

ICT and Labor Mobility: Online search and prediction of remittances in Kyrgyzstan

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Why do we need Google Trends search?



WHY?

Motivation (air ticket from Moscow to Osh)

Google Trends

Comparison

● Москва Бишкек
Search query

● Москва Ош
Search query

+ Add comparison

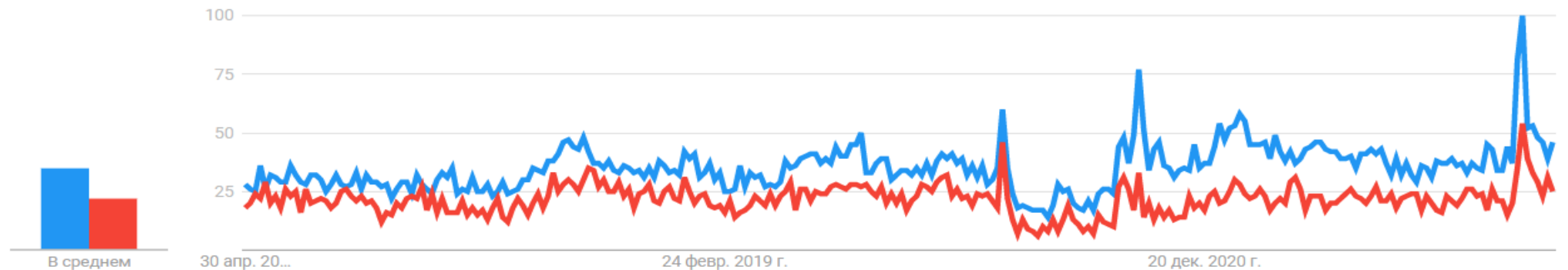
All over the world ▾

Last 5 years ▾

All categories ▾

Web search ▾

Popularity dynamics ?



Comparison by region

Region ▾



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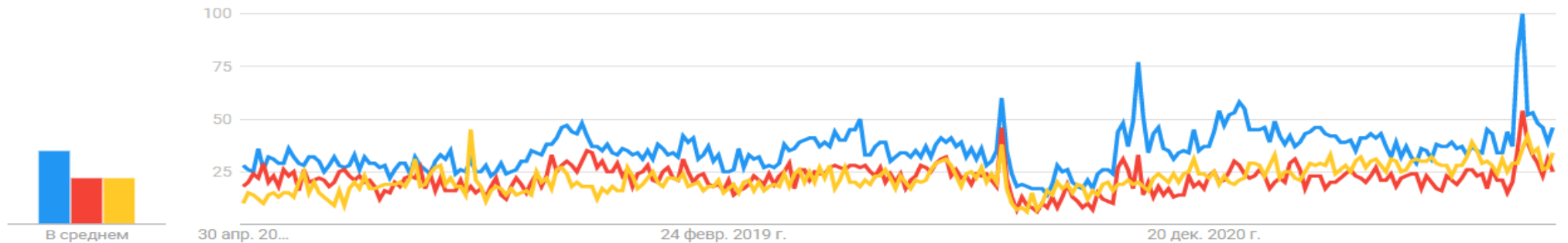
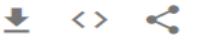
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All categories ▾

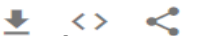
Web search ▾

Popularity dynamics ⓘ



Comparison by region

Region ▾



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Objectives

- ICTs are widely used by migrants to send remittances and obtain migration information.
- Thanks to ICT, new sources of measurement of migration and remittances are emerging.
- One of the latest advances in migration research is the incorporation of Google Trends data to predict migration flows.
- Traditional statistics fail to measure the diversity and complexity of international migration.
- Recent literature focus on migration in case of the high-income countries.
- However, the high mobility of the labor force and the lack of data on migration in developing countries highlights the prospects for the use of big data in these countries as well.
- This study aims to predict remittances using GTI for the world's largest remittance recipient country, Kyrgyzstan.
- For better prediction of remittances, we attempt to incorporate diaspora intensities in destination countries via the inclusion of search keywords on Kyrgyzstan and migration in destination countries.

Literature Review

- Google Trends (GT): the online service, launched in 2008, provides an index that reflects the relative popularity of a particular keyword (Fantazzini et al., 2021; Varian, 2009).
- Online search trends may help to predict migration flows (Böhme et al., 2020)
- People receive information about migration online before making decision to emigrate (Jun et al., 2018).
- Online search in a country of destination may inform about the diaspora (Drašković, 2020).
- However, it may not explore enough current migration outflow. Therefore, online search keywords in country of origin is needed too.
- We started analyzing migration related keywords presented at Böhme et.al. (2020). Then we add new keywords, that were assumed to be related with migration and remittances.
 - *Search words at countries of destination of migrants (Russian Federation, Kazakhstan, Germany, USA and England)*
 - *Search words at country of origin of migrants (Kyrgyzstan)*

Kyrgyz Republic: migration and internet access

- Kyrgyz Republic has high migration rates, mostly to Russia.
- Remittances account for 30% of GDP in 2021 and ranked 3rd (World Bank)
- Google is dominant as search engine in Kyrgyz Republic – over 93%
- Currently, 99% of Kyrgyzstanis are covered by mobile networks, of which 70% have access to 4G Internet.
- About 63% of the population of Kyrgyz Republic aged 15 and over, use the Internet. At the same time, the most active Internet users are young people aged 15-28.

Data

- Monthly data
 - Remittance (*million US Dollars*), GDP (*million US Dollars*), REER
 - Google Trends search keywords averaged monthly values.
- Google Trends keywords: analysis of 40 words
 - *Search words at countries of destination of migrants (Russian Federation, Kazakhstan, Germany, USA and England)*
 - *Search words at countries of origin of migrants (Kyrgyzstan)*
- Period: January 2011 – June 2021
 - This period is selected as better incorporate periods of using smartphones in Kyrgyzstan and most Google Search words are available since 2011.
- 635 observations
 - Five countries of destination are included. Russia - 97% of remittances and four countries (Kazakhstan, Germany, USA and UK) with non-zero values.

Summary statistics

Google Trends



Search Words

Variable	Mean	Std. Dev.	Min	Max	Observations
Remittance (million US Dollars)	36.50689	74.1957	0	274.1805	635
GDP (million US Dollars)	607.3482	169.7376	293.3547	1147.537	635
REER	111.826	4.50384	103.2	124.1	635
GT words for destination					
Bishkek	30.55433	23.14332	0	100	635
Osh	26.01417	25.60784	0	100	635
Toi	42.39213	25.22828	0	100	635
Chingiz Torekulovich Aitmatov	25.82677	22.18893	0	100	635
Komuz	19.27087	25.1099	0	100	635
Kumtor	10.44882	20.77812	0	100	635
Kumis	23.4063	20.55228	0	100	635
Issyk-Kul	23.7748	21.06677	0	100	635
GT words for origin, Kyrgyzstan					
Employment	22.51969	21.85154	0	100	635
Job Kg	26.20472	28.21821	0	100	635
Job	36.22047	21.80061	0	100	635
Work	30.74803	23.6146	0	100	635
Air Ticket	28.83465	22.73519	0	100	635
Air Tickets	45.8189	20.85719	0	100	635
Business	37.79528	16.11539	13	100	635
Plane Ticket	20.08661	20.87216	0	100	635
A Ticket	40.71654	21.75099	0	100	635
Birge.ru	18.15748	24.27122	0	100	635
Vacancy Bishkek	46.87402	23.4746	0	100	635
Vacancies	41.45669	12.07152	8	100	635
Visa	41.2126	18.17095	0	100	635
Departure	22.88976	17.49007	0	100	635
Citizen	26.32283	21.04257	0	100	635
Border	20.02362	21.38039	0	100	635
Jerdesh.ru	19.77953	27.75396	0	100	635
Work	34.84252	24.10591	0	100	635
Looking For Work	45.59843	24.98494	0	100	635
Lalafo Bishkek Work	20.59843	27.18649	0	100	635
Lalafo Work	20.93701	25.39677	0	100	635
Experience	25.67717	18.2408	0	100	635
Passport	46.65354	15.92242	14	100	635
Work in Bishkek	49.11024	23.88994	0	100	635
Work in Turkey	21.83465	21.87351	0	100	635
Diesel Work	41.14961	27.03167	0	100	635
Work	56.37008	13.3225	21	100	635
Resume	23.68504	16.75708	5	100	635
Homeland	37.14961	21.28375	0	100	635
Plane	23.75591	12.70492	0	100	635
Black List	28.8189	24.22828	0	100	635
Labor	28.88189	21.0481	0	100	635

Methodology

- To analyze impact of **GTI on remittances inflow to Kyrgyzstan** from **Russian Federation, Kazakhstan, Germany, USA and England** we have applied the **gravity model**.

$$X_{ijt} = \exp[\beta_0 + \beta_1 \ln GDP_{it} + \beta_2 REER_{it} + \beta_3 GT_{oit} + \beta_4 GT_{djt}] * \delta_t * c_{ij} * \varepsilon_{ijt}$$

i - represents the country of origin – Kyrgyzstan;

j - represents countries that send remittances – Russian Federation, Kazakhstan, Germany, USA and England;

X_{ijt} - is the level of remittance inflow in period t, million US Dollars;

GDP_{it} - is the level of Gross Domestic Product in the Kyrgyzstan in period t, million US Dollars;

$REER_{it}$ - is the real exchange rate;

GT_o - GT words for origin, Kyrgyzstan

GT_d - GT words for destination countries - Russian Federation, Kazakhstan, Germany, USA and England

δ_t - time-specific effects that may affect all countries in the same way, the time dummy variable

Empirical results

	GT words in origin		GT words in destination		TOTAL	
GDP	0.0021***	-0.0007	-0.0015***	-0.0006	-0.0052***	-0.0015
REER	-0.0352***	-0.0089	-0.0809***	-0.0128	-0.1181***	-0.0406
GT origin words		0.0006				
Job Kg	-0.0087***	-0.0028			0.0535***	-0.0138
Job	-0.0005	-0.0042				
Work	-0.0007	-0.0016				
Air Ticket	0.0023**	-0.0011			-0.0370***	-0.0109
Air Tickets	0.0003	-0.0016				
Business	-0.0076***	-0.002				
Plane Ticket	-0.0025	-0.0019			0.0156***	-0.0056
A Ticket	0.0090**	-0.0041				
Vacancies	-0.0073**	-0.0029			-0.0294***	-0.0109
Border	0.0048**	-0.002				
Jerdesh.ru	0.0077***	-0.0021			-0.0212***	
Looking For Work	0.0065***	-0.0022				
Lalafo Work	-0.0048**	-0.0024				
Experience	0.0038**	-0.0017				
Passport	0.0066	-0.0044				
Work in Bishkek	0.0143	-0.0089				
Work in Turkey	0.0036***	-0.0005				
Homeland	0.0017	-0.0041			0.0185**	
GT words for destination						
Bishkek Moscow			-0.0242**		-0.0256**	
Osh			0.0599***		0.0606***	
Toi			0.0403***		0.0421***	
Chingiz Torekulovich Aitmatov			0.0204***		0.0192***	
Komuz			0.0267***		0.0285***	
Kumtor			-0.0074***		-0.0090***	
Kumis			-0.0491***		-0.0507***	
Issyk-Kul			0.0259**		0.0247**	
Constant	6.2762***	-1.2684	7.3250***		13.8313***	
ll	-34478.0198		-8667.6447		-8399.845	
r2	0.0236		0.7785		0.7909	
N	614		631		629	

Findings

- The decline in GDP in the country of origin leads to an increase in remittance inflows showing that in poor economic conditions in their country of origin, migrants are more likely to remit
- Exchange rate depreciation in Kyrgyzstan is associated with lower remittance inflow indicating that after the depreciation of the national currency, a smaller amount of foreign currency (US dollars) can buy the same basket of goods.
- Search words in destination countries explains the variation in remittances better than those searched words in Kyrgyzstan suggesting that searching for trends on Google in countries where migrants live can predict the inflow of remittances to Kyrgyzstan.
- Also, searched words (job, air tickets) in Kyrgyzstan are important in explaining remittances, indicating that these words can signal people's limited opportunities for employment in the local labor market and their intentions to migrate for the purpose of employment
- Words such as place, music, social event, and literature may inform about the migrant stock in destination countries which therefore explain remittances inflow
- GT words have a strong influence on remittances along with GDP and REER.
- These results indicate that GTI can explain not only migration of the labor force, but remittances inflow too.