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News or noise? Consumer susceptibility towards misinformation

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Abstract

In the post-truth era, consumer awareness is considered a critical defense against the rapid dissemination of misinformation; however, 'love for information' might induce consumers to overlook manipulative content, referred as 'fear of missing out' (FOMO). In this paper, we probe if high-aware consumer experiencing FOMO can lead to more dissemination of misinformation? Categorizing consumer on traits like, ideological sensitivity and level of awareness, we derive the pooling equilibrium condition under which misinformation propagates in a signaling framework. The results reveal that while greater awareness reduces incidence of misinformation, presence of FOMO can offset this effect by relaxing the pooling equilibrium conditions. Unlike the extant literature, our findings highlight the need to integrate behavioral factors into misinformation-mitigation strategies

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1. Introduction

In the contemporary age of information and rapid digitalization, consumer demand for news updates has intensified. As the global media landscape is emerging and news producers compete for higher viewership ratings and larger subscriber bases, the incentive to manipulate content to appeal to consumer perceptions has grown stronger (Maybury *et al.* 2004; Gentzkow and Shapiro 2006). Driven by their 'love for information,'consumers are more likely to overlook such manipulations and subscribe to distorted information (Talwar *et al.* 2019). This behavior is termed as *'fear of missing out'* (FOMO). Owing to FOMO, news producers are increasingly catering to consumer preferences, often creating echo chambers that facilitate the spread of misinformation (Del Vicario *et al.* 2016; Franken and Pilditch 2021). Misinformation may also be disseminated by mainstream traditional media competing for immediacy and journalistic authority (Lewis and Cushion 2009), thereby fostering a culture of *breaking news* induced by FOMO. This suggests that consumer attributes may also drive the dynamics of misinformation. Our paper examines how consumer traits, particularly FOMO, contribute to the spread of misinformation. While the existing literature largely focuses on the role of social media in its propagation, our study highlights the behavioral dimension of consumers in driving this phenomenon. In contrast to some studies indicating that individual awareness about presence (or detection) of misinformation serves as a mechanism to curb dissemination of misinformation (Apuke *et al.* 2020; Jost *et al.* 2020), this paper derives that even an *aware* consumer would be susceptible to misinformation owing to FOMO.

News producers disseminating misinformation are mostly viewed in the literature as 'stubborn agents' misreporting the true state (Della Lena 2024). Conversely, as a result of the race to deliver breaking news, traditional news media sometimes share unverified news to expedite news production and boost viewership ratings (Pelau *et al.* 2023). Therefore, our model differentiates between *two categories* of news producers: *(i) Deliberate Misreporter*, which includes a news producer who invariably misreports the true state irrespective of whether their signal is subscribed (or unsubscribed) by the consumer.*(ii)Strategic Misreporter,* which includes a news producer who misreports depending on which signal is likely to be subscribed to by the consumer. Given information asymmetry, the origin of the signal is not common knowledge, and misinformation persists when a pooling equilibrium sustains at the misreported signal. From the obtained pooling equilibrium condition, we explore how fake news propagates even for an *aware* consumer. The result is interesting as it delves into the limitation of awareness as a mechanism to curb misinformation, and our findings underscore the need to integrate behavioral factors, like FOMO, into misinformation mitigation strategies.

2. Model

We assume that there are two rational economic agents- a news producer and a consumer, involved in a dynamic game of incomplete information. There are two *types* (t) of news producers: *Strategic misreporter (SM)* and *Deliberate misreporter (DM)*, and hence, $t \in \{SM, DM\}$, which is private information with the news producers. λ is the probability that the type of the news producer is type SM. The possible states of the world are given as $\omega \in \{\omega_1, \omega_2\}$. To fix ideas, we assume ω_1 to be the true state without loss of generality. The news producer of both types can observe the true state ω_1, but the consumer cannot. The news producer generates a signal (message) $M: \{m_1, m_2\}$, depending upon the observed state, where m_1 is the signal for the state ω_1 and m_2 is the signal for the state ω_2. Upon receiving the signal, the consumer can either subscribe (S) or unsubscribe (US) to the signal. Hence, the action set of the consumer is $S_C: \{S, US\}$. Given our assumption of ω_1 being the true state, for any type t,

m_2 is the misreported signal. The reporting strategies of the two types differ in the following manner: type DM strictly prefers to misreport, making m_2 as the chosen signal. In contrast, the decision of SM to misreport depends on the likelihood that the consumer will subscribe to the signal. Now, the consumer has an ideological standpoint, which yields a utility $\alpha \geq 0$ when the signal (M) matches their ideology. To fix ideas, let m_2 be the state matching the ideological standpoint of the consumer. In other words, subscribing to the signal m_2 the consumer receives α, which can be interpreted as *ideological sensitivity* parameter of the consumer. Additionally, consumer exhibits different degree of awareness level, $\beta \in [a, b]$, where a and b are positive arbitrary constants. The consumer incurs a disutility β when they subscribe to a misreported signal from any type, implying that the more aware the consumer is, the greater the disutility they experience from subscribing to misinformation. Since a news producer of type SM may not always pander misinformation, consumer anticipates a lesser possibility of misreporting from type SM and hence attaches the disutility of β' from subscribing to the misreported signal from type SM, where $\beta' < \beta$[1]. In this framework, the utility gain (or loss) depends on the action of the consumer upon receiving the signals, which is reflected by positive (or negative) payoff in the payoff structure.

2.1 Categorizing Consumer

In our model, we examine the persistence of the pooling equilibrium at the misreported signal m_2 across different categories of consumers. Since the equilibrium at m_2 denotes the dissemination of misinformation, we refrain from analyzing possibilities of pooling equilibrium at m_1, which represents a non-interesting scenario with no misreporting. Assumption 1:

$\alpha - \beta < 0,$

indicating that the consumer's utility from subscribing to an ideology-aligned signal is dominated by the disutility from the possibility of it being untrue. Relaxing the assumption will provide a trivial case that for low-awareness consumers, pooling at ideology aligned signal m_2 always sustains and fake news propagates. For consumers with strong ideology and weak awareness, payoff from subscribing to the ideology-aligned misreported signal m_2 is $\alpha - \beta \geq 0$. Therefore, the consumer derives a positive expected utility from subscribing to m_2 from any type of news producer. Consequently, news producers of any type would also not have any incentive to deviate from m_2. The persistence or dissemination of misinformation among a cohort of consumers with weak awareness and strong ideology is intuitively obvious, making the result uninteresting. Therefore, we explore the scenario for the cohort of consumer with strong awareness and weak ideology, for whom persistence of misinformation is not intuitively obvious. Henceforth, all the results are based on Assumption 1.

Note that the consumer is not aware that m_2 is a misreported signal since the true state is unknown for the consumer. Therefore, the net payoff from subscribing to signal m_2 from a news producer of type SM and type DM is α and $\alpha - \beta$, respectively. Based on the net payoff $\alpha - \beta$, we categorize the consumer as having *weak ideology and strong awareness* $(\alpha < \beta)$ and *strong ideology and weak awareness* otherwise. This case is interesting as it is not intuitively obvious that misinformation would persist. Therefore, we move forward deriving the condition under which pooling equilibrium at m_2 holds for consumer with weak ideology and strong awareness. Putting everything into perspective, we obtain that the consumer's payoff from subscribing a signal,

[1] Without loss of generality, we consider $\beta' = 0$.

$$U(S) = \left(1_{M=m_2}\right)\alpha - \left(1_{M=m_i|t=DM}\right)\beta \;\; \forall\, i = 1,2 \tag{1}$$

where, $\left(1_{M=m_2}\right)$ is the indicator function that takes the value 1 when the reported signal (M) is m_2 and 0 otherwise, similarly, $(1_{M=m_i|t=DM})$ takes the value 1 when the reported signal is from the DM and 0 otherwise.[2]

When the consumer unsubscribes (US) from any signal, they receive a payoff of 0, except in the case where the unsubscribed signal is from type SM. If the consumer chooses US for any signal from type SM, the consumer fears that they might be missing out on true information. In this case, the consumer obtains a payoff of $-v$ from choosing US for any signal from type SM, where $v > 0$. The parameter v is interpreted as FOMO. It is imperative to note that unsubscribing (US) yields a payoff of $-v$ for the consumer due to FOMO, regardless of the consumer's awareness level.

Consumer's payoff from US is thus given as,

$$U(US) = 0 - v(1_{t=SM}) \tag{2}$$

where, $(1_{t=SM})$ takes the value 1 when the reported signal is from SM and 0 otherwise.

The two types of news producer differ in the sense that type DM receives a payoff of 1 only when the consumer subscribes to the misreported signal, otherwise 0. However, the type SM receives a payoff whenever their signal is subscribed by the consumer. Particularly, they receive a payoff of 1 upon consumer subscribing to the signal and 0 on unsubscribing. The news producer's payoff is given as,

$$U_P^{SM} = (1_{\{S_C=S\}}) \tag{3}$$

where, U_P^{SM} is the payoff of $SM-$ type, $1_{\{S_C=S\}}$ takes the value 1 when the consumer subscribes the signal and 0 otherwise, $1_{M=m_1}$ takes the value 1 when $SM-type$ reports the true signal m_1 and 0 otherwise.

$$U_P^{DM} = 1_{\{M=m_2|S_C=S\}} \tag{4}$$

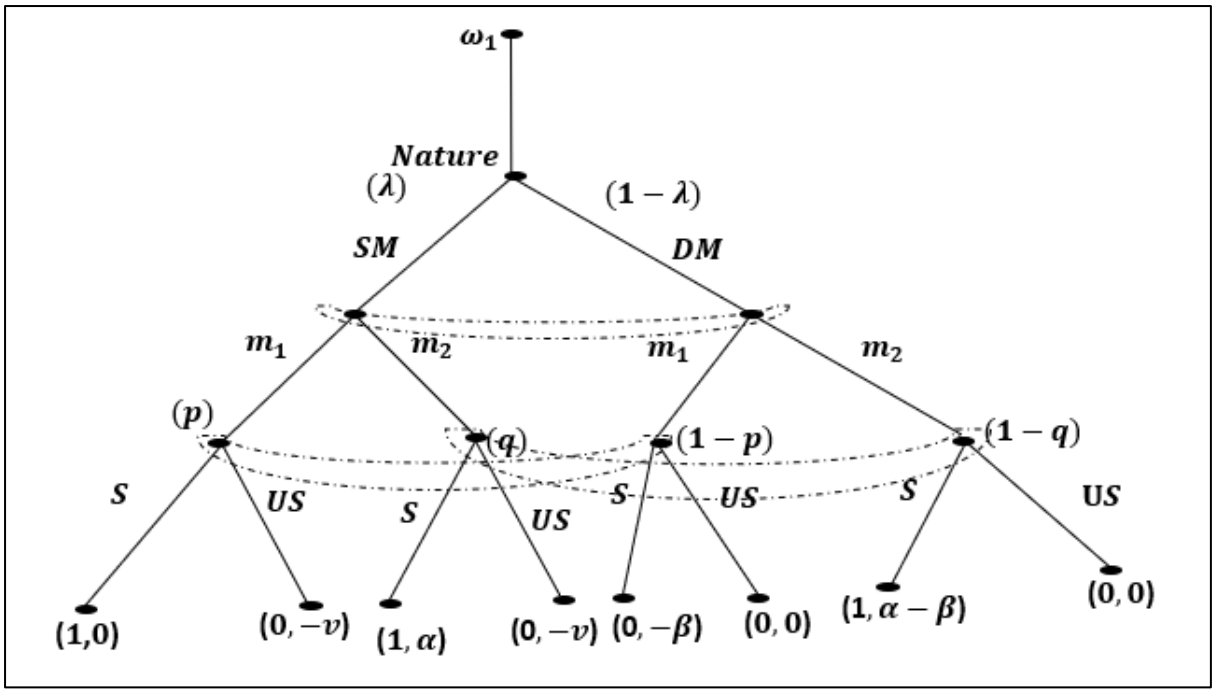
where U_P^{DM} is the payoff of $DM-$ type, $1_{\{M=m_2|S_C=S\}}$ takes the value 1 when the misreported signal m_2 by $DM-$type is subscribed and 0 otherwise.

Timeline of the game

At $t = 0$, the news producer sends a signal $M \in \{m_1, m_2\}$. The consumer holds a prior belief in producer types: λ for $SM-type$ and $1-\lambda$ for $DM-type$. Upon receiving signals, following Bayesian updation, the consumer attaches a belief p that signal m_1 is from $SM-type$ and $(1-p)$ that it is from a $DM-type$. Similarly, the consumer attaches a belief q and $(1-q)$ to signal m_2 coming from SM and DM type, respectively. In the next period, the consumer either subscribes (S) or unsubscribes (US) to the signal, after which both players receive their payoffs and the game ends.

[2] The payoffs are ex-post as they are realized at the end of the game.

Figure 1: Signaling Game between News Producer and Consumer



Source: Authors' Illustration

Proposition 1

For a consumer with weak ideology and strong awareness, such that $\beta > \alpha$, in a signaling game between consumers and news producers, the pooling equilibria at m_2 with the consumer choosing S is $[m_2, m_2, S\ US, p < p^*, q \geq q^*]$, where $p^* = \frac{\beta}{\beta+v}$ and $q^* = \frac{\beta-\alpha}{\beta+v}$.

Proof: The consumer chooses the optimal strategy of choosing S or US by comparing the expected payoffs from both actions. From Figure 1, there is no dominant strategy for consumer to choose between S and US for a received signal of m_2 for any type t, given assumption 1. Therefore, we compute the expected payoffs for the actions, given as $E(S) = \alpha - (1-q)\beta$ and $E(US) = -vq$ respectively, given the consumer's updated beliefs p and q (refer to the game timeline) regarding the origin of the signal. Comparing these expected payoffs, we obtain that the consumer subscribes to $m_2\ iff\ q \geq q^* = \frac{\beta-\alpha}{\beta+v}$. Similarly, at the off –the- equilibrium path optimal strategy for the consumer is $iff\ p < p^* = \frac{\beta}{\beta+v}$.

Given the optimal strategy of US off-the-equilibrium path, no news producer has an incentive to deviate from the strategy they are currently playing, i.e., sending signal m_2. A DM type news producer has no incentive to send m_1, as sending m_2 is a weakly dominant strategy and yields no higher payoff from sending m_1, irrespective of the consumer's action (see Figure 1). Similarly, an SM type news producer has no incentive to report the true signal m_1, as the consumer chooses US off-the-equilibrium path (given $p < p^*$), and therefore, the news producer has no incentive to deviate. The pooling equilibrium at m_2 is represented as $[m_2, m_2, S\ US, p < p^*, q \geq q^*]$, where $p^* = \frac{\beta}{(\beta+v)}$and $q^* = \frac{(\beta-\alpha)}{(\beta+v)}$.

We also obtain another form of PBNE, $[m_2 m_2, SS, p \geq p^*, q \geq q^*]$. At this PBNE, pooling at m_2 holds even when the consumer subscribes m_1.To elaborate, a type SM news producer receives a payoff of 1 if the true signal m_1 is subscribed; therefore no incentive to send m_1 instead of m_2. Hence, pooling equilibrium at m_2 holds even when the consumer subscribes off-equilibrium path, and it can be represented as $[m_2, m_2, SS, p \geq p^*, q \geq q^*]$. **QED**

From the proof, we obtained the pooling equilibrium condition at m_2 given as $q \geq q^*, p < p^*$ where $q^* = \frac{\beta-\alpha}{\beta+v}$, $p^* = \frac{\beta}{(\beta+v)}$ Since q^*,p^* are functions of v, we can discuss the effect of v on stringency of pooling equilibrium condition on m_2.

2.2 FOMO-Impact on the PBNE

Given assumption 1, as consumer awareness increases, the perceived disutility from consuming misinformation also rises. Therefore, even for the ideology-aligned signal (m_2), the consumer is less likely to subscribe any signal, thereby tightening the pooling equilibrium condition. However, in the presence of an increased FOMO(v) even for a consumer with weak ideology and strong awareness ($\beta > \alpha$), the pooling equilibrium is more likely to hold. Precisely, increased awareness makes the pooling condition stringent, but an increase in v dampens the effect on q^*.

Proposition 2

Even for a consumer with weak ideology and strong awareness, such that $\beta > \alpha$, the pooling equilibria condition for m_2 ($q \geq q^* = \frac{\beta-\alpha}{\beta+v}$) will be eased by a rise in fear of missing out (v) i.e.,$\frac{\partial q^*}{\partial v} \leq 0$.

Proof: With an increase in β from β_0 to β_1 (say), the pooling equilibrium condition on m_2 shifts from q^* *to* q^{**}(say), where $q^{**} > q^*$,because $\frac{\partial q^*}{\partial \beta} \geq 0$. However, even for the increased level of awareness β_1, an increase in v relaxes the pooling equilibrium condition q^*, that is, $\frac{\partial q^*}{\partial v}|_{\beta=\beta_1} \leq 0$. This occurs because, with a rise in FOMO, consumers are more likely to subscribe to any signal. Therefore, even for a consumer with higher awareness *($\beta_1 > \beta_0 > \alpha$)*, an increase in FOMO raises the disutility experienced when unsubscribing from a signal produced by an SM type news producer. This is because the consumer perceives an SM type producer as less likely to misreport compared to a DM type producer. As a result, the consumer associates a disutility, interpreted as fear of missing out, when unsubscribing m_2 might be the true signal. Consequently, as the disutility from FOMO increases, consumers become less likely to unsubscribe from the signal even when they are aware. At the off-equilibrium path, with rise in v, we obtain p^{**}(say) where $p^{**} \leq p^*$ since $\frac{\partial p^*}{\partial \beta} \leq 0$. Therefore with rise in v, the transformed equilibria will be represented as: $[m_2, m_2, SS, p \geq p^{**}, q \geq q^{**}]$ and $[m_2, m_2, S\,US, p < p^{**}, q \geq q^{**}]$, where $p^{**} \leq p^*$ and $q^{**} \leq q^*$. **QED**

We show that even for consumers with higher levels of awareness, the stringency of the pooling equilibrium condition may not be sustained as FOMO increases. Overall, our results question the efficacy of awareness as a deterrent to the propagation of fake news and underscore the importance of incorporating behavioral factors into misinformation mitigation strategies.

2.3 Discussion: Interplay of FOMO and Awareness of the Consumer

From Proposition 2, we obtain that the pooling equilibrium on the misreported signal m_2 becomes more stringent with an increase in the level of awareness and for a given degree of awareness, the condition relaxes with increased FOMO. However, similar results may not hold when v is a function of β. The extant literature on misinformation has not explicitly examined the interplay between awareness and FOMO in the propagation of misinformation. However, evidence from Handlington (2020) and Chan *et al.* (2022) suggests that increased awareness is associated with greater value for accuracy of information rather than solely its consumption. In our context, this would indicate that $v(\beta)$ such that $v_\beta \leq 0$, implying that increased awareness reduces FOMO. In contrast, information consumption is also influenced by consumers' partisan bias, such that, despite being aware, consumers may subscribe to misinformation that is closer to their ideological standpoint (Badrinathan, 2021; Gawronski *et al.*, 2023). We represent this scenario in the model by considering the case $v_\beta > 0$.

We obtained that when $v_\beta < \frac{\alpha+v(\beta)}{\beta-\alpha}$, $\frac{\partial q^*}{\partial \beta} = \frac{\alpha+v(\beta)-(\beta-\alpha)v_\beta}{(\beta+v(\beta))^2} > 0$[3], where $\frac{\alpha+v(\beta)}{\beta-\alpha} > 0$ by assumption 1. Therefore, when FOMO declines with higher awareness, the pooling equilibrium condition remains stringent; i.e., $\frac{\partial q^*}{\partial \beta} > 0$, and awareness continues to act as a deterrent to misinformation. However, awareness may not remain effective to break the pooling on the misreported signal m_2, when v_β sufficiently large, such that $v_\beta \geq \frac{\alpha+v(\beta)}{\beta-\alpha}$. In this case as increased awareness raises FOMO and weakens the stringency effect of awareness on the pooling equilibrium condition at m_2. Specifically, for $v_\beta \geq \frac{\alpha+v(\beta)}{\beta-\alpha}$, $\frac{\partial q^*}{\partial \beta} = \frac{\alpha+v(\beta)-(\beta-\alpha)v_\beta}{(\beta+v(\beta))^2} \leq 0$. Therefore, by endogenizing v in the model, we can overturn the direct positive effect of β on the pooling equilibrium condition q^*.

3. Conclusion

The results present an important implication for the literature on misinformation. Awareness initiatives, such as fact-checking platforms, are generally viewed as deterrents to fake news. Some experimental studies suggest that interventions through awareness can reduce the incidence of misinformation. However, our findings indicate that this may not necessarily hold true. In the current information ecosystem, misinformation proliferates rapidly, fueled by behavioral drivers like fear of missing out (FOMO). While awareness campaigns aim to make consumers more discerning, awareness alone may not suffice. For instance, during the COVID-19 pandemic and the 2016 U.S. elections, misinformation spread widely on social media, even among informed users eager to stay updated. Similarly, false claims about AI-generated content or celebrity deaths often go viral due to FOMO-driven sharing. Our findings show that greater awareness tightens the acceptance threshold for misinformation, but FOMO can weaken this effect, underscoring the need for interventions targeting both awareness and behavior.

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[3] When $v_\beta \leq 0$, $\frac{\partial q^*}{\partial \beta} = \frac{\alpha+v(\beta)-(\beta-\alpha)v_\beta}{(\beta+v(\beta))^2} \geq 0$. However, when $v_\beta > 0$, pooling condition becomes less stringent, only when $v_\beta > \frac{\alpha+v(\beta)}{\beta-\alpha} > 0$, $\frac{\partial q^*}{\partial \beta} = \frac{\alpha+v(\beta)-(\beta-\alpha)v_\beta}{(\beta+v(\beta))^2} < 0$. Therefore, combining the conditions together we get, when $v_\beta < \frac{\alpha+v(\beta)}{\beta-\alpha}$, $\frac{\partial q^*}{\partial \beta} = \frac{\alpha+v(\beta)-(\beta-\alpha)v_\beta}{(\beta+v(\beta))^2} > 0$, where $\frac{\alpha+v(\beta)}{\beta-\alpha} > 0$.

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