Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

# Investment & Innovation amid Russian-Ukraine conflict

Minh Dao

UT Dallas

December 4, 2024

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

Brief Introduction

Preliminary Analysis

Conclusion

Motivation

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

- ▶ **Why** firms go abroad and **how** they make impacts on the global market are broad questions that we are asking, especially in the context of globalization.
- ▶ Theory of MNEs (Hymer, Hennart, Venables, Markusen, etc.)
- ▶ OLI framework (Dunning)
- ▶ FDI spillovers, especially knowledge spillovers
- ▶ Literature gap: FDI-Innovation nexus

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion
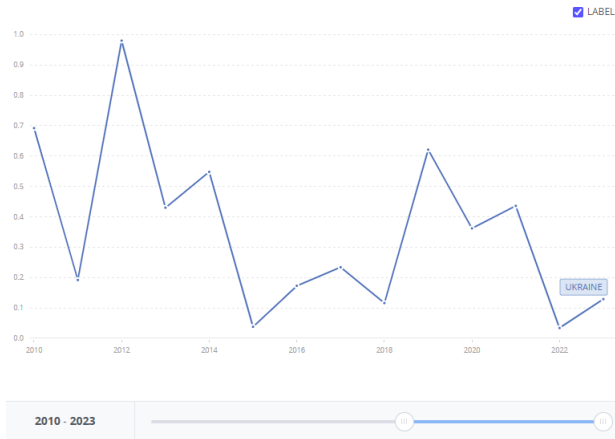
- Sudden drop in outward FDI at 2015 and 2022
- April 2014: War in Donbas
- February 2022: Russian invasion

Research Question

▶ RQ: What is the causal impact of investment coming from Ukrainian investors on their firms' innovation?

▶ Outcome: Patent counts, Unit of analysis: firm

▶ Exogeneity: Russia-Ukraine war (Feb-2022)

▶ Treated group: Headquarters having first level shareholder being Ukrainian with 10% ownership & its subsidiaries (data source: Orbis)

▶ Control group: Comparable firms in host countries

Treated Firms

▶ Combine Firms and their Subsidiaries, remove Russian and Ukrainian firms. We have a unique 25,766 firms.

ISO Code	Country Name	Percentage
BG	Bulgaria	5.041528
CZ	Czechia	31.852053
DE	Germany	1.412714
GB	United Kingdom	13.199565
IT	Italy	4.952263
LT	Lithuania	1.987115
LV	Latvia	3.166964
PL	Poland	19.296748
RO	Romania	2.615850
SK	Slovakia	9.753163

Table: Country Data with ISO Code and Percentage > 1

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

► We would have lots of 0s since not many firms can
   apply for patents
► We will focus on firms that we can find their associated
   patents

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

ISO Code	Country Name	Percentage
AT	Austria	4
BG	Bulgaria	4
CH	Switzerland	4
CY	Cyprus	4
CZ	Czechia	4
EE	Estonia	4
GB	United Kingdom	28
IT	Italy	36
PL	Poland	4
SI	Slovenia	4
SK	Slovakia	4

▶ Our total treated units is 25.

▶ 4% implies that we have one firm in the corresponding host country and that firm does have at least one patent in 'PatentsView' dataset.

Control Firms

▶ Look at the other firms in the host countries: they will be the potential comparable firms in our control pools.

▶ Get all the possible firms in those countries (excluding all the identified firms in the treatment group)

  ▶ Total possible control firms: 25,766 units

▶ Use SQL to get a random sampling out of the total control firms that maintain the same proportion of countries as in the treated sample. E.g., 28% of the treated firms are of GB, then in the control sample approximately 28% of the control firms are also of GB.

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

```r
# Random Sampling from WRDS/ORBIS dataset
###################################
# Step 1: Define the proportion #
###################################

ctryiso_proportions <- c(
  AT = 0.04, BG = 0.04, CH = 0.04, CY = 0.04, CZ = 0.04, EE = 0.04,
  GB = 0.28, IT = 0.36, PL = 0.04, SI = 0.04, SK = 0.04)

#######################
# Step 2: SQL command: #
#######################

setwd("C:/Users/tuanm/OneDrive/Projects/ukraine_investment/2-data_cleaning/preprocess/")
treatment <- fread("treatment_id.csv")

excluded_bvdid <- paste0("'", treatment$bvdid, "'", collapse = ",") # Taken form 2.1 file

# SQL Query to retrieve all firms for the specified countries
ctryiso_query <- paste0(
  "WITH all_firms AS (",
  "  SELECT bvdid, ctryiso, name_internat, 'table_l' as source_table FROM bvd_orbis_large.ob_w_company_id_table_l WHERE ctryiso IN
(",
  paste0("'", names(ctryiso_proportions), "'", collapse = ","),
  ") UNION ALL ",
  "  SELECT bvdid, ctryiso, name_internat, 'table_lm' as source_table FROM bvd_orbis_medium.ob_w_company_id_table_lm WHERE ctryiso
IN (",
  paste0("'", names(ctryiso_proportions), "'", collapse = ","),
  ") UNION ALL ",
  "  SELECT bvdid, ctryiso, name_internat, 'table_lms' as source_table FROM bvd_orbis_small.ob_w_company_id_table_lms WHERE
ctryiso IN (",
  paste0("'", names(ctryiso_proportions), "'", collapse = ","),
  ")",
  ")",
  " SELECT DISTINCT bvdid, ctryiso, name_internat FROM all_firms ",
  " WHERE bvdid NOT IN (", excluded_bvdid, ");" # Exclude treated units
)

# Step 3: Execute SQL command

all_firms <- dbGetQuery(wrds, ctryiso_query)
```
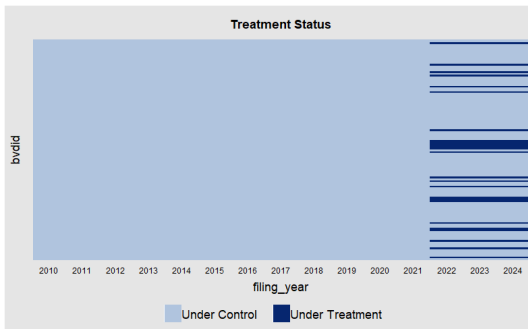
Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

▶ Exact matching procedure to find firms' filing patents
▶ We will just focus on the pre-grant application (not approved as patent yet, in the middle of application process)
  ▶ There is a lag time between application date and granted patent date: 1-3 years.

Treatment Assignment

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

- ▶ Patentsview database (patent-level)
- ▶ Group by firm and filing year, count the application
- ▶ Choose 2022 as the treated year (Russian-Ukraine war: Feb 2022)

Visualization

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

- A visualization of our data: Treated units and control units
- We will run our model from 2016-2024

Main Result

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

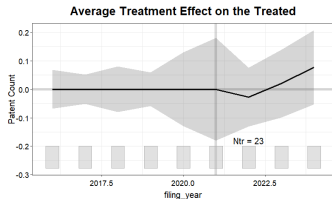Preliminary
Analysis

Conclusion

Figure: ATT plot
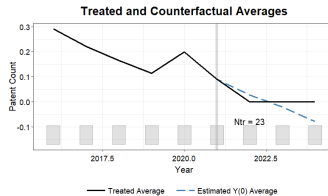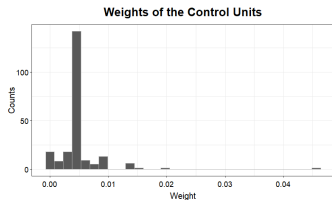

Figure: Counterfactual plot

Figure: Weights

Figure: Covariate Balance

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion
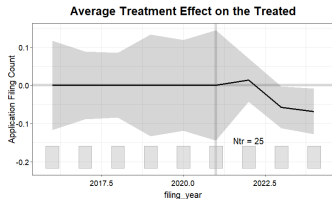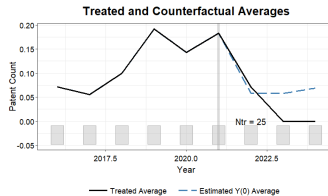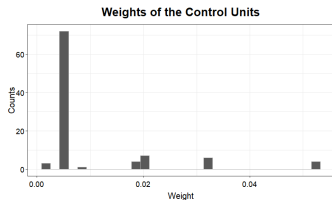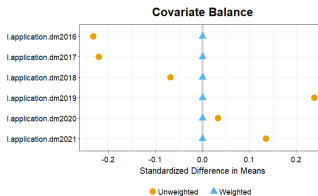
Year	ATT	S.E.	z-score	CI.lower	CI.upper	p.value	n.Treated
2016	0.0000	0.0594	0.0000	-0.1165	0.1165	1.0000	25
2017	0.0000	0.0455	0.0000	-0.0891	0.0891	1.0000	25
2018	0.0000	0.0433	0.0000	-0.0849	0.0849	1.0000	25
2019	0.0000	0.0679	0.0000	-0.1331	0.1331	1.0000	25
2020	0.0000	0.0605	0.0000	-0.1185	0.1185	1.0000	25
2021	0.0000	0.0738	0.0000	-0.1446	0.1446	1.0000	25
2022	0.0140	0.0292	0.4792	-0.0432	0.0712	0.6318	25
2023	-0.0577	0.0278	-2.0720	-0.1122	-0.0031	0.0383	25
2024	-0.0684	0.0304	-2.2510	-0.1279	-0.0088	0.0244	25

Table: Yearly Results by Period (including Pre-treatment Periods).

	ATT	S.E.	z-score	CI.lower	CI.upper	p.value
[1,]	-0.0374	0.0154	-2.421	-0.0676	-0.0071	0.0155

Table: Average Treatment Effect on the Treated.

Placebo Test

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

- ▶ As placebo test suggested by Abadie, we will conduct two tests
    - ▶ Unit placebo test
        - ▶ Remove all the true treated units in the full sample
        - ▶ Assign random treatment status to the control group with the same proportion (25/100=0.25)
        - ▶ Re-run the whole analysis
    - ▶ Time placebo test
        - ▶ "Extend" the treatment time of the true treated units back to 2018
        - ▶ Remove all data points from 2022-2024 (true treatment timing)
        - ▶ Re-run the whole analysis

Unit Placebo Test

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

Figure: ATT plot

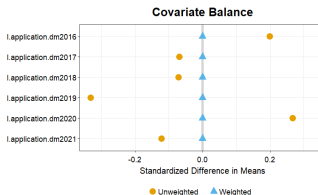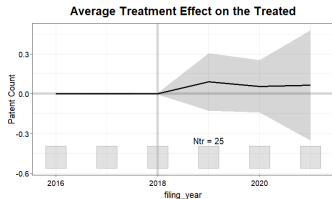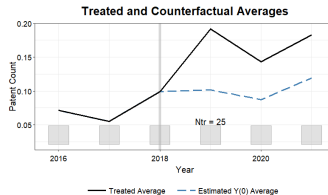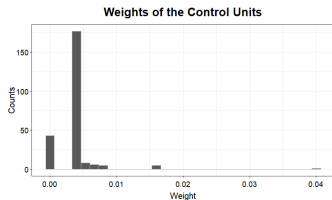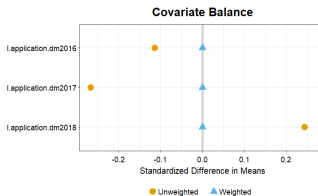Figure: Counterfactual plot

Figure: Weights

Figure: Covariate Balance

Time Placebo Test

Figure: ATT plot

Figure: Counterfactual plot

Figure: Weights

Figure: Covariate Balance

Discussion

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

▶ The sudden drop in outward FDI from Ukraine
negatively impacts firms' innovative capacity (a drop
around 3-6% of the filing new patents) had decrease in
outward investment never took place.

▶ We also use different 'set.seed()' and different number
of control units for this analysis. The result still holds.

▶ Any comments or suggestions are welcome.

Thank You

Investment &
Innovation amid
Russian-Ukraine
conflict

Minh Dao

Brief Introduction

Preliminary
Analysis

Conclusion

Minh Dao - PhD Student

Minh.Dao@utdallas.edu

UT Dallas – School of Economic Political and Policy Sciences