Governing through Gossip: The Role of Informal Communication in the Presence of Reputation Systems in Online Markets

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Extended Abstract

While historically maintained through informal information exchange (Diekmann and Przepiorka 2019), sharing of reputational information in complex large-scale online markets has been largely delegated to socio-technical solutions, such as formalized reputation systems (Diekmann et al. 2014). Formalized reputation systems have been shown to be particularly important in solving cooperation dilemmas in illegal online marketplaces, where traders face many challenges in reliably using social knowledge to build and evaluate reputations (Przepiorka, Norbutas, and Corten 2017). While the quantitative information in these reputation systems constitutes a central reference point of reputational knowledge generation in technology-backed online markets, traders also make use of informal forum community spaces for interactive gossip-like production of information about trader reputations.

Yet, researchers have not systematically explored the role informal channels play in governing cooperative relations in these contexts. This is likely due to the challenging nature of the task of extracting relevant information about the evaluations of sellers from rich textual data. We tackle this task using a dataset containing 1.6 million forum posts from two illegal online marketplace forums. We start by extracting around 300 thousand forum posts that mention sellers' usernames in the post text or forum thread title. We manually label a sample of a 1,000 forum posts with the help of three trained human coders, denoting whether the tone in the post discussing the sellers was positive, neutral, or negative. We then fine-tune a RoBERTa transformer model (Liu et al. 2019) using our manually labelled dataset and use this model to automatically label the remaining posts. This procedure allows us to easily quantify complex textual evaluations of sellers as counts of posts in the forum that discussed them in a positive or negative manner.

After extracting relevant reputational information from marketplace forum posts, we combine these data with data on almost 2 million transactions from the marketplaces themselves. Using panel and survival models, we evaluate two roles of information shared in informal forum communities: first, in disseminating additional information about traders' quality and, thus, supporting informal social control (Buskens and Raub 2013; Duxbury and Haynie 2021); second, in reporting trader transgressions that help market administration enforce formal social control (Carr 1993).

Controlling for formal reputation, we find that the more community posts discuss a seller positively, the higher their sales and revenues, and the less likely they are to exit the market voluntarily in both surveyed markets. Furthermore, positive community discussions lower, while negative community discussion increase, sellers' hazard of being forcefully excluded from the market by the market administration. Our approach combining reliable manual labelling with state-of-the-art language models allows us to shed new light on the ecosystem of bottom-up and top-down mechanisms of social control in large-scale anonymous market environments.

References

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	Logged weekly sales		Logged avg. weekly revenue	
	(1)	(2)	(1)	(2)
	Silk Road	AlphaBay	Silk Road	AlphaBay
Logged avg. weekly revenue	0.18***	0.10***		
	(0.02)	(0.00)		
Logged positive ratings	0.18***	0.34***	-0.21***	-0.36***
	(0.04)	(0.01)	(0.03)	(0.01)
Logged nonpositive ratings	-0.01	-0.05***	-0.02	-0.02*
	(0.03)	(0.01)	(0.02)	(0.01)
Logged positive forum mentions	0.11**	0.07***	0.11***	0.05***
	(0.04)	(0.01)	(0.03)	(0.01)
Logged negative forum mentions	-0.09*	-0.07***	-0.01	-0.02*
	(0.04)	(0.01)	(0.03)	(0.01)
Seller forum posts	0.13***	0.00	0.11***	0.03*
	(0.03)	(0.01)	(0.03)	(0.01)
Seller's age in weeks	-0.05***	-0.01***	-0.03***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Logged active items	0.08**	0.17***	0.09***	0.39***
	(0.03)	(0.01)	(0.02)	(0.01)
Logged total revenue	0.02	-0.07***	0.21***	0.33***
	(0.02)	(0.01)	(0.02)	(0.01)
Intercept	0.06	-0.14	1.92***	1.72***
	(0.09)	(0.18)	(0.07)	(0.30)
Seller FE?	Y	Y	Y	Y
Times FE?	Y	Y	Y	Y
N	9854	147928	9854	147928

Table 1. Regression models of weekly sales and average revenues of sellers in the two surveyed illegal online markets with time and seller fixed effects. We extract the measures of positive and negative forum mentions using our method combining text string search to identify texts discussing the seller in the market forum, manual labelling to determine the sentiment (positive, neutral, negative) of a sample of identified texts, and RoBERTa model to expand the manual labelling onto more than 300 thousand texts. We combine this information with data on sellers' formal ratings received in the market itself and run panel models to identify the effects of informally shared reputational information – controlling for the formal reputation scores – on seller performance in terms of sales and revenues.