

Social Media as an Identity Barometer: Evidence from the Russia-Ukraine War[†]

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While most research in economics treats ethnic identity as exogenous, recent studies have increasingly focused on the issue of endogenous identity choice, as highlighted in Dahis, Nix, and Qian (2019); Atkin, Colson-Sihra, and Shayo (2021); Jia and Persson (2021); and, more recently, in the literature on nation-building (Rohner and Zhuravskaya 2023).¹

That said, measuring shifts in individual identity can be challenging, particularly when the target population is inaccessible through conventional survey methods, such as during wars or other disruptive events. Further, gathering sufficient data at the subnational level through surveys can be prohibitively expensive.

We argue that supplementing traditional data-collection methods with social media data could significantly mitigate the challenges associated with gathering information on identity choice.

We focus on the context of Ukraine and the dynamics of Ukrainian identity before and during the Russia-Ukraine war. Analyzing data from two large social media platforms, VK and Twitter, we observe a significant shift in users' reported language proficiency (on VK) and the language of users' posts (on Twitter) from Russian to Ukrainian, evident in both the early (2014–2022)

and later (2022 post-full-scale invasion) war phases.

Our analysis also reveals a positive association between the identity shifts observed in social media data and those seen in responses to nationally representative surveys where individuals reported their ethnic identity. For VK, we find a strong positive correlation between province-level changes in reported proficiency in Ukrainian and reported ethnicity in surveys between 2013 and 2014. For Twitter, the province-level correlation between shifts in the language of users' posts and survey-based identity is positive but not statistically significant, suggesting that changing language use may be a costlier signal of identity change. Overall, these patterns reinforce the validity of using social media data for studying identity choices.

We contribute to the literature in three ways. First, we introduce a novel way of measuring users' identity on social media via their indication of proficiency in a specific language, applying this approach to VK. Second, we document a substantial spike in the share of tweets in Ukrainian versus Russian in the territory of Ukraine following the full-fledged Russian invasion in February 2022. Third, we show that changes in both measures relate to trends observed in nationally representative surveys.

Our study closely relates to Metzger et al. (2016), who examine the language choices in Twitter posts in Ukraine around the Euromaidan protests and the annexation of Crimea. The authors find no significant aggregate shift toward the use of Ukrainian and, if anything, a relative rise in the use of Russian. Our findings stand in contrast to their conclusion that the language of social media posts may not be an appropriate proxy for ethnic identity activation.

The rest of the manuscript is structured as follows: Section I offers information regarding the context; Section II describes the data; Section III presents the results; and Section IV concludes.

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¹Generally speaking, viewing identity as changeable within economics can be traced back to Akerlof and Kranton (2000).

I. Background

Ever since the dissolution of the Soviet Union, Ukraine has had a sizeable Russian minority, both ethnic and linguistic. According to the last available census, in 2001, 17 percent of Ukraine's population was ethnically Russian, and 29 percent were native Russian speakers. In 2013, according to nationally representative surveys conducted by the Kyiv International Institute of Sociology (KIIS), 26.6 percent of Ukrainians self-identified as at least partly ethnically Russian on a scale from fully Russian to fully Ukrainian.²

The Euromaidan protests, sparked in November 2013 by President Yanukovich's decision not to sign the European Union-Ukraine association agreement, escalated into a revolution by February 2014 and led to the replacement of the pro-Russian government. These events were immediately followed by Russia's annexation of Crimea and then by the de facto occupation of parts of Donetsk and Luhansk oblasts. After years of military conflict, at first active and then dormant, Russia launched a full-scale invasion of Ukraine in February 2022.

The 2014 Russia-Ukraine conflict drastically reshaped Ukrainians' attitudes toward Russia from overwhelmingly positive to negative, especially among ethnic Ukrainians (Korovkin and Makarin 2023). Likewise, self-reported ethnicity shifted even more toward Ukrainian in nationwide surveys (Abramenko et al. 2024).

VK and Twitter have both been crucial platforms in Ukraine's social media landscape. VK originated in Russia in 2006, closely following Facebook in its design and features. By 2013, VK had more than 11 million daily active users in Ukraine and was consistently among Ukraine's top five most-viewed websites (Karpenko 2013). Initially, VK leadership was politically neutral, and the platform's rise helped spur protests against electoral fraud in Russia from 2011–2012 (Enikolopov, Makarin, and Petrova 2020). However, the landscape shifted in 2014, when VK's founder resisted closing online groups supportive of the Ukrainian revolution, leading to VK's forced sale to groups closely

aligned with Vladimir Putin (Toor 2014). This change in ownership and subsequent policy shifts resulted in VK being banned in Ukraine in May 2017, followed by the eventual decline of the platform's use in the country (Golovchenko 2022). In contrast, Twitter had 400,000 active users in Ukraine as of July 2014 (Yandex 2014) and remains a major market player there today.

II. Data

Our study relies on three datasets: (i) the self-reported language proficiency of VK users; (ii) the universe of posts on Twitter originating from Ukraine, including their language as identified by Twitter; (iii) the self-reported ethnicity from a series of nine nationally representative surveys conducted in 2013 and 2014 by KIIS.

First, we obtain data on self-reported language proficiency of VK users for September 2013 and March 2014 from *statistika.in.ua* (2014). The data contain the precise locations of Ukrainian settlements, the number of VK users claiming to reside in each settlement, and the counts of VK users whose profiles indicate knowledge of either Russian or Ukrainian.³ The data cover 856 settlements, with a median number of VK users of 1,926. To adjust for any general changes in the completeness of VK profiles, we focus on the proportion of VK users reporting knowledge of Ukrainian relative to the total number of users indicating knowledge of Russian and the number of users indicating knowledge of Ukrainian.

Second, we use the Twitter Application Programming Interface (API) to gather data on all original tweets (without retweets) originating from the territory of Ukraine between January 2012 and November 2022, a total of 36 million tweets.⁴ In our analysis, we rely on Twitter's built-in automatic algorithm for determining the

³An example of how a personal VK page displays the language field can be viewed here: <https://bit.ly/4axCqmF>.

⁴With user consent, Twitter can access location data, enabling the identification of tweets from Ukraine. However, a tweet's metadata will contain the exact location only if the tweet was geotagged by the user. With a shift in Twitter's privacy policies and a general decrease in user preference for sharing precise locations, we observe a noticeable decline in geotagged tweets from Ukraine—from 70 percent in 2014 to just 7 percent in 2022 (Khalid 2019). As a result, and to be consistent with our VK data, we focus on the 2013–2014 period for our validation exercise, where location data is a crucial component.

²The number drops slightly to 22.2 percent when one considers only the territories de facto controlled by Ukraine from 2015 to 2021.

language of tweets. To validate the accuracy of this algorithm, we compared it against existing language-identifying libraries and determined that it outperforms them.

Third, for our validation exercise, we rely on nine nationally representative surveys conducted by KIIS in Ukraine, four in 2013 and five in 2014, focusing on the question, “What nationality do you consider yourself to be?” Following Soviet terminology, “nationality” in this question’s formulation should be interpreted as ethnicity rather than citizenship (UNHCR 1993).

III. Results

A. VK as an Identity Barometer

We begin our analysis by examining shifts in self-reported language proficiency among VK users from September 2013 to March 2014. Figure 1 presents a map of Ukraine displaying the percentage change in the share of VK users reporting knowledge of Ukrainian relative to the total number of users reporting knowledge of either Russian or Ukrainian.

The vast majority of the country experienced a relative increase in reported Ukrainian proficiency. Of the 856 settlements we studied, only 44 witnessed a decrease, and, of these 44 settlements, 27 experienced less than a 1 percent change, and 17 were located in the mostly Russian-speaking Crimea and Donbas regions. Further, 10 percent of the settlements saw a decline in the absolute number of users reporting proficiency in Russian. Overall, a median settlement observed a rise in reported Ukrainian proficiency by 1.4 percentage points, or a 2.9 percent increase relative to the median baseline of 48.1 percent. The large magnitude of these changes over just seven months suggests that these shifts are likely due to political events and not secular trends in identity.

B. Twitter as an Identity Barometer

Next, we explore changes in the language used in Twitter posts written from within Ukraine. The left panel of Figure 2 presents the aggregate trends in the total number of tweets written in Russian and Ukrainian. The right panel of Figure 2 tracks the evolution of the share of tweets in Ukrainian relative to the number of tweets in either Russian or Ukrainian.

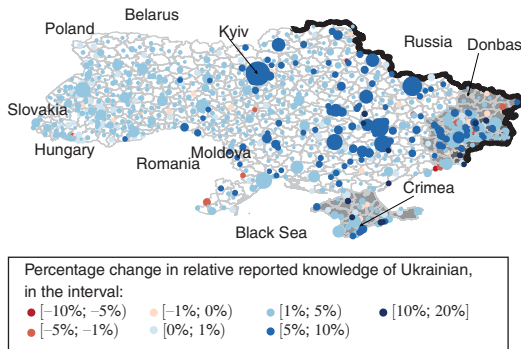


FIGURE 1. CHANGE IN SHARE OF VK USERS REPORTING KNOWLEDGE OF UKRAINIAN, SEPTEMBER 2013–MARCH 2014

Notes: The figure maps the proportional change in the share of VK users reporting knowledge of the Ukrainian language. For a given population center i , this change is calculated as $\Delta_i = 100 \times (S_{i,2014} - S_{i,2013}) / S_{i,2013}$, where $S_{i,t} = U_{i,t} / (U_{i,t} + R_{i,t})$ and where $U_{i,t}$ and $R_{i,t}$ are, respectively, the total numbers of VK users claiming knowledge of Ukrainian and Russian at time t . The size of each circle is weighted by the square root of the total number of VK users in September 2013. The Crimean Peninsula, annexed by Russia in February 2014, and the Donbas region are in gray. The territories in black have been under the control of Russian military forces and pro-Russian separatists since 2015. The thick black line represents the border between Ukraine and Russia.

The share of tweets in Ukrainian was trending upward following the Euromaidan protests and the annexation of Crimea, although only gradually. In contrast, it experienced a dramatic spike after Russia’s full-scale invasion of Ukraine in February 2022. That year, the share of tweets in Ukrainian surged from 53 percent in January to 67 percent in April and to 79 percent in November. The left panel of Figure 2 shows that this increase was driven both by a sharp decrease in the number of tweets in Russian and a corresponding rapid increase in Ukrainian language tweets.⁵

C. Validation

Our proposed social media–based indicators of identity shifts appear promising, but their

⁵Our additional analysis, available upon request, suggests that these results hold within individual users and, thus, are not driven by worsened internet connection or military activities.

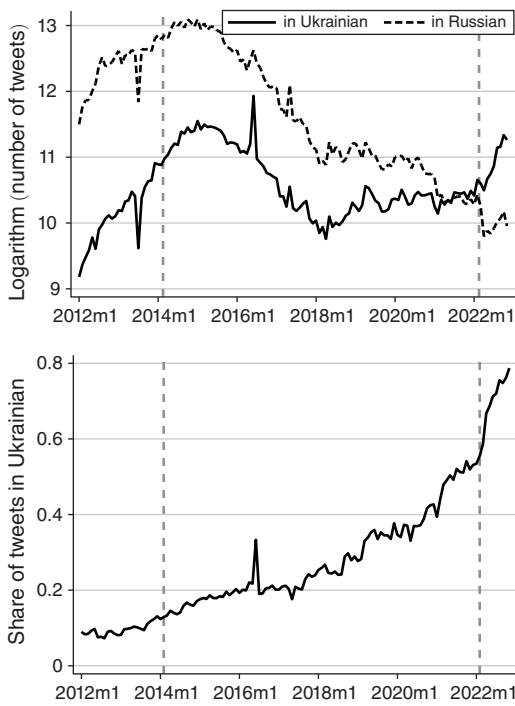


FIGURE 2. CHANGE IN LANGUAGE OF TWITTER POSTS IN UKRAINE, JANUARY 2012–NOVEMBER 2022

Notes: The top panel displays the evolution of the total number of tweets in Russian and Ukrainian in the territory of Ukraine. The bottom panel displays the evolution of the share of tweets in Ukrainian as opposed to in Russian in the territory of Ukraine. The vertical gray lines represent the months of two major acts of Russian aggression against Ukraine: the annexation of Crimea (February 2014) and the full-scale invasion (February 2022).

correlation with classical survey-based identity measurements remains unclear. To explore this relationship further, in Figure 3, we plot the province-level correlations between the changes in our proposed social media measures from 2013 to 2014 and the corresponding shifts in the proportion of individuals identifying as ethnically Ukrainian in the nine KIIS surveys, which also exhibited a shift following the 2014 Russia-Ukraine armed conflict (Abramenko et al. 2024).

We observe positive correlations for both social media measures. The correlation is statistically significant for VK but not for Twitter, which could be attributed to noise stemming from Twitter’s lower usage outside major

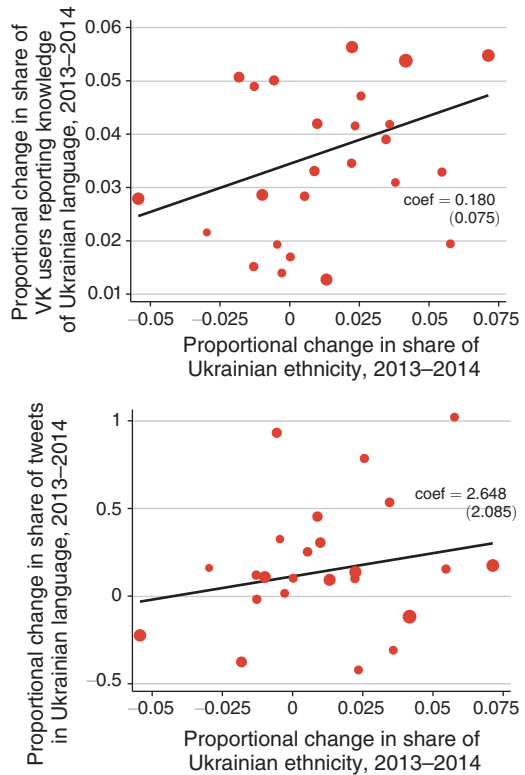


FIGURE 3. PROVINCE-LEVEL CORRELATIONS BETWEEN CHANGES IN IDENTITY ON SOCIAL MEDIA AND IN SURVEYS

Notes: The top panel displays the province-level correlation between the proportional changes in the share of respondents claiming Ukrainian ethnicity (*x*-axis) and the share of VK users reporting knowledge of the Ukrainian language (*y*-axis). The bottom panel displays the province-level correlation between the proportional changes in the share of respondents claiming Ukrainian ethnicity (*x*-axis) and the share of Twitter posts written in Ukrainian as opposed to in Russian (*y*-axis). The proportional change in identity is calculated as $\Delta_i = (S_{i,2014} - S_{i,2013})/S_{i,2013}$, where $S_{i,t}$ stands for a share of individuals of Ukrainian identity in a province *i* and year *t*. For VK, $S_{i,t} = U_{i,t}/(U_{i,t} + R_{i,t})$, where $U_{i,t}$ and $R_{i,t}$ are, respectively, the total numbers of VK users claiming knowledge of Ukrainian and Russian at year *t*. For Twitter, $S_{i,t} = U_{i,t}/(U_{i,t} + R_{i,t})$, and $U_{i,t}$ and $R_{i,t}$ are, respectively, the total numbers of Twitter posts written in Ukrainian and Russian at year *t*.

Ukrainian cities. Alternatively, changing one’s posting language could be much costlier relative to self-reporting one’s ethnicity or language proficiency to an interviewer or on a social media profile. These findings imply that social media data are a valid complementary source of data for measuring identity shifts.

IV. Conclusion

In many instances, identity is a choice. This fact carries significant implications for academic research and policymaking, especially as related to nation building. We posit that in scenarios where survey-based tools are unavailable or cannot reach the desired scale, social media data offer a feasible alternative for tracking shifts in identity. Utilizing data on self-reported language proficiency from VK and language usage in Twitter posts, we investigate identity transformations in Ukraine following the Maidan Revolution and the subsequent Russia-Ukraine war. Our analysis reveals that these social media indicators not only display intuitive patterns but also correlate positively with traditional survey-based measures of ethnicity.

In ongoing research, we are leveraging these data to examine the impact of conflict on nation building in the context of the Russia-Ukraine war (Abramenko et al. 2024). We also hope to encourage future researchers to fully exploit the power of social media as an identity barometer.

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