The gig economy in Poland: evidence based on mobile big data

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Outline

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Introduction

- Platform economy, also known as gig economy, is a new dimension of the Economy 4.0.

- It consists in commissioning and carrying out task-oriented activities with the use of Internet technologies.

- However, because of its online character it is hard to measure using standard statistical data sources (such as surveys) or administrative data.

Introduction – goals

- **The subject of this project** is the supply side of the platform economy in Poland, and more specifically *people working with the use of mobile applications* that enable them to carry out gainful activities in Poland.

- **The main goal of the project** is the socio-demographic characteristics of people working in the gig economy and the recognition of their behavior related to the management of working time.

- The research conducted in the project will use data from smartphones of users located in Poland purchased from private company (Selectivv).

To our knowledge this study is one of the first studies that analyse platform economy at such level.

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Platform Economy – details

- "Platform work is non-standard work facilitated by online platforms which use digital technologies to 'intermediate' between individual suppliers (platform workers) and buyers of labour" (Hauben et al. 2020),

- consists of jobs broken down into very small tasks, with services provided on demand,

- relationships involving at least three parties: the platform, the client (customer) and the platform worker,

- rapidly developed labour market,

- atypical, flexible work arrangements attract growing numbers of worker.

Typology for the project

We have identified the following typology for the project:

1. transportation services (np. Uber, Bolt),

2. delivery (np. Deliveroo, Glovo),

3. "traditional" jobs such as gardening, cleaning (np. TaskRabbit, Helpling),

4. specialized services such as marketing, advertising services, translations (np. Fiverr, Upwork)

5. outsourcing micro-tasks, often performed over the internet as part of crowdworking (np. Amazon Mechanical Turk).

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Data sources

We may consider the following sources to measure gig economy:

- probability samples (e.g. ICT or BAEL),
- non-probability samples (e.g. PBI Gemius/Megapanel),
- administrative data (e.g. taxi drivers registrations),
- modern data sources such as: 1) job advertisements (e.g. OLX, pracuj.pl), 2) banking systems (e.g. credit cards payments), 3) smartphone data (e.g. usage of applications).

Non-statistical data sources – smartphones data

- **Programmatic advertising**, also known as programmatic display advertising, is an automatic process of planning, buying and selling ad inventory.

- **Programmatic advertising** is a technology that enables advertisers to automatically target audience.

- When person opens website or app that contain advertisements basic information about device along with device ID is collected (GAID – Google Advertising ID), and IDFA – Apple's Identifier For Advertising).

- Companies, such as Selectivv, operate within marketing networks that contains milions of websites and thousands of applications (e.g. Selectivv uses about 200k. apps and 15 mln websites).

Non-statistical data sources – Programmatic

Selectivv collects data about:

- locations,
- apps usage,
- applications,
- device,
- OS,
- or mobile operator.

Based on algorithms (i.e. rules or ML) they classify user into 362 variables and collects and analyse data in real-time.

Non-statistical data sources – Selectivv examples

- According to Selectivv study at the end of January 2020 about **1.27 mln people from Ukraine** were present in Poland.

- According to the experimental study conducted by Statistics Poland based on integration of 11 registers **1.35 mln Ukrainians** were identified (as of 31 December 2019).

Data obtained from Selectivv

- We decided to only use these applications that are dedicated to drivers/couriers.
- From the initial proposal of **35 applications, only 8 were used** due to: 1) lack of dedicated apps, 2) insufficient number of users in Poland.
- We selected the following transportation apps and users who at least for one minute used given application:

Persons	Goods
Bolt Driver	Bolt Courier
FREE NOW for drivers	Glover
iTaxi Kierowca K3	Takeaway.com Courier
Uber Driver*	Wolt Courier Partner

[*] it is not possible to distinguish between Uber and Uber Eats (one app).

Data obtained from Selectivv

We obtained five datasets for selected apps for period 2018–2020:

- monthly number of users,
- half-year number of users by gender, group age, country as well as characteristics on: students, parents of 0–4 children, parent 5–10 years, women planning a baby, type of smartphone (standard, premium iPhone, other premium),
- half-year number of users by cities, local urban areas and Voivodeships,
- half-year time use (mean and std) during working week and weekends (day and night).
- app activity (per month): to 40 month (1/4 time), 40-80h (1/2 time), 80-120h (3/4 time) and over 120h (full time).

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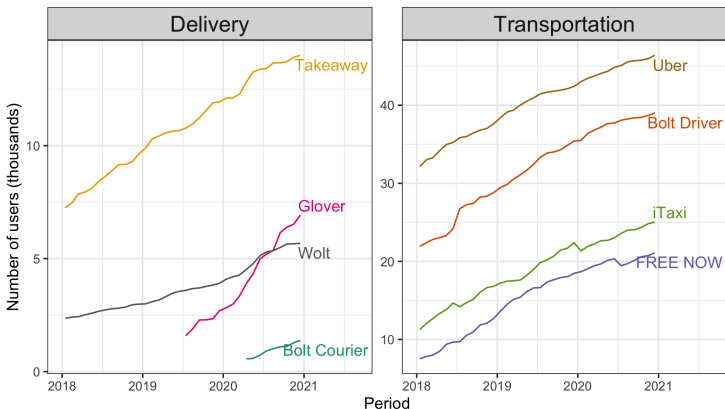## Results – monthly statistics

Figure 1: Number of monthly active users of selected apps in Poland by type and between 2018 and 2020
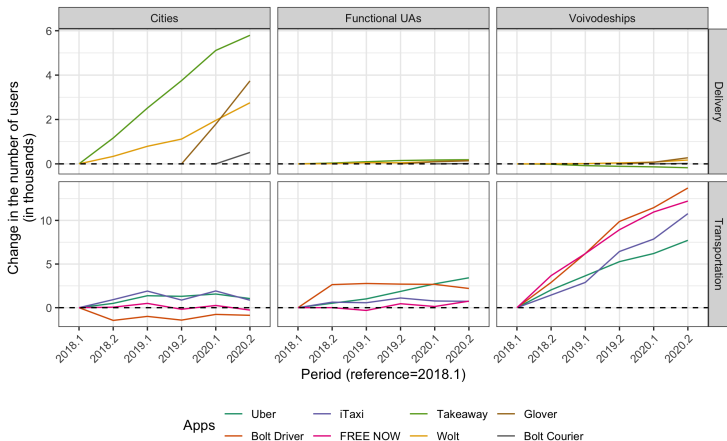
Results – monthly statistics

Figure 2: Change in the number of active users for selected apps in Poland by type and between 2018 and 2020. Base 2018HY1

Results – demography

Table 1: Demographic characteristics of gig economy app users at 2020HY2

App	Gender		Age group			Nationality			Student
	Men	Women	18–30	31–50	51–64	PL	UA	other	
Transportation									
Uber	88.0	12.0	49.2	46.4	4.4	66.0	24.1	9.8	2.7
Bolt	86.3	13.7	56.2	37.8	6.0	65.5	26.1	8.5	3.1
FREE NOW	88.6	11.4	40.1	52.4	7.5	76.8	21.7	1.5	0.8
iTaxi	88.7	11.3	28.2	58.1	13.7	77.9	20.2	2.0	4.4
Delivery									
Takeaway	89.7	10.3	94.6	4.5	0.9	62.1	31.1	6.7	8.1
Glover	93.8	6.2	94.1	5.7	0.2	61.6	27.5	10.8	7.8
Wolt	92.3	7.7	95.7	2.9	1.4	54.2	28.4	17.5	7.9
Bolt Courier	94.7	5.3	100.0	–	–	62.3	27.5	10.2	0.0

Note: PL – Polish, UA – Ukrainian, other – other foreigners.
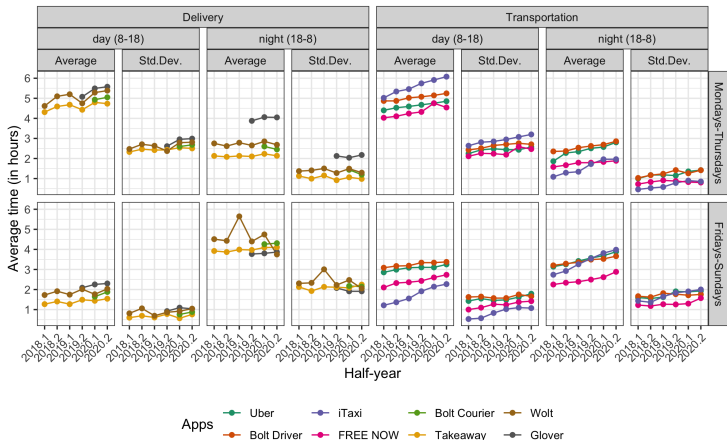
Results – activity time

Figure 3: Average and standard deviation (Std. Dev.) of activity time by app type, app, weekdays and hours
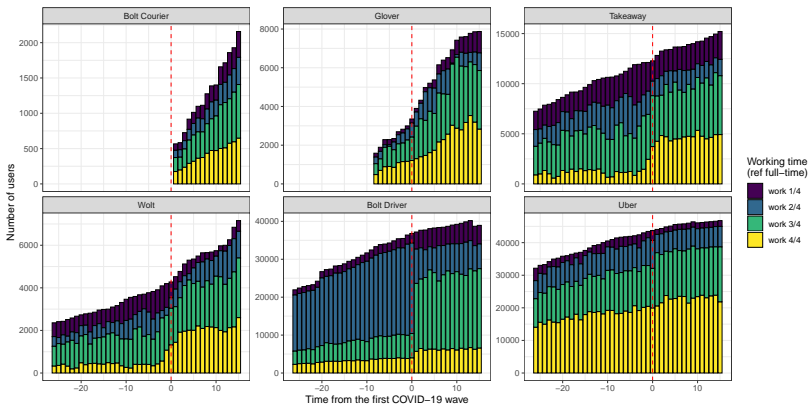
Results – activity time

Figure 4: Number of users by apps' activity time (as proxy for working hours)
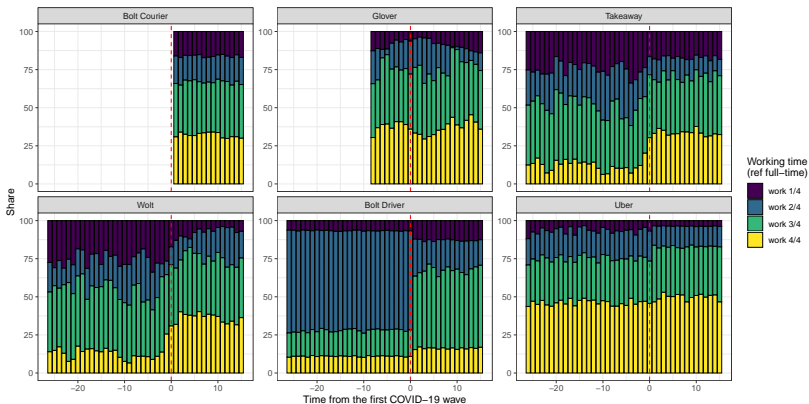
Results – activity time

Figure 5: Share of users by apps' activity time (as proxy for working hours)

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Conclusions – general

- Males dominate in the use of transportation apps (possible reason: driving licences, security).
- Users of transportation of persons and goods apps differ in terms of age (possible reason: couriers often use bikes).
- Share of foreigners is about 20-25% thus they does not dominate (but we do not know how much time they spend working).
- We observe difference in time spend in applications between working week and weekends (possible reason: people are treating these jobs as normal work).
- COVID-19 had a significant impact on the working hours structure of couriers and drivers.

Conclusions – statistical

- Lack of survey or administrative data for comparison or variability due to small sample sizes does not allow for reliable comparisons.
- Important variables from surveys are observed separately (i.e. driving licence and labour force status).
- Foreigners are missed by surveys and partially covered by admin data.
- Selection of applications and how to define users is crucial. For instance, how to mimic LFS question about "working at least 1 hour during last week"? Thus, we have measurement errors.
- Coverage of Selectivv data is very high (around 24 mln users in Poland) and over-coverage is rather low.
- Measurement error in socio-demo variables (i.e. due classification algorithms).

Acknowledgements

Working papers and codes

- The gig economy in Poland: evidence based on mobile big data – https://arxiv.org/abs/2106.12827
- COVID-19 and the gig economy in Poland – https://arxiv.org/abs/2107.11124
- datasets and codes are available at Github: github.com/ DepartmentOfStatisticsPUE/rid-gig-economy

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