Social Networks in Times of Turkey's Currency Crisis

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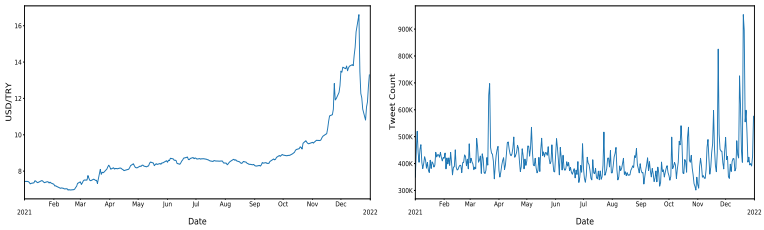
1 Introduction

In the last two months of 2021, the Turkish Lira (TL) lost about half of its value against the US dollar (USD). This happened after a relatively stable period of almost 20 months (from the beginning of 2020 until mid-October 2021) where the USD/TRY exchange rate steadily increased by about 50%. Towards the end of October, the exchange rate started moving much faster and reached its highest point on December 20, 2021, after about a 33% increase in the preceding week. This meant a total increase of about 100% in slightly more than 2 months, since 1 USD was worth about 18.40 TL at that point although it was worth about 9 TL around mid-October (Fig. 1(a)). TL regained some of its value after that evening when a new financial instrument ("FX-Protected Deposit Accounts") was introduced by the government. Turkish citizens were divided in their opinion on the economic policies of the government leading to as well as the handling of this sudden loss of value in the local currency. Hence, there was a lot of discussion on the exchange rate and the general economic situation on Twitter (Fig. 1(b)).



(a) (b)

Fig. 1: (a) USD/TRY rate in 2021, sampled daily. *Data provided by Yahoo! Finance [3].* (b) Daily Turkish Tweets with dolar, tl, #dolar, and #tl in 2021.

Studies show that humans tend to copy the beliefs and behaviors of others who are liked and have high social status [5,7]. Researchers also observe and analyze human communication, emotions, beliefs, and behaviors on social media through text and network analysis methods [6,4]. Our hypothesis is that before the economic intervention,

collectives group around users with higher likes and followers. To investigate social networks in the online economic discussions, we collected users and Tweets with specific economic keywords and hashtags (e.g., #dollar, #minimumwage; for more Table A1). We ask questions: (i) Who do users group around the economic crisis time in online discussions? (ii) How do networks change before and after an economic intervention?

2 Method

2.1 Data collection

The Twitter data collected for this study is part of the Politus project[4], where the aim is to understand political trends and social changes in Turkey. In order to create a sample of Twitter users from Turkey, first, 100 popular accounts from Turkey [1] have been manually selected and the user IDs of their followers have been collected by a snowball sampling approach, resulting in 55 million unique Twitter users. Out of these unique users, locations, and genders of 3.5 million users have been identified from the location, description, name, and username attributes provided by Twitter API [2]. We selected Tweets from our user database that include only economic terms, connotations, and well-known Turkish hashtags of the financial climate in Turkey a week before and after the deposit intervention (Table A1). The overall number of Tweets, users, likes, followers, and followees for the two networks that we consider are shown in Table A2.

2.2 Network analysis

We built two different social networks from interactions and relationships available on Twitter; namely, *favorite* and *follow* networks for a week before and after the selected event (i.e., the "FX-Protected Deposit Accounts" introduction). The first period of the aggregated networks is constructed via the relevant data collected from the timeline December 14 - 20, 2021, and the second one is constructed, similarly, using the data collected from the timeline December 22 - 28, 2021.

For *favorite* networks, nodes represent Twitter users, whose on-topic tweets are liked by other Twitter users around the studied timelines, and edges represent the number of likes in between two users. The weight of the link comes from the total number of likes and therefore, *favorite* networks are constructed as weighted directed networks. *Follow* networks are built based on the directed edges indicating the act of following. We classify users according to their account holders' content and number of followers, such as Politics, Economy, Journalism, Technology, Entertainment, Sports, Community, and Influencers. Our aim is to compare these two networks in terms of their centrality measures and structures, such as normalized in-degree centrality and Page Rank [8].

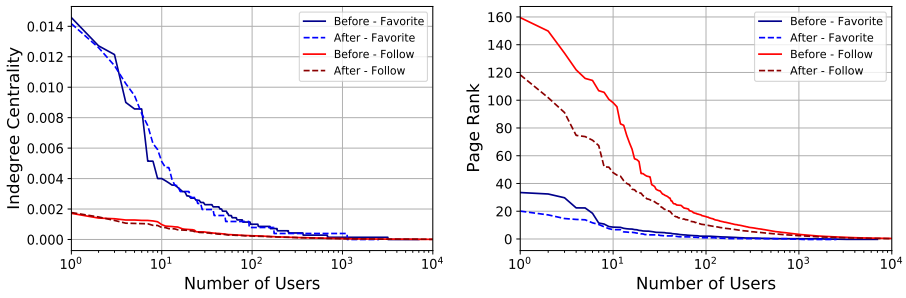
3 Results

Who do users group around the economic crisis time in online discussions? Both *favorite* and *follow* networks show that nodes with higher influence, such as politicians,

[4]Politus ERC PoC (project id: 101082050)

comedians, economists, and journalists are liked in our data samples. The interesting output from our networks is that users follow and group around high-tech company owners and digital currency platforms in addition to economy related accounts (Fig. A1). We also observe that users follow influencers who gather communities and organize fund raising activities (Figs. A1 and A2).

How do networks change a week before and after an economic intervention? The in-degree centrality measures do not show significant differences before and after the economic intervention (Fig. 2 (a)). However, our findings from the Page Rank analysis indicate that these two networks have nodes with higher influence before the event (Fig. 2 (b)). To further compare popularity in networks, we calculated in-/out-degree of nodes (Table A3). Although the average values of in-/out-degree of nodes are small compared to denser networks, they are higher for both networks before the intervention.



(a) (b)

Fig. 2: Centrality distributions for *favorite* and *follow* networks before and after the intervention (a) In-degree Centrality (b) Page Rank.

4 Discussion

With this study, we analyze how Twitter users interact with each other a week before and after the economic intervention in December 2021, Turkey. Our results for both network types provide that the influence is higher before compare to after the intervention. People tend to follow users with higher followers, especially before the event. *Favorite* networks show that users also like accounts who tweet about economic analysis, cryptocurrency, and financial solutions.

Our first data collection was limited to the default settings for maximum results of the fields, such as 100 recent favorites, followers, and followees. We started extracting those fields to complete our dataset with an aim to better understand communities of social networks according to text similarity (e.g., content and sentiment), users' favorite and following behaviors. We will also compare the topological structures of these communities before and after further specific events.

References

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A Appendix

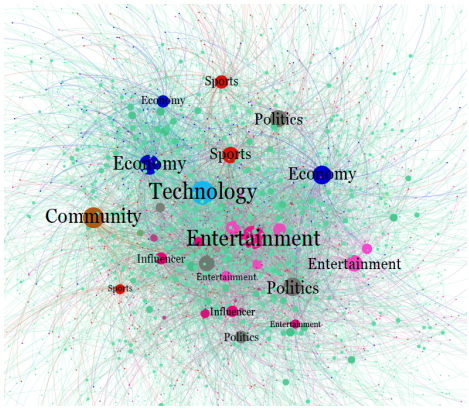

Fig. A1: *Follow* networks before the deposit intervention (16% sample of edges are shown).

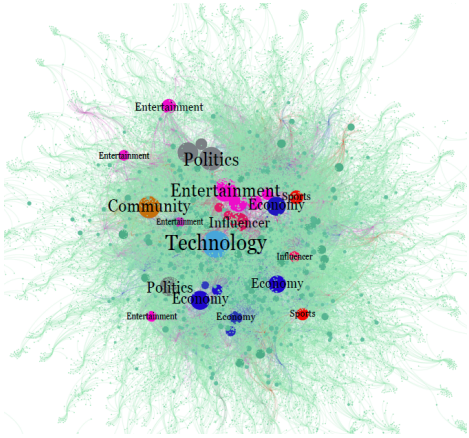

Fig. A2: *Follow* networks after the deposit intervention (16% sample of edges are shown).

Table A1: Economic terms, connotations, and well-known Turkish hashtags of the financial climate in Turkey. Words are represented in Turkish and English, and not shown with suffixes.

Turkish	**English**
dolar, tl, para, asgari, iş, zam, devlet	dollar, tl, money, minimum, job, raise, state
gelir, ücret, faiz, ekonomi, #dolar, kur	income, wage, interest, economy
döviz, lira, ekmek, ekonomik, simit, enflasyon	foreign currency, lira, bread, economical, inflation
yatırım, kredi, fiyat, indirim, yüzde, tayyip	investment, credit, price, discount, percent, tayyip
banka, #asgariucret, ihtiyaç, alışveriş, hazine, hesap	bank, #minimumwage, need, shopping, treasury, account
gram, vergi, maliye, piyasa, #btc, #hemensecim	gram, tax, finance, market, #btc, #electionnow
#erkensecim, #bitcoin, #geliyorgelmekteolan, #faiz, #dolartl	#earlyelection, #bitcoin, #geliyorgelmekteolan[a], #interest, #dollartl
#enflasyon, #altın, iphone, #faizkararı, #devletiminyanındayım	#inflation, #gold, #iphone, #interestratedecision, #Istandbymygovernment
#budüzendeğişecek, #borsa, üretim, #geçinemiyoruz	#thissystemwillchange, #stockmarket, #production, #wecantearnaliving
#merkezbankası, #güçlüvebüyüktürkiye, faizmekarşı, #hukumetistifa	#centralbank, #strongandgreatturkey, faizmekarşı[b], #governmentresign
#paramızıpulettiniz, #buişiseçimtemizler, burs, #ekonomikkriz	#youmadeourmoneyworthnothing, #theelectionwillcleanthismess, bursary, #economiccrisis
#battık, #hanidışgüçlerdi, #bim, #indirim, #asgari, #simit	#weareruined, #whathappenedtotheforeignpowers, #bim, #discount, #minimum, #bagel
#liderinegüventürkiye, #elinizdepatladı, #tl, maaşlar, #bist, #memur	#trustyourleaderturkey, #blewupinyourface, #tl, salaries, #bist, #civilservant
#eth, #marketterörünehayır, #bakbatiyoruz, emekli, #milleteteslimolun	#eth, #marketterörünehayır, #lookwearegoingbankrupt, retired, #giveintothepeople
#boykot, #döviz, #usdtry, #zam, #migros, nft, satış, #düştü	#boycott, #foreigncurrency, #usdtry, #raise, #migros, nft, sales, #fell

[a] Strictly contemporary Turkish political context-related. It is a motto widely used by the opposition supporters coined by Kemal Kılıçdaroğlu, the leader of the main opposition party -CHP- The Republican People's Party.

[b] does not correspond to a Turkish word; considering the context, it could be translated as "against the proponents of high interest rates".

Table A2: The number of Users, Tweets, Favorites, Followers, and Followees from the Intervention Periods. Tweets and Favorites are not yet collected for the fields with *.

	Favorite Networks		*Follow* Networks	
Count	**Dec 14 - 20, 2021**	**Dec 22 - 28, 2021**	**Dec 14 - 20, 2021**	**Dec 22 - 28, 2021**
Users	7,000	2,541	312,831	127,163
Tweets	7,768	2,376	*	*
Favorites	6,702	1,944	*	*
Followers	211,836	81,339	231,667	90,246
Followees	200,253	82,506	200,253	82,506

Table A3: In-degree/Out-degree statistics for *favorite* and *follow* networks.

	Favorite Networks		*Follow* Networks	
Count	**Dec 14 - 20, 2021**	**Dec 22 - 28, 2021**	**Dec 14 - 20, 2021**	**Dec 22 - 28, 2021**
Nodes	7,000	2,541	312,831	127,163
Mean	0.85	0.67	1.32	1.22
Min	0.00	0.00	0.00	0.00
Median	0.00	0.00	1.00	1.00
Max	102	36	537	225
Std. dev.	2.98	1.78	3.84	2.16