Spanish corpora, highlighting cross-cultural differences in metaphors and metonymies within financial press articles, emphasizing their importance for comprehending financial texts and cultural nuances. The studies conducted previously share a foundational rationale with the current research, which centers on the examination of metaphorical expressions within authentic texts reporting on financial markets. The overarching objective is to safeguard the enduring relevance of ESP within the evolving linguistic landscapes influenced by the digital era.

The present research aligns itself with the broader continuum of scholarly work that seeks to explore and comprehend the nuanced linguistic intricacies of contemporary discourse. From the learner perspective, a recent study would suggest this is a worthwhile research endeavour as motivation levels were higher among university commerce students who were about to take an ESP course which was directly aligned with their main interest (Martín-González & Chaves-Yuste, 2024).

Conceptual metaphor theory, which is the focus of this work, was developed by Lakoff and Johnson (1980). It is grounded in the idea that human thought processes are largely metaphorical, and for this reason, conceptual metaphors exist as linguistic expressions. In essence, conceptual metaphors are the underlying conceptual mappings between domains, while metaphorical expressions are the specific linguistic manifestations of these conceptual metaphors in language.

The cognitive link between source and target domains allows associations of words or expressions. In the finance domain, Lakoff and Johnson (1980) exemplify this with the metaphorical expression "inflation has pinned us to the wall". Ideology is manifested in metaphors through semantic entailments, as explored by O'Mara-Shimek et al. (2015), influencing perceptions in second language instruction. Framing inflation as an adversary validates political and economic actions and supports governments "declaring war" on inflation through policy initiatives that restrict spending and encourage saving.

The main research conducted in the last 25 years on CMTs used in business and financial reporting is outlined in Table 1. Oberlechner et al. (2004) assert that success in financial markets can be attained through trading, gambling, sportive competing, or belligerent fighting, with associated metaphorical expressions suggesting entertainment, thrill, and risk. Their study concludes that conceptual

metaphor analysis is instrumental in comprehending participants' perspectives on financial markets. The notion of winning by "gambling" underscores luck, minimizing the role of skill in defeating opponents, while the sports metaphor emphasizes participant performance, where skill is crucial for goal achievement.

REFERENCE	TIMEFRAME AND CORPUS DESCRIPTION	MAIN FINDINGS
White (1997)	September 1992 The Financial Times, The Times, The Sun. No details as to the size of the corpus.	Metaphors were sourced from the following domains: war, natural phenomena, living organism (sub-domain, the market is an intelligent agent or sentient being)
Charteris-Black & Ennis (2001)	October– November 1997 English Corpus sourced from The Times (16 articles yielding 12,500 words). Spanish Corpus sourced from El Diario (Chile) and Estrategia (Chile), yielding 12,250 words	The English corpus yielded 288 instances of metaphor, one every 43 words. The Spanish corpus yielded 350 instances, one every 35 words. Despite their similarities, the Spanish corpus indicated a preference for metaphors based on psychological mood and personality. The English corpus had a higher frequency of nautically sourced metaphors.
Charteris-Black & Musolff (2003)	September–November 2000 The Financial Times (47 articles, yielding 25,017 words). The Financial Times Deutschland (63 articles, yielding 25,668 words)	Metaphors described euro trading in terms of (1) up/down movement and (2) presence of health domain in financial reporting in both English and German. English reporting employs combat metaphors in which the euro is an active agent. German reporting represents the euro as a passive beneficiary of the actions of institutional bodies (banks and governments).
Chung et al. (2003)	October– November 1997 Internet postings: (a) Huashishingwen front page TV news (b) business news in Gungshangshibao. 120 financial articles yielding a corpus containing 97,156 Chinese characters, which produced 69,397 words	Compared the choice of conceptual metaphors in Mandarin Chinese with those of Spanish and English. It focuses on the conceptual metaphor *stock market is ocean water* in Mandarin Chinese and compares it with Spanish and English data. Although different languages share similar conceptual metaphors, they differ in what is conceptually mapped from the linguistic perspective.
Oberlechner et al. (2004)	not specified 55 interviews with expert participants in foreign exchange markets sourced from Austria, Switzerland, and the UK	The interviewee's understanding of the foreign exchange market revolved around seven main metaphors: the market as a bazaar; as a machine; as gambling; as sport; as war; as a living being; and as an ocean.
Morris et al. (2007)	January–June 2000 Study 1: 64 undergraduates at Cornell University. Study 2: CNBC transcripts to extract (non)metaphorical references to the day's change in the three major market indices (i.e., Dow Jones, Nasdaq, S&P 500 indices)	Investigated *agent* metaphors (describe price trajectories as volitional actions) and *object* metaphors (describe price changes as movements of inanimate objects).
Rojo López & Orts Llopis (2010)	June-November 2007 (a), September–December 2008 (b) Financial articles from The Economist and El Economista. (a) English corpora: 4,699 words; Spanish corpora: 4,913 words. (b) English corpora: 5,028 words; Spanish corpora: 4,830 words.	English articles had a higher number of metaphors used in a negative sense than Spanish articles. The following metaphor type labels were used: Object, Building, Natural force, Supernatural force, Human behaviour, Illness, Celebration, Living being (animal or plant), Machine.

Luporini (2013)	2008 (Global Financial Crisis) Corpus source from The Financial Times (FT London Edition) and Il Sole 24 Ore. The FT corpus has 307,181 words and Il Sole 24 Ore, 556,096 words	Explored articles from The Financial Times and Il Sole 24, finding that the source domains of the metaphors used are the same in the English and the Italian newspaper: physical object, container, health, war, and natural force.
Cardini (2014)	2008–2012 Corpus sourced from The Economist, and International Economy - 100,000 words	Forty different types of metaphors were identified. Financial crisis is predominantly conceptualized in terms of something negative about a human being, about an object, and a motion. Viewing a state of economic/financial crisis as a damaged or destroyed object was the most used metaphor.
O'Mara-Shimek et al. (2015)	June–October 2008 (Global Financial Crisis) Corpus is 91,000 words: New York Times (NYT)- 38 texts = 39,499 words; Wall Street Journal (WSJ)-50 texts = 35,482 words; and the Washington Times - 18 texts =16,019 words.	Statistically significant preference by NYT and WSJ for animate-biological metaphors which promote understanding of the stock market in terms of a living being that must be 'nurtured' through intervention. This contrasts with the perception of stock markets as something that must be 'left alone', which is more consistent with laissez-faire approaches to economic crisis scenarios.
Arrese (2015)	2010–2012 Right-wing daily (ABC), left wing daily (El País), and El Mundo, a more central newspaper on the ideological spectrum, and an economic and financial title (Expansión). Articles were selected based on the following criteria: publication date 7 days before and after 11 key events or developments that signalled the evolution of the Euro crisis	Metaphors around health and disease were the most common, both in each journal and in absolute terms. Next were metaphors of actions and situations of living beings (Organism) and those based on natural phenomena (Natural). Except in one case (ABC) the third place is occupied by metaphors of artifacts and constructions (Mechanical), and the least frequent ones, around 10% of the total in each case, are those of war, sport and entertainment.
Nerghes et al. (2015)	2006–2011 The Sun (Sun- 168 articles), The New York Times (NYT- 437 articles), and The Financial Times (FT- 2,212 articles) Divided into three sets: the precrisis period (2006–2007); the crisis period (2008–2009); and the postcrisis period (2010–2011)	Automated extraction of metaphors showed how the toxic metaphor family has been used differently in three news sources (Sun, NYT, and FT) in three time periods. Large metaphor families using source domains such as toxic may result in negative portrayals of the events through their persuasive character, which in turn can create panic among consumers of financial products.
Wiliński (2017)	1990–2012 Corpus of Contemporary American English (COCA) - 86 million words from nearly 100 different popular magazines, coming from a range of domains including financial and business.	War terms not closely associated with combat (strategy, operation) demonstrate strong associations with the business target domain, whereas those strongly connected with combat (kill, defeat, attack) are rejected source domain lexemes.
Prast et al. (2018)	October–November 1997 and same period for 2015. News from Financieele Dagblad, Algemeen Dagblad compared a period of turmoil in financial markets (1997) and the same dates for 2015, a stable period in financial markets.	Metaphors used tend to come from a few source domains that are predominantly masculine. Arguably this positively impacts men, not women, and biases masculine investors towards excess trading.

Table 1. Summary of previous studies

The literature indicates a degree of heterogeneity in the descriptors of CMTs for the corpora and time frames studied, although there are some conceptual overlaps in the work of Arrese (2015), O'Mara-Shimek et al. (2015), Luporini (2013), Rojo López and Orts Llopis (2010), Oberlechner et al. (2004), and White (1997). Building on these conceptual overlaps provides an opportunity to standardize the descriptors for the source domain labels.

Moreover, the metaphor descriptors – namely, the keywords that describe the conceptual metaphor type – and their respective lists of words originally used by Charteris-Black and Musolff (2003) to denote movement (up or down), state of health, and war/physical combat, have also been incorporated in the present study. Metaphors of movement are what Charteris-Black and Musolff (2003) describe as buried metaphorsbecause they have become commonly used in financial reporting given the logic of perceiving directional movement as inherent to the changing value of assets.

The metaphor descriptors (N=10) designed for this study are detailed in Appendix B. These descriptors are based on the previously cited works and offer an attempt at standardization that includes the main identified descriptors of the CMTs in the literature. Standardization would assist future work that seeks to identify patterns of CMTs and potentially discover new patterns over time.

3. METHODOLOGY

To address the research questions, we analyzed two leading sources from MM whose editorial content is focused on providing daily business and finance news and analysis, namely, the Wall Street Journal and the Financial Times. Their paid online subscriptions were also the highest of all the dailies, with 2.4 million and 1.1 million paid online subscriptions, respectively (World Economic Forum, 2021).

For SM, the target profile for Twitter was influencers from the investment domain, sourced from World Top Investors (Mutlimedia LLC, 2021). We then identified those with Twitter handles whose number of followers ranged from 15,000 to 8.2 million at the time the tweets were downloaded, resulting in 14 high-profile influencers. We also used Reddit's renowned r/WallStreetBets community, which was in the top 25 communities by number of members, at 13 million (Reddit, 2022). According to Google Trends (2022), r/WallStreetBets was the community that generated the highest search interest, reaching peak popularity in January 2021, which coincides with the GameStop rally (see section 4.1.).

Our goal was to recover as many metaphor occurrences as possible. First, we automatically detected the metaphors, maximizing recall and precision, which is critical to avoid verifying matches manually. In this section, we explain the steps to reproduce our approach, which are summarised in Figure 1.

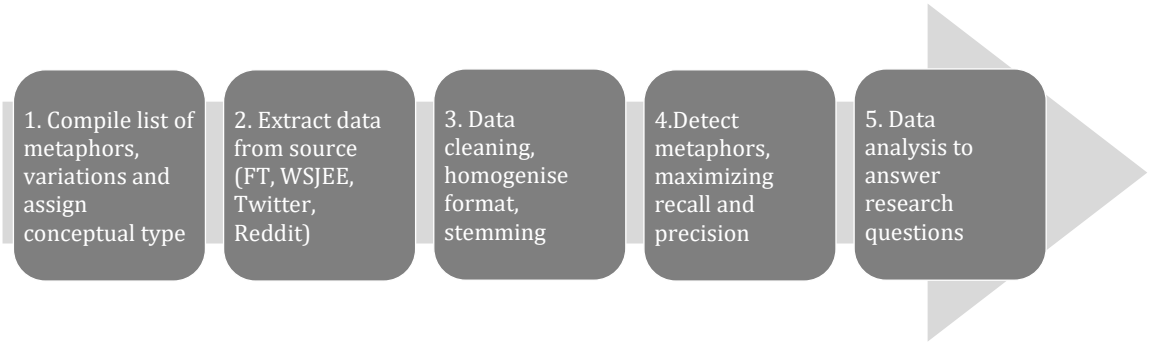

Figure 1. Procedure for exploring conceptual metaphors

First, we compiled a list of metaphorical expressions starting from the list published in Charteris-Black (2000). Then, we tapped into the experience of the research team which comprises retail investors and economics specialists with real-world experience in the Anglo-American sphere. Outside experts were consulted and each metaphor in the final list was searched for and cross-checked via Investopedia (2022). Sometimes, the entire term existed as an entry, with a semantic explanation, such as in the case of bear market and bull market. In other instances, when the term was searched it would appear in various article entries, and from the context and meaning, the metaphor could be attributed to the source domain. Please consult Appendix B for the list of metaphorical expressions chosen for study.

Next, we extracted data from the different sources, as follows: first, Twitter API[1] was used to download all profile tweets for the time frame studied; next Reddit data was obtained from the Pushshift dataset (Baumgartner et al., 2020). Full dumps were filtered offline to get the relevant r/WallStreetBets [2] subreddit content, extracting both posts and comments. We searched the WSJEE and FT USA Region[3] (FT) data using ProQuest.[4]

For WSJEE and FT, we considered news with ProQuest classification codes (see Appendix A) to ensure matches within the finance domain. No filtering was necessary for Twitter and Reddit since the domain was bounded beforehand. In our corpus, a "document" is news from WSJEE or FT, or a tweet or a post/comment from Reddit. Each document includes a unique ID, document title,[5] body text, and other metadata such as date of publication.

Subsequently, we pre-processed data using spaCy[6] removing numbers, URIs, emails, and punctuation marks as well as single words to reduce noise intertwined with a phrase representing a metaphor. Both documents and metaphors were

[1] Twitter API 2.0: https://developer.twitter.com/en/docs/twitter-api
[2] https://www.reddit.com/r/wallstreetbets/
[3] Filtering was done by considering the [Usa region] in the document title.
[4] ProQuest: https://www.proquest.com/
[5] Except for tweets and Reddit comments, in this case, title was set to "null".
[6] spaCy 3.3: https://spacy.io/

normalized to lowercase, using the stem to allow the recovery of variations of the metaphor due to different word inflexions, for example, "diamond hands" is searched as "diamond hand". Looking for precision, we did not remove stop words since some metaphors such as "dig yourself out of a hole" could lose meaningful tokens, i.e., becoming "dig hole" leading to potentially false matching.

To automatically detect metaphors, we indexed[7] all documents in our corpus, i.e., each tweet, Reddit post or comment and news item. Then, for each metaphor we ran fuzzy queries at the phrase level, allowing matches with up to one word difference to increase recall. This way, a document containing "... diamond holding hands ..." will match the metaphor "diamond hand". To evaluate the precision of the automatic search, we randomly picked and manually evaluated 1,677 documents to check if the match was correct. This yielded an estimated precision for metaphor detection of 90.22%. At the end of this stage, we got a list of tuples with this data: [metaphor, document ID, field where the metaphor occurs]. For example, [diamond hand, 1327317783420481536, body text].[8] Thus, the same ID can appear several times in the list as different metaphors can occur within the same document, and in different fields. Given the ID or the metaphor, it is possible to know the publication date, conceptual type, field length in words, etc.

Finally, using the list collected in the previous stage, we ran different analyses to answer the research questions. We defined the following variables per document: i) title word count; ii) body text word count; iii) total word count, i.e., the sum of title and body text word count, considering only documents where a metaphor occurs; iv) metaphor word count: counts all the words comprising a metaphor within the title or body text. For example, if "diamond hand" appears twice in a document, it will count as 4 words; v) conceptual metaphor type frequency: every single occurrence of a metaphorical expression in a document is counted as a conceptual metaphor type (CMT). Then, we computed the proportion of a CMT as a percentage of all CMTs. This enabled us to compare the frequency, independently of the word count or the number of documents, which is considerably larger in Reddit. When comparing different sources, the CMT proportions are relative to the source: e.g., for computing the CMT proportions in Twitter we did not count occurrences in Reddit and so on.

4. RESULTS AND DISCUSSION

This study benefits from the huge volume of data analyzed between the set time frame lending weight to the accuracy of the patterns observed. The main highlights of the data analysis will be presented first, after which the findings will be discussed

[7] Indexing and search was done using the Python library Whoosh 2.7.4: https://pypi.org/project/Whoosh/

[8] Tweet from @wallstreetbets, https://twitter.com/wallstreetbets

in line with the research questions. Table 2 presents the total number of documents sourced (n=38,614 million) by media type.

<table>
<tr><th colspan="3">SOCIAL MEDIA (SM):</th><th colspan="2">MAINSTREAM MEDIA (MM):</th></tr>
<tr><td colspan="3">38,611,530</td><td colspan="2">2,327</td></tr>
<tr><td rowspan="2">Twitter:
24,711</td><td colspan="2">Reddit: 38,586,819</td><td rowspan="2">FT: 1,550</td><td rowspan="2">WSJEE: 777</td></tr>
<tr><td>RP:
1,363,705</td><td>RC:
37,223,114</td></tr>
<tr><td colspan="5">Total: 38,613,857</td></tr>
</table>

Table 2. Total number of documents, comprises: tweets, Reddit posts (RP), Reddit comments (RC), Financial Times News (FT), and Wall Street Journal News (WSJEE)

We analyzed the data to find out the most common word-count range of documents containing at least one metaphor for both social media (SM) and mainstream media (MM). The rationale for extracting this data is that a communication barrier caused by a metaphor is more likely to happen in text with low word counts, on the proviso that the audience is new to retail investing, or their level of English is basic.

To better gauge the data distribution, we calculated the quantiles for both corpora. The results presented in Table 3 indicate that for MM, 80% of the documents containing at least one metaphor had a word count ranging from 358 to 965 words for the body text. For SM, the word count was considerably lower, with 80% of the documents ranging from 6 to 64 words underscoring the shortness of the documents sourced from social compared to mainstream media. On this basis, communication barriers are more likely to occur in social than in mainstream media in the audience profile previously described.

As for the word count of document titles, Table 3 indicates that there is far less variation between both media types, which is not surprising as titles are more effective as a short, attention-grabbing means by which to hook the reader irrespective of their source.

SOURCE	FIELD	$Q_{0.9}$-$Q_{0.1}$
Mainstream media (MM)	title	[8, 29]
	body text	[358, 965]
Social media (SM)	title	[6, 64]
	body text	[4, 29]

Table 3. Word count range by source and field. Q0.9-0.1 represents the boundaries of the range containing 80% of word count length, i.e., 0.9 quantile - 0.1 quantile

We also computed the metaphor density at the document level, as an estimation of the likelihood of finding a metaphor. In line with previous studies, such as Charteris-Black and Ennis (2001); Charteris-Black and Musolff (2003); Chung et al. (2003); Rojo López and Orts Llopis (2010); Luporini (2013); Cardini (2014), we computed

the proportion of words comprising metaphors (Words-Metaphor) in relation to the total word count of the document where the metaphors occur (Words-Total), normalized as words comprising a metaphor per 1,000 words. Table 4 displays the quantile that encompasses 80% of the document density values. It indicates that there is a significantly higher likelihood of encountering words related to conceptual metaphors in SM compared to MM. This can be explained by the shorter length of documents in SM together with the high number of metaphor occurrences. This result validates the relevance of studying the use of CMTs related to financial markets in social alongside mainstream media, which has previously been the exclusive source for this type of research.

SOURCE	$Q_{0.9}$-$Q_{0.1}$
Mainstream media (MM)	[10.77, 45.81]
Social media (SM)	[23.25, 200.00]

Table 4. Metaphor density values range by source. Q0.9−0.1 represents the boundaries of the range containing 80% of density values, i.e., 0.9 quantile - 0.1 quantile

4.1. Proportion of CMTs in social and mainstream media

The findings concerning RQ1, presented in Figure 2, indicate that the most frequent CMT observed for the MM studied was from the markets-inanimate domain, with the WSJEE only slightly higher at 30.6% than the FT at 27.7%. The health and markets-animate domains were the next most frequently occurring CMTs, ranging from between 24-25% for both newspapers and both domains. Remarkably, metaphors from the gambling domain had very low frequencies compared to the other domains.

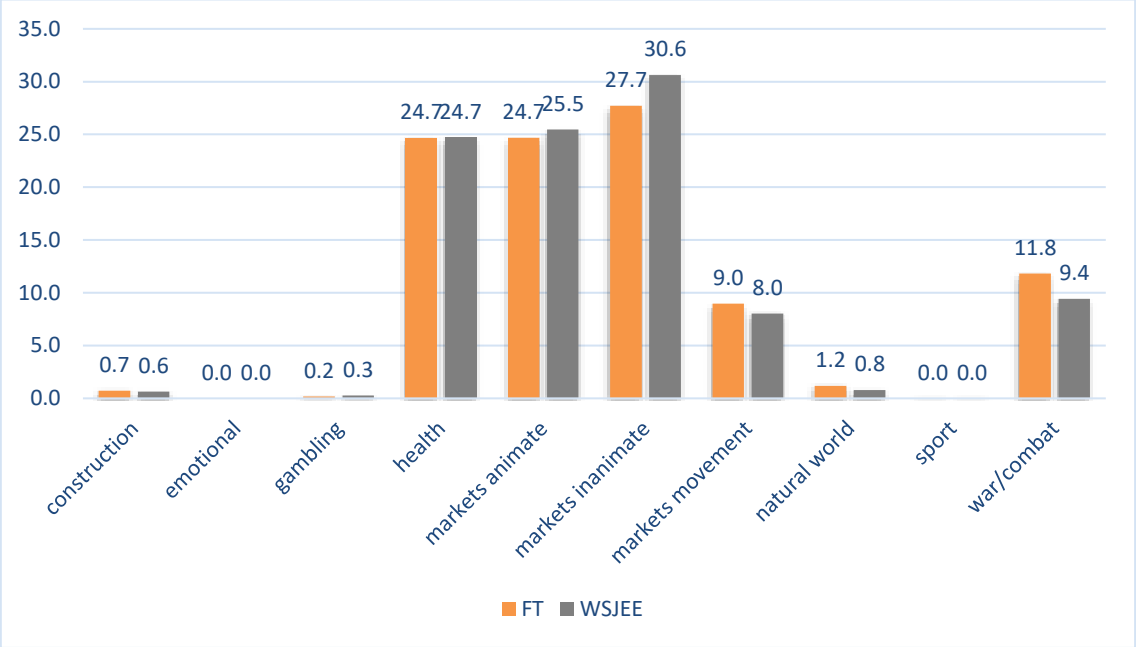

Figure 2. Proportion of each conceptual metaphor type (CMT) as a percentage of the total number of metaphor occurrences in mainstream media

Moving on to RQ2, according to Figure 3, metaphors from the markets-animate domain were the most popular overall for the SM studied, and this was especially pronounced for Twitter at 46.1% compared to r/WallStreetBets at 39.8%. The next most frequently occurring CMT was from the markets-inanimate domain at 21.7% for r/WallStreetBets and 18.3% for Twitter. By contrast, the gambling domain occurred more frequently in r/WallStreetBets (7%) than in Twitter (0.2%).

Regarding RQ3, as shown in Figure 4, the four metaphor source domains that appear the most frequently in mainstream and social media are markets-animate, markets-inanimate, health, and war/combat. When comparing the proportions of the four most common source domains, there are, nevertheless, distinctions between mainstream media and social media. For instance, in the markets-animate source domain, the proportions were significantly higher for social media (39.8%) than for mainstream media (25%). Also, for the war/combat source domain, the results indicate that social media (13.2%) was slightly ahead of mainstream media (11%). Moreover, for social media, there is a noteworthy difference in the prevalence of the gambling source domain (7%) compared to mainstream media (0.2%).

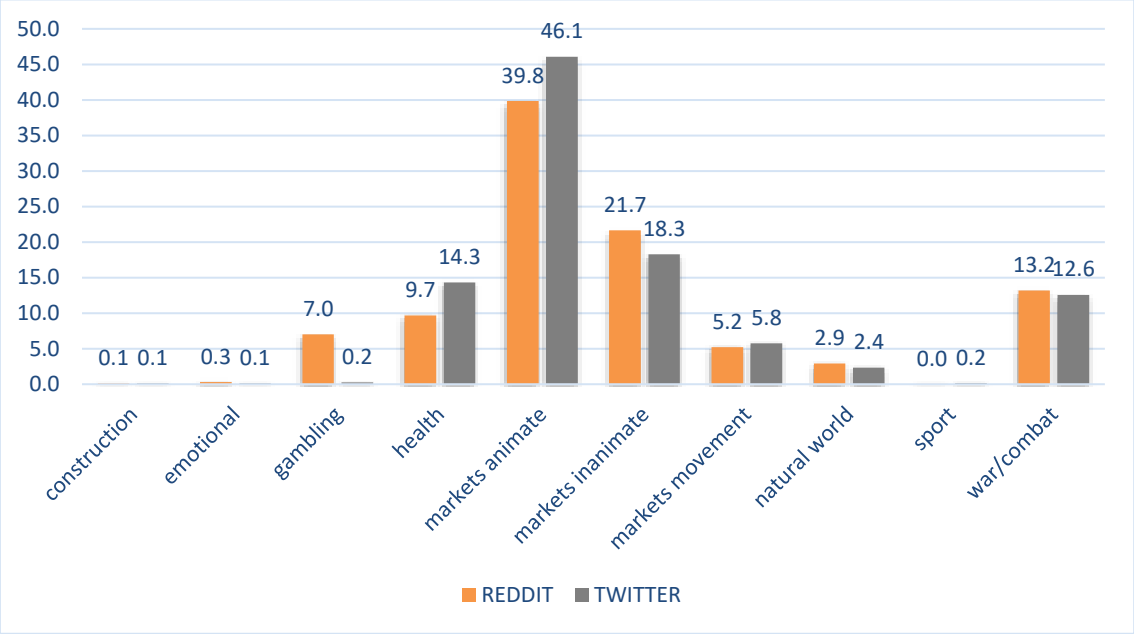

Figure 3. Proportion of each conceptual metaphor type (CMT) occurrence as a percentage of total metaphor occurrences in social media

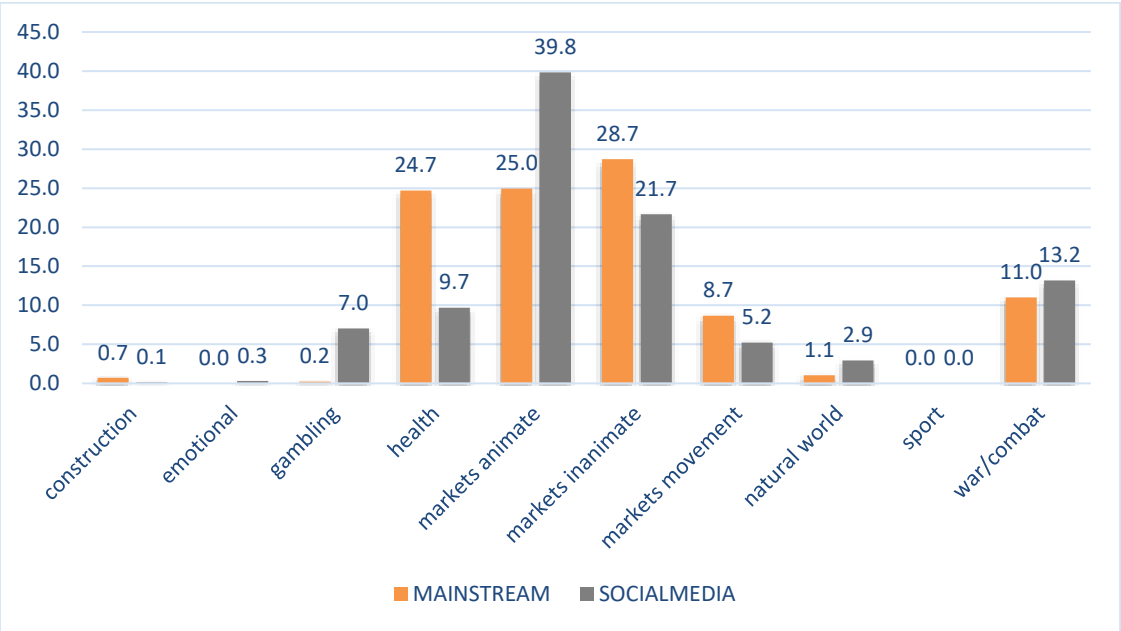

Figure 4. Proportion of each conceptual metaphor type (CMT) as a percentage of all metaphor occurrences, mainstream vs. social media

Beyond the data, the question arises as to what these variations in the distribution of CMTs may mean in terms of how financial markets are perceived by consumers of mainstream versus social media. Given that the conceptual is inseparable from the emotional, and vice versa (Lakoff, 2016), a discussion of the underlying semantic consequences and possible emotional triggers related to the source domains of metaphors follows next.

For both the social media and the Anglo-American financial press analyzed, the markets-animate domain reported some of the highest proportions of all CMTs, with higher figures for social compared to mainstream media. Generally, the notion of markets being animate could refer to the idea that markets exhibit characteristics or behaviours typically associated with living things in the sense that they grow, decline, adapt and interact, in the same way that organisms behave. This perspective may be used metaphorically to underscore the complex dynamics and interrelationships of economic systems.

The next most frequently occurring domain was markets-inanimate, with a greater proportion in the mainstream than in social media. When financial news reporting uses conceptual metaphors from the inanimate domain, this could suggest that markets are mechanistic, non-living entities, rather than natural living things. In turn, this peddles a more laissez-faire, i.e., noninterventionist governmental approach to dealing with economic crises. The underlying idea is that entities are inanimate objects, and as such are governed by the laws of physics and cannot be altered or intervened with. This also suggests that financial markets are a law unto themselves, where intervention is ineffective and pointless and, therefore, they are best left to regulate themselves to work through peaks and troughs (O'Mara-Shimek, 2020; O'Mara-Shimek et al., 2015).

The war/combat domain is well documented in the literature as a popular source domain for business and financial reporting (Arrese, 2015; Luporini, 2013; Oberlechner et al., 2004; Prast et al., 2018; Wiliński, 2017). One of the key findings in the present study is that the war/combat domain was more frequent in social than in mainstream media, although the difference was slight, at under 3%. The war/combat domain shares similar attributes to the sports domain as both are competitive activities involving two or more opponents that deploy strategies to gain an advantage and ultimately, victory over their adversary (Charteris-Black & Musolff, 2003; Wiliński, 2017). Interesting to note that despite the similarity in the attributes between them, the sports domain was dwarfed by the war domain. Arguably the war/combat domain is more severe and extreme in its underlying message of markets as comparable to a hostile battle where the stronger opponent will win, and the weaker one, who took a loss-making investment position, will be destroyed.

The health domain, with notably higher proportions for mainstream than social media, is also worthy of comment. When the health domain is used with entities, such as a currency or to describe the movements of markets in general, the inference is that markets are likened to a patient who needs treatment, and the

central bank or other branch of government policymaking is likened to a medical professional (Charteris-Black & Musolff, 2003). The underlying idea is that central bank intervention can ameliorate the functioning of financial markets, which is more at odds with laissez-faire economic thinking that tends to be in favour of letting markets regulate themselves.

Finally, the gambling domain, notable for its higher proportion in social media and its relative non-existence in the mainstream media studied, appears to be linked to the GameStop rally in January 2021. GameStop is a brick-and-mortar video game retailer whose shares had been steadily declining over the years with the rise of gaming download options. This decline led to the stock being heavily shorted by major hedge fund firm Melvin Capital in anticipation of the stock price falling further. The GameStop "meme stock", as it is referred to, was made popular by retail investors who bought stock to bolster the struggling video retailer. Their strategy was more driven by a kind of highly charged sociopolitical activism, rather than stock fundamentals, to save the fledgling retailer and wage war against the big Wall Street hedge fund firms. Indeed, the r/WallStreetBets fuelled rally forced Melvin Capital to close its short position after sustaining huge losses (Li, 2021). By March 2021, GameStop shares were up more than 1,200% year to date (Murphy, 2021). The strategy driven by r/WallStreetBets is called a "short squeeze" – i.e., a stock or other asset jumps sharply higher, forcing traders who had bet that its price would fall to buy it to prevent even greater losses (Mitchell, 2021).

The semantic consequence of deploying gambling metaphors in texts related to financial markets is the importance gambling places on the role of luck rather than skill in defeating an opponent (Oberlechner et al., 2004). The social media analyzed for this study suggests a perception of markets as a game played in a gambling context, where you need to rally all the players and get them on board to win against your opponent. All this highly charged rallying can happen, regardless of stock fundamentals, as indicated by the GameStop rally of 2021. This contrasts with the war/combat domain, for example, which places greater emphasis on the role played by strength, power, and skill in achieving the win.

4.2. Monthly proportions of CMTs by source

Moving on to the findings related to RQ4, which explores monthly proportions of CMTs as a percentage of all CMTs appearing in both mainstream and social media, two interpretations emerge from the findings. First, the study was conducted during a period marked by the two following landmark events: i) the financial market turbulence experienced in the lead-up to and the months following the World Health Organization declaring COVID-19 an official pandemic on March 11, 2020. The Dow Jones fell nearly 3,000 points on March 16, one of the largest single-day drops in U.S. stock market history (McCabe et al., 2020); and, ii) the meme stock related to the GameStop rally in January 2021 (Li, 2021). Second, the CMTs used by MM and SM

differ, as corroborated by the findings discussed in the previous section. Thus, we see a constant use throughout the period of the markets-animate domain across both types of media, with a slightly stronger proportion for SM. As for the war/combat domain, the monthly proportions were slightly greater in March and April 2020 for MM, whereas for SM, the proportions held out constantly right across the 15 months studied.

However, what is remarkable about the monthly proportions of CMTs for social media is the slightly higher concentration from the gambling domain observed in January and February 2021, which coincides with the previously mentioned and highly publicized GameStop rally, driven by r/WallStreetBets. The gambling domain is rarely observable in MM, whereas it is relatively highly prevalent in SM. This suggests that forums like r/WallStreetBets communicate as gamblers would, using metaphors like "paper hands", "diamond hands", "positions or ban", and "double down" with highly charged metaphors such as "BTFD" (Buy The Fucking Dip), as if these retail investors are gambling in a casino but are at the same time at war with their opponents, in this case, the big Wall Street hedge fund managers. Using gambling metaphors implies that financial markets are speculative, and in the case of the GameStop surge, the r/WallStreetBetts community engaged in heated pleadings to defeat their opponents and make collective purchases of the fledgling GameStop stock. What is clear is that the rallying worked in this case; GameStop Corp. (GME) was trading on the NYSE between USD 4-5 just before the rally. It peaked at around USD 86 on 27 January 2021. By February 14, 2024, the stock was trading at USD 14.17, approximately tripling its value from before the rally. Moreover, in the interim, the stock has not decreased to its pre-rally level of USD 4-5 (Yahoo Finance, 2024).

5. PEDAGOGICAL IMPLICATIONS

The findings of this study carry important pedagogical implications for teaching ESP and supporting ongoing professional development for finance and economics university students. For these students, a nuanced understanding of CMTs becomes an asset, enabling them to decipher the conveyed meaning as it moves from the source to the target domain. Including a study of metaphorical expressions in course modules specializing in financial markets discourse would also be beneficial. It would offer students a comprehensive grasp of the diverse viewpoints inherent in financial markets, as suggested by the various source domains of the metaphorical expressions detected. This knowledge not only enhances linguistic proficiency but also cultivates a deeper insight into the intricacies of their specialized field.

The findings also highlight the significance of introducing authentic texts containing metaphorical expressions to university students as it will strengthen their capacity to recognise and understand metaphorical language in real-world contexts. This will build a more complete skill set for negotiating the challenges of

their academic and professional pursuits. For example, in line with Campos Pardillos (2016), an introductory exercise could be formulated where the emphasis lies not on the precise wording of a metaphor but rather on the identification of abstract concepts associated with the source domain to understand the underlying meaning behind metaphorical expressions and what impact this may have on how different collectives perceive financial markets. Once this conceptual foundation is established, gap-fill exercises may entail students choosing from three similes to accurately complete the metaphorical expression to encourage confidence in the use of these fixed expressions. Greater confidence will encourage more effective participation in the economic sphere. This was found to be the case in a study where English foreign language learners performed better in terms of perceived writing proficiency when the grammatically correct use of metaphors was present, indicating a positive association between language proficiency and the correct use of metaphorical expressions (Hoang & Boers, 2018).

The future monitoring of metaphors in financial reporting is crucial to ensure that pedagogical materials are dynamic and up to date in terms of discovering both new CMTs and metaphorical expressions. This will ensure that ESP courses stay relevant for professional or retail investors, financial advisors, or indeed financial journalists and commentators, who may have a basic level of English. Given the greater density of metaphors observed in social compared to mainstream media, we believe ESP courses should consider metaphor use in social media. Low or no-cost apps are a significant step towards democratizing trading in financial markets. However, if social media communities are chatting in a kind of metaphoric code that only a few understand, this could pose a communication barrier and thereby impede social inclusion.

6. CONCLUSIONS

The novelty of this work lies in the creation of large-scale corpora sourced from social and mainstream media to study the density and types of metaphors used in financial markets reporting. The descriptors selected to characterize the conceptual metaphors under which the metaphorical expressions are grouped benefit from the work of previous researchers and are an attempt at standardization to facilitate future research.

The study occurred during a 15-month time frame that coincided with one of the most turbulent periods in recent memory, both economically and socially. The fine-grain analysis of large-scale data was possible by deploying information processing tools from computer science. The methods and tools presented in this work are reproducible and can be deployed by future researchers so that metaphor lists can be updated, and new metaphor types may be discovered over time.

The conclusions of this study underscore the importance of monitoring social alongside mainstream media to explore the distinctive density and patterns of

metaphor types that appear in each, and how they may change over time. There are three main conclusions of the study. Firstly, the data indicate that consumers of social media are more than twice as likely to come across a metaphor as those of mainstream media. Secondly, the word-count range of the vast majority (80%) of social media texts that contain at least one metaphor is significantly shorter than that of mainstream media. This means that when metaphors appear in shorter tweets or posts, they potentially pose a greater communication barrier for inexperienced audiences or for those whose level of English is basic. Thirdy, even during the months of market turbulence, the patterns of metaphor types were constant between social and mainstream media. Thus, the gambling domain was strongly associated with the social media corpus, and the markets-animate, and markets-inanimate domains were strongly associated with both media types studied.

Returning to the argument put forward by Lakoff (2016) that the conceptual is inseparable from the emotional, and vice versa, some interpretations were made concerning likely audience sentiment towards financial markets in the two corpora explored. Although a thorough investigation of this is a question beyond the scope of this work, the results detected highly marked patterns that distinguish social from mainstream media in terms of the metaphor types detected in the corpus. Arguably, this perception of financial markets could create a new reality upon which consumers of these different media will react, as evidenced by the GameStop rally of 2021.

The findings of this study provide a green light for further inquiry, given the density of metaphors in social media and the fact that these metaphors appear in much shorter texts compared to newspapers. The monitoring of metaphorical expressions needs to be updated, especially in periods of turmoil in financial markets. This would identify new metaphorical expressions, which may or may not fit into the conceptual metaphor types adopted in this study. From the data science perspective, a possible research direction could involve developing novel approaches to automatically detecting new metaphorical expressions. This would open opportunities to study languages as a dynamic phenomenon where emerging expressions can be readily detected and understood by interested stakeholders.

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Appendix A

ProQuest classification codes for news items

Classification	Description
52111	monetary authorities-central bank
52211	commercial banking
52212	savings institutions
52219	other depository credit intermediation
52221	credit card issuing
52222	sales financing
52229	other non-depository credit intermediation
52231	mortgage and nonmortgage loan brokers
52311	investment banking and securities dealing
52312	securities brokerage
52313	commodity contracts dealing
52314	commodity contracts brokerage
52321	securities and commodity exchanges
52391	miscellaneous intermediation
52392	portfolio management
52393	investment advice
52511	pension funds
52591	open-end investment funds
52592	trusts, estates, and agency accounts
52599	other financial vehicles
53121	offices of real estate agents and brokers
53131	real estate property managers

Appendix B

Metaphor descriptors (N=10) designed for the study

Construction: bolster * bolstering * crumble * crumbling * undermine * whipsaw * whipsawed

Emotional: BTFD * buy the fucking dip * clowngrade * dig herself into a hole * dig herself out of a hole * dig himself into a hole * dig himself out of a hole * dig myself into a hole * dig myself out of a hole * dig oneself into a hole * dig oneself out of a hole * dig themselves into a hole * dig themselves out of a hole * dig yourself into a hole * dig yourself out of a hole * catch a falling knife * graveyard market * pump and dump * rekt * santa claus rally * santa's rally * sucker's rally

Gambling: blue chips * diamond hands * dd * double down * paper hands * positions or ban * skin in the game * weak hands

Health: ailing * angst * anxious * bleeding * bout of flu * breakdown * casualty * cautious * confidence * contagion * debility * decline * depress * diet * dislocation * economic cure * economic decay * economic depression * economic disease * economic growth * fat * fears * feverish * growth * hemorrhage * health * healthy * healthy economy * hysteria * infant industry * jitters * life support machine * nerves * nervous * nursing * paralysis * recover * recovery * remedy * robust * skittish * strength * strong * suffer * support * tension * vulnerable * weak * worry

Markets Animate: continue * expect * grow * move * need * pick up * reckons * slow * think *belt tightening *

Markets Inanimate: boom * bounce * bouncing * buoyant * close * crash * crashing * expand * fall * increase * open * overheat * rebound * rebounding * remain * rise * rollercoaster * slump * swings and roundabouts

Markets Movement: anchor * bale out * calm * dive * don't try and catch a falling knife * don't try to catch a falling knife * falling knife * drop bounce rebound * fair weather * flagship * floating * floating loans * free fall * haven * jump * landing * lurch * nosedive * plummet * plunge * ripples * slide * slip * soar * stagger * stumble * teeter * topple * tumble * turn tide * wobble *aftershocks * boil over * bubble burst * buffet * collapse * decimated * dent * disaster * eclipse * engulf * evaporated * fallout * havoc * lethal cocktail * meltdown * overheating * pressure * punctured * shakeout * shock waves * turmoil * volatile

Natural World: a green shoot * all rosy in the garden * not rosy in the garden * rosy in the garden * ashdraked * ashdraking * bear market * bear market bounce * bearish * bull market * bull run * bull trap * bullish * cat and mouse * dead cat bounce * dead cat bouncing * dead-cat bounce * dovish * financial meltdown * galloping * hawkish * lame duck * predator * prey * runaway * shark investor * shark stock * storm hurricane * to the moon * weather the storm * whale * whale investor * whale trade * white elephant

Sport: base-hit * beat the market * beating the market * can't hit a home run every time you swing the bat * get a hit every time you swing a bat * hit a home run every time you swing the bat * won't get a hit every time you swing the bat * home run * level playing field * play off the front foot * swing the bat

War/Combat: assault * attack * batter * battering * battle * be on the receiving end * beleaguered * blood in the streets * bloodbath * bloodletting * blow * bout of * damage * debacle * dragged down * embattled * fight * firepower * hit * hold out * impact * knockout blow * mobilise * on the ropes * protect * punch drunk * rally * rallying * reeling * respite * retreat * reversal * savagely * shell shock * shell shocked * stonk * tank * tanking * tear apart * throw in the towel * trigger * under fire * under the hammer * unscathed * victory * wipe out