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An economic definition of 'Fear of Missing Out' (FOMO)☆

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ABSTRACT

This research note proposes a decision theoretic definition of the popular phenomenon of Fear of Missing Out (FOMO). Our definition assumes that FOMO causes individuals to base their decision-making utility on their own anticipated regret and the decisions made by individuals in their social peer group. We use an example related to asset trading in order to illustrate how to analyse decision-making under FOMO preferences and to highlight differences with the concept of regret aversion.

1. Introduction

Fear of Missing out (FOMO) is widely referred to in financial media nowadays (e.g. Hershfield, 2020). It is often associated with worries and regret and has often something to do with feeling left out and thus not belonging to a group (Przybylski et al., 2013). Hence, FOMO contains a social component that distinguishes it from post-decisional regret, which occurs upon realising that another choice would have been better after a choice has been made and the ex-ante uncertainty resolved (Milyavskaya et al., 2018; Zeelenberg, 1999).

Existing research in psychology and economics relies on informal descriptions and the colloquial use of the term "Fear of Missing Out" (Przybylski et al., 2013; Milyavskaya et al., 2018). This lack of a formal definition makes it difficult to use preferences characterised by FOMO in an economic analysis. In this research note, we propose an economic definition of preferences governed by FOMO by relying on these informal description and the colloquial use.

We suggest that an individual who feels FOMO compares their outcome under a certain choice with outcomes in the same state of nature under alternative choices made by their social peer group. What our proposed definition has in common with the concept of regret aversion is the comparison with alternative outcomes in the same state of nature, but the main difference to that concept is the restriction of this comparison to actions taken by the individual's peer group, which adds a social component. Furthermore, due to the impact of the peer group's decisions on FOMO preferences, a solution is found by using game theoretic analysis.

We provide an illustrative example of such an analysis using lotteries which are designed to resemble the asset market model in Qin (2015) who assumes investors to be regret averse, in order to compare decisions under both concepts. We show that under FOMO, an individual can avoid regret by mimicking their social peer group's decision, even if this decision is not the expected

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material payoff maximising one. As a consequence, such a materially inferior choice can occur under a wider parameter range when the decision maker's preferences are characterised by FOMO compared to regret aversion.

This research note's main contribution is to propose an economic definition of FOMO as a feature of a decision-maker's preferences and to illustrate some implications on an individual's financial decision-making. The primary objective is not to develop an entirely new concept of decision-making, but rather to suggest a formal definition that captures the essence of the cognitive construct commonly referred to as FOMO, and what people seem to have in mind when they talk about FOMO.

The most closely related concept to our suggested definition of FOMO is that of regret aversion (e.g. Bell (1982) and Loomes and Sugden (1982)) which assumes that individuals anticipate the regret they might feel if the action they choose turns out to be inferior to an alternative action they rejected, and make their decision so as to avoid that regret. While a regret averse individual compares their payoff in each state of nature to that of all alternative actions, we define FOMO as avoiding the regret of not taking an alternative action that someone in the decision-maker's social peer group has taken.

Furthermore, our definition of FOMO has the comparison with other people in common with the theory of social preferences pioneered by Fehr and Schmidt (1999), in which individuals compare their own payoffs with those of members of their social peer group. In particular, Saito (2013) and Maccheroni et al. (2012) allow for making these comparisons on an ex-post basis in each state of nature. In this regard, our concept of FOMO is related to envy based on ex-post payoffs. However, the difference is that, under FOMO, a decision-maker will compare their actual payoff with their own payoff if they mirrored the same action as someone in their peer group, rather than comparing it with that other individual's payoff.

To sum up, a decision-maker feels regret when realising that a different action could have led to a better outcome, but this is only relevant for FOMO, according to our definition, if this other action was chosen by someone within their peer group. On the other hand, a decision-maker feels envy if someone in their peer group is better off, but this is only relevant for FOMO if this advantage is due to an alternative action chosen by this peer group member.

2. Definition

FOMO has been described as a pervasive fear "that others might be having rewarding experiences from which one is absent" and this is characterised "by the desire to stay continually connected with what others are doing" (Przybylski et al., 2013). It is also referred to as something that can arise from a plethora of choices coupled with uncertainty about the best choice (Milyavskaya et al., 2018). In the context of financial markets, FOMO is often referred to as the fear of "missing out on a potentially lucrative investment or trading opportunity" (Ma, 2023). According to Neumann (2020), FOMO is based on a feeling of uncertainty about possible negative future outcomes closely related to anticipatory regret. Furthermore, FOMO is closely related not only to regretful feelings but also the feelings emerging out of the social comparison within an individuals' peer group which shows an individual what she could have had if she had gone for the same ex-ante action (Neumann, 2020).

Numerous scientific and practical papers,[1] as well as non-scientific articles[2] refer to the cited literature above as a basis for their own contributions by using the provided notion of FOMO. When using the term FOMO, it often involves missed opportunities and choosing actions that could have been chosen.

Based on these informal uses of the term FOMO in the previous literature, we suggest that FOMO consists of two components: anticipated regret and an individuals' peer group. Regret stems from comparisons of the outcome of chosen decisions versus unchosen decisions. When a decision maker anticipates feeling regret in some state of nature before a decision is made, future regret will receive a higher weight in the forthcoming decision-making process (Zeelenberg, 1999). Through the (social) peer group, individuals are inclined to compare themselves with each individual in their peer group (Festinger, 1954).

Let N be the set of all individuals and N_i be the subset of N that denotes an individual i's peer-group. Following Bell (1982) and Loomes and Sugden (1982) we assume that an individual i maximises expected utility $E_\sigma u(x_i, X_{-i}, \sigma)$ where $u_i(x_i, X_{-i}, \sigma)$ is our modified utility function and equals to the sum of the Bernoulli utility $v(r_i(\cdot))$ of the individual's material payoff $r_i(\cdot)$[3] and a regret function $f_i(\cdot)$ which reflects the disutility from regret[4]:

$$u_i(x_i, X_{-i}, \sigma) = v(r_i(x_i, \sigma)) + f_i(x_i, X_{-i}, \sigma) \tag{1}$$

x_i represents individual i's choice while $X_{-i} := \{x_j\}_{j \in N_i}$ represents the choices of all individuals of i's peer group. σ represents the state of nature drawn from a finite set. Similar to Quiggin (1994), we assume that regret arises from the comparison between the realised return and alternative outcomes:

$$f_i(x_i, X_{-i}, \sigma) = \phi(m_i(x_i, X_{-i}, \sigma) - r_i(x_i, \sigma)) \tag{2}$$

where $\phi(\cdot)$ is a decreasing function $R_0^+ \to R$ and $m_i(x_i, X_{-i}, \sigma)$ denotes the alternative payoff which i compares their own payoff with.

[1] See Dempsey et al. (2019), Li et al. (2020) and Gioia et al. (2021).

[2] See Dillian (2018), Laurent (2023) and Delmar (2018).

[3] In the context of the function $r_i(x_i, \sigma)$, choice x_i under state of nature σ can represent a financial market asset. This asset could either be a risky asset for which r_i is volatile across σ or a risk-free asset for which r_i is constant for all σ.

[4] That is to say that the disutility from FOMO is self-centred in the sense that individual i compares themselves with the individual j that yields the highest outcome in their social peer group, but she does not care per se about FOMO within the group. Furthermore, we do not account for time preferences to keep the discussion focused on risk preferences.

Definition 1. FOMO preferences are characterised by a utility function given by (1) and (2), where the alternative payoff $m_i(\cdot)$ is equal to

$$m_i(x_i, X_{-i}, \sigma) = \max_{j \in \{i\} \cup N_i} r_i(x_j, \sigma) \tag{3}$$

Note that these assumptions imply that the utility function under FOMO preferences (1) is strictly increasing in an individual's own and weakly decreasing in an individual's peer group members' material payoffs. Furthermore, if an individual's peer group behaves uniformly, an individual can avoid any FOMO-related ex-post regret by aligning their decision with their peer group. However, even when deviating from the peer group's decision, FOMO-related ex-post regret may be avoided in states of nature in which the individual's option yields a higher material payoff than that chosen by the individual's peer group.

To see the difference between our definition of FOMO and regret aversion, define A as the set of all possible actions x, and $A' := \{x \in A : \exists j \in \{i\} \cup N_i \text{ such that } x_j = x\}$ as the set of actions that were actually chosen by someone in i's peer group. Then, our definition of the relevant alternative outcome under FOMO preferences can be written as $m_i(x_i, X_{-i}, \sigma) = \max_{x \in A'} r_i(x, \sigma)$, whereas the typical assumption in models of regret aversion[5] is $\hat{m}_i(x_i, \sigma) = \max_{x \in A} r_i(x, \sigma)$.

Hence, the difference between our definition of FOMO and regret aversion lies in the alternatives with which an individual compares their own action. Under FOMO, i's action x_i is compared with the chosen action X_{-i} of i's peer group, while with regret aversion i's action x_i is compared with all possible actions.

Furthermore, the main difference between our definition of FOMO and social preference models[6] is that in social preference models the payoffs are compared, whereas our definition of FOMO is based on the comparison of actions. Under FOMO, we consider the payoff difference between the decision-maker's actual actions versus the actions taken by their peer group.

3. Illustrative example

Using the following example, we will show how to work with the definition introduced in the previous section. Furthermore, this example aims to clarify the difference between FOMO and anticipated regret. Let there be two states of nature σ with the following distribution:

$$\sigma = \begin{cases} 1 & \text{with probability } \hat{\mu} \\ 0 & \text{with probability } 1 - \hat{\mu} \end{cases} \tag{4}$$

where $0 < \hat{\mu} < 1$. Let us further assume that there are two lotteries to choose from, Lottery $(B)uy$ and Lottery $(S)ell$, where the material payoff in lottery x equals[7]:

$$r(x, \sigma) = \begin{cases} \sigma - \mu & \text{if } x = B \\ \mu - \sigma & \text{if } x = S \end{cases} \tag{5}$$

Let there be two individuals (i, j) who make up each other's peer group and have identical payoff functions $r_i(x, \sigma) \equiv r_j(x, \sigma) \equiv r(x, \sigma)$.

The utility function defined in (1) is the sum of two components, (a) the expected material payoff $r(x_i, \sigma)$ and (b) the disutility of anticipated regret $f(x_i, x_j, \sigma)$. Following Qin (2015), we assume the following functional form for the regret function:

$$f(x_i, x_j, \sigma) = -\eta \sqrt{m(x_i, x_j, \sigma) - r(x_i, \sigma)} \tag{6}$$

Recall that, as defined in Eq. (3) and diverging from Qin (2015), $m(x_i, x_j, \sigma)$ represents the maximum material payoff within i's peer group in state σ. We can see by the subsequent function (7), that individual i's expected utility and, therefore, optimal choice x_i depends on the other individual's choice x_j:

$$\hat{u}(x_i, x_j) = \hat{\mu} \cdot u(x_i, x_j, \sigma = 1) + (1 - \hat{\mu}) \cdot u(x_i, x_j, \sigma = 0) \tag{7}$$

As both individual choices are interdependent, we need to use game theory to solve the model, which is the main difference from the concept of anticipated regret.

Proposition 1.

(a) If $\hat{\mu} > \mu$, then there is always a Nash equilibrium where both players choose lottery B and a second Nash equilibrium where both players choose lottery S if and only if

$$\eta \geq \eta^1_{FOMO} := \frac{(\hat{\mu} - \mu)\sqrt{2}}{(1 - \hat{\mu})\sqrt{\mu}}$$

[5] See e.g. Qin (2015).

[6] See e.g. Fehr and Schmidt (1999) and Saito (2013).

[7] Note that $E_\sigma r(B, \sigma) \gtreqless 0 \gtreqless E_\sigma r(S, \sigma)$ if and only if $\hat{\mu} \gtreqless \mu$.

(b) If $\hat{\mu} < \mu$, then there is always a Nash equilibrium where both players choose lottery S and a second Nash equilibrium where both players choose lottery B if and only if

$$\eta \geq \eta^0_{FOMO} := \frac{(\mu - \hat{\mu})\sqrt{2}}{\hat{\mu}\sqrt{(1-\mu)}}$$

To simplify the distinction of decision-making for different material interests, we will write that decision-maker i acts "in accordance with" ("against") the material interest if and only if $x_i = B$ if $\hat{\mu} > \mu$ and $x_i = S$ if $\hat{\mu} < \mu$ ($x_i = S$ if $\hat{\mu} > \mu$ and $x_i = B$ if $\hat{\mu} < \mu$). Given that the other individual's choice is "in accordance with" the material interest, an individual's aforementioned objectives are aligned, as taking the same choice satisfies both objectives of i, maximising expected material payoff and minimising anticipated regret. Hence, it is always an equilibrium that both individuals follow the material interest. However, if j's choice goes "against" the material interest, i's objectives to maximise expected material payoff and to minimise anticipated regret are in conflict. In that case, the best reply is to avoid FOMO by mimicking j's action x_j whenever the regret parameter η is sufficiently high, in which case both individuals going "against" the material interest is also an equilibrium. However, if η is below a threshold, the best reply is to maximise material payoff by choosing the action that the material interest suggests, in which case it can no longer be optimal for the other individual to go "against" the material interest. Hence, both individuals acting "in accordance with" the material interest is the only Nash equilibrium for these low values of η.

The structure of material payoffs from lotteries B and S is equivalent to traders' decisions of whether to buy or sell an asset within a particular stage of Qin's (2015) asset market model with regret aversion. Therefore, we will use our analysis to compare equilibrium choices under FOMO with optimal choices under aversion against anticipated regret.

Assumptions made by Qin (2015) in his model regarding an individual's expected utility are identical to our Eqs. (1) and (6) with the only difference $\hat{m}_i(x_i, \sigma) = \max_{x \in A} r_i(x, \sigma)$ according to our remark in Section 2. Therefore, Qin's (2015) Proposition 2 derives an individual's optimal choice between our lotteries B and S if that individual's preferences are characterised by regret aversion instead of FOMO. The following Proposition compares the outcomes under both concepts.

Proposition 2. *If we compare each possible outcome for every η in FOMO with those under anticipated regret as identified by Qin (2015) we can make following statements:*

(a) Under FOMO, the parameter range for which an equilibria exists where players act according to their material interest is weakly larger than under anticipated regret.

(b) Under FOMO, the parameter range for which an equilibria exists where players act against their material interest is strictly larger than under anticipated regret.

Under anticipated regret, an individual wants to minimise regret rather than maximise material payoff if η is big and thus, deviates from maximising material payoff towards regret minimising. Furthermore, there is always an alternative action that could lead to regret, threatening the optimality of the expected material payoff maximising action. Under FOMO, regret does not exist if individuals choose the same action. This means that there is always an equilibrium where both individuals choose actions that are expected to maximise their expected material payoff, even if η is high. Therefore, with FOMO, it is fundamentally easier to establish a certain action as equilibrium, which also applies to the expected material payoff maximising action.

4. Conclusion

This research note proposes an economic definition of Fear of Missing Out (FOMO) relying on the informal description and the colloquial use of this phenomenon. Using a simple economic analysis, we examine the effect of FOMO on an individual's decision making where an individual not only anticipates regret when making a decision but also incorporates the actions chosen by their social peer group.

We demonstrate that FOMO can cause individuals to act against their material interest[8] by aligning their decision-making with their peer group to avoid any FOMO-related regret. Furthermore we compare the outcome of FOMO to regret aversion, showing that under FOMO regret can be avoided by an individual by mimicking their social peer group's decision, even if the decision is not the expected material payoff maximising one. Such a substantially inferior choice can occur under a wider parameter range if the decision-maker's preferences are characterised by FOMO compared to regret aversion (Qin, 2015).

In a similar way, one could construct an example that highlights the similarities and differences of our definition of FOMO preferences with Saito's (2013) concept of ex-post envy by allowing for decision-makers to have different payoff functions $r_i \neq r_j$.

Our definition of FOMO combines the features of regret aversion and social preferences. As opposed to regret aversion, an individual with FOMO only compares their actual decision with their peer group's decisions. The principal distinction from social preferences (e.g. Saito, 2013) is that the decision maker's own benchmark is their own hypothetical payoff when choosing the same action as their peer group. Therefore, the concept of FOMO as introduced in this research note is more suitable for situations in which each decision-maker influences their own material payoff, whereas social preferences as in Saito (2013) are suitable in situations where a decision-maker influences their own and their peer group's material payoffs.

[8] This result is supported by recent experimental evidence in Friederich et al. (2024), who show that individuals repeat adverse financial decisions when a FOMO appeal is externally evoked.

Note that the avoidance of FOMO by mimicking one's peer group's behaviour, even if this goes against one's material interests, suggests that FOMO could be an explanation for herds. Further investigation into this connection could provide valuable insights. In general, FOMO allows us to understand an individual's decision-making in real markets by considering the actions of an individual's social peer group.

Moreover, the tendency for inferior financial decisions by following one's peer group in order to avoid FOMO suggests that an individual with strong FOMO preferences may be better off in a small or more financially successful peer group. This situation presents an opportunity for individuals to strategically choose their social peer groups to enhance financial decision-making for financial choices. A rational individual aware of their FOMO tendencies might thus opt for participation in a different or smaller peer group, potentially to benefit from more profitable outcomes. While exploring these strategies and their effectiveness in mitigating FOMO's negative impacts on financial decisions extends beyond this research note's scope, it certainly constitutes an intriguing area for future research.

CRediT authorship contribution statement

Mohammed Kaddouhah: Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Appendix. Proofs

Proof of Proposition 1. The definition of the lotteries in (4) and (5) implies that:

$$f(x_i, x_j, \sigma) = \begin{cases} -\eta\sqrt{2(1-p)}, & x_i = S,\ x_j = B,\ \sigma = 1; \\ -\eta\sqrt{2p}, & x_i = B,\ x_j = S,\ \sigma = 0; \\ 0, & \text{otherwise.} \end{cases}$$

Table 1 illustrates the possible expected utilities $\hat{u}(x_i, x_j)$:

Table 1
Strategic game: i vs. j.

	j	
i	$x_j = B$	$x_j = S$
$x_i = B$	$\hat{u}(B,B), \hat{u}(B,B)$	$\hat{u}(B,S), \hat{u}(S,B)$
$x_i = S$	$\hat{u}(S,B), \hat{u}(B,S)$	$\hat{u}(S,S), \hat{u}(S,S)$

If $\hat{\mu} > p$ and $x_j = B$, or $\hat{\mu} < p$ and $x_j = S$, then i's best reply is $x_i = x_j$, as this maximises the expected material payoff $\hat{\mu}r(x_i, 1) + (1-\hat{\mu})r(x_i, 0)$ and at the same time $f(x_j, x_j, \sigma) = 0$ for either σ.

If $\hat{\mu} > p$ and $x_j = S$, then the best reply is $x_i = x_j$ if and only if $\hat{\mu}(S,S) \geq \hat{\mu}(B,S)$, which is equivalent to $\hat{\mu}(1-p)+(1-\hat{\mu})(-p-\eta\sqrt{2p}) \geq p - \hat{\mu}$. This is equivalent to η being above the threshold $\eta^1_{FOMO} := \frac{(\hat{\mu}-p)\sqrt{2}}{(1-\hat{\mu})\sqrt{p}}$ in Proposition 1(a).

For $\eta < \eta^1_{FOMO}$ the best response is $x_i = B$, whereupon j's best reply is $x_j = B$, so that $x_j = S$ cannot happen in equilibrium. Case $\hat{\mu} < p$ in part (b) of Proposition 1 is analogous to (a). ■

Proof of Proposition 2. The analysis in Qin (2015, p. 169) implies for our setting that a decision-maker acts in accordance with the material interest if and only if $M(\hat{\mu}) \leq \frac{\sqrt{2}}{\eta}$, where $M(\hat{\mu}) = \frac{(1-\hat{\mu})\sqrt{p}-\hat{\mu}\sqrt{1-p}}{\hat{\mu}-p}$.

We distinguish between case (a), where $M(\hat{\mu}) > 0$ and case (b), where $M(\hat{\mu}) < 0$.

For case (a), a decision-maker acts in accordance with the material interest if and only if $\eta \leq \eta_{Qin} := \frac{\sqrt{2}}{M(\hat{\mu})} = \frac{(\hat{\mu}-p)\sqrt{2}}{(1-\hat{\mu})\sqrt{p}-\hat{\mu}\sqrt{(1-p)}}$. For case ($b$), a decision-maker acts always in accordance with the material interest as the above inequality is satisfied for all positive η in this case.

In order to prove Proposition 2, let us compare the equilibrium under FOMO preferences characterised in Proposition 1 and an individual's optimal decision under anticipated regret.

For Proposition 2(a) an equilibrium where individuals act in accordance with the material interest always exists under FOMO preferences but do not exist under anticipated regret if at the same time $M(\hat{\mu}) > 0$ und $\eta > \eta_{Qin}$.

As for part (b), individuals with either type of preferences may act against the material interest for a sufficiently large regret parameter. If $\hat{\mu} > p$, then $\eta^1_{FOMO} = \frac{(\hat{\mu}-p)\sqrt{2}}{(1-\hat{\mu})\sqrt{p}} < \frac{\sqrt{2}(\hat{\mu}-p)}{(1-\hat{\mu})\sqrt{p-\hat{\mu}\sqrt{1-p}}} = \eta_{Qin}$. Hence, if $M(\hat{\mu}) > 0$ and $\eta \in \left(\eta^1_{FOMO}, \eta_{Qin}\right)$, a decision-maker under anticipated regret would not act against the material interest, but under FOMO preferences there exists an equilibrium where the decision-maker acts against the material interest. If $M(\hat{\mu}) < 0$, there is no η such that the decision-maker acts against the material interest under anticipated regret, but some $\eta > \eta^1_{FOMO} > 0$ such that the decision-maker acts against the material interest under FOMO. The case where $\hat{\mu} < p$ is analogous. ■

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