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Digitalization, Remote Work and Firm Performance: Evidence from the COVID-19 Shock

Reproducibility Package for paper "Digitalization, Remote Work and Firm Performance: Evidence from the COVID-19 Shock."

Overview

The codes in this replication packages prepare the analysis file as well as the figures and tables for Constantinescu, Grover and Nayyar (2024).

Directory Structure

1. "Data" folder contains six data files with indicators that are publicly available.
2. "1. Prepare regression dataset.do" constructs the analysis file "dataset.dta" by merging two confidential datasets with the six data files in the "Data" folder.
3. "2. Prepare data for figures and tables.do" uses "dataset.dta" to create figures and tables. The do file has multiple independent modules, each of which corresponds to one figure/table in the paper.

Instructions to Replicators

1. Copy the reproducibility package to your folder of choice. Unzip the files and update the file paths in both STATA scripts.
2. Request and add the confidential datasets once they become publicly available.
3. Run "1. Prepare regression dataset.do" to generate "dataset.dta".
4. Run "2. Prepare data for figures and tables.do." to replicate the figures or tables included in the paper. The modules are independent and can be executed separately.

Summary of Availability

☐ All data are publicly available.
☒ Some data cannot be made publicly available.
☐ No data can be made publicly available.

Data sources

Data/Indicator name	Name of data files	Location	Source/Citation
Selected indicators from the COVID-19 Business Pulse Survey	GlobalBPS_clean_combined.dta	Not publicly available, hence not provided.	COVID-19 Business Pulse Survey. The clean file and the code to produce the harmonized data is with the global team, EFI-FCI-TIC-Investment Climate (ETIIC). (List of indicators below)
Mapping of BPS sector codes to ISIC codes	concordance to ISIC classification.dta	Not publicly available, hence not provided.	A. J. Giesberts and S. Eapen. Industry (isic) classification tool. Technical report, Mimeo,World Bank DECDG, 2022. The clean file and the code to produce the harmonized data is with the global team, EFI-FCI-TIC-Investment Climate (ETIIC).
GDP per capita (constant 2015 US$ Share of individuals using internet Number of secure internet servers per 1 million people	API_NY.GDP.PCAP.KD_DS2.xlsx Internet_usage.dta Secure_servers.dta	Provided in folder "Data".	World Bank (2024). World Development Indicators.
Average years of schooling in population over the age of 25)	R_Data_Extract_From_Education_Statistics_Education_Attainment.xlsx	Provided in folder "Data".	Barro-Lee Educational Attainment Dataset (http://barrolee.com/
Sectoral amenability to remote work	Remote_labor_isic.dta	Provided in folder "Data".	Espitia, A., A. Mattoo, N. Rocha, M. Ruta, and D.Winkler (2021). Pandemic trade: Covid-19, remote work and global value chains. *The World Economy*. 45: 561-589.
ISIC Rev. 4 classification	Sector_categories.xlsx	Provided in folder "Data".	Working file created by paper's authors

List of indicators from the COVID-19 Business Pulse Survey:

```
country_code  -  Country code, country_long  -  Country name, wbes  -  WBES
format, firm_id  -  Firm id (country level), unique_id  -  Firm id (unique)

wave  -  Wave, cov0  -  Suvey date, month_int  -  Survey month, sector  -
Sector, subsector  -  Subsector, global_region  -  Region, size  -  Size

size_t0  -  Total employment, baseline
```

```
size_t1  -  Total employment, wave 1

size_t2  -  Total employment, wave 2

cov0c1  -  Full time employment, Jan 2020

cov0c2  -  Part time employment, Jan 2020

cov0c  -  Total employment, current

cov0d  -  % female employees

sales  -  Baseline sales

cov6a  -  Annual sales 2019

covm6a  -  Monthly sales 2019

cov0e  -  Year of establishment

age  -  Age

age_bin  -  Age bin

exporter  -  Exporter

women  -  Women-led

status  -  Current status

open  -  Establishment is open

reason_closed  -  Main reason to close business

cov1c  -  Sales during past 30 days

change_sales  -  % change in sales during past 30 days

pctile_sales  -  Percentile change in sales during past 30 days

plants_hired  -  Firm hired during past 30 days

plants_fired  -  Firm laid off during past 30 days

plants_absence  -  Firm granted leave of absence during past 30 days

plants_wages_cut  -  Firm reduced wages during past 30 days

plants_hours_cut  -  Firm reduced hours during past 30 days

extensive  -  Firm made adjustment on extensive margin

intensive  -  Firm made adjustment on intensive margin

workers_hired  -  # workers hired during past 30 days

workers_fired  -  # workers laid off during past 30 days

workers_absence  -  # workers furloughed during past 30 days

workers_wages_cut  -  # workers with reduced wages during past 30 days

workers_hours_cut  -  # workers with reduced hours during past 30 days

change_size  -  Net change in employment during past 30 days

cov2a  -  Hours of operation during past 30 days
```

change_hours - % change in hours of operation during past 30 days

cancel_orders - Firm cancelled orders (missing inputs)

share_cancel - % monthly sales affected by cancellations

adjust_inputs_1 - No change, waiting until the situation improves

adjust_inputs_2 - Expand the number of local suppliers

adjust_inputs_3 - Expand the number of foreign suppliers

adjust_inputs_4 - Increased in-house production of inputs

adjust_inputs_5 - Keep larger inventories

cover_costs - Weeks to continue operating with cash available

extra_cover - Weeks to continue operating with external finance

tot_weeks_finance - Weeks to continue operating with cash available +
external finance

no_debt - Establishment has no outstanding liabilities

adjust_finance - Establishment adjusted repayment terms/schedule

arrears - Establishment will fall in arrears?

arrears_clients - Establishment's clients will fall in arrears?

difficulty_finance_1 - No difficulty

difficulty_finance_2 - Interest rates too high

difficulty_finance_3 - I have no collateral

difficulty_finance_4 - Too many outstanding loans

difficulty_finance_5 - Repayment risk is too high

difficulty_finance_6 - Supplier are less willing to provide finance

difficulty_finance_7 - Other reason for difficulty accessing finance

expectations_sales - Average expected sales growth

uncertainty_sales - Average uncertainty of the prediction

policy_1_both - Preferred: Grants

policy_2_both - Preferred: Deferral of payments

policy_3_both - Preferred: Access to new credit

policy_4_both - Preferred: Fiscal exemptions

policy_5_both - Preferred: Wage subsidies

policy_6_both - Preferred: Support for tech adoption

policy_7_both - Preferred: Support for health protocols adoption

policy_8_both - Preferred: Support for innovation

policy_9_both - Preferred: Skills training

policy_10_both - Preferred: Other

access - Firm received government support

received_1_both - Received: Grants

received_2_both - Received: Deferral of payments

received_3_both - Received: Access to new credit

received_4_both - Received: Fiscal exemptions

received_5_both - Received: Wage subsidies

received_6_both - Received: Support for tech adoption

received_7_both - Received: Support for health protocols adoption

received_8_both - Received: Support for innovation

received_9_both - Received: Skills training

received_10_both - Received: Other

reason_1_both - I was not aware

reason_2_both - Too cumbersome or costly to apply

reason_3_both - I am not eligible

reason_4_both - I don't have the right connections

reason_5_both - I applied but not received it

reason_6_both - Do not need it

reason_7_both - Other reason for not receiving government support

cov5a1 - Started using or increased use of digital platforms? USE ONLY WITH 4 CATEGORIES

no_digital - Establishment does not sue digital platforms

use_digital - Establishment started using or increased use of digital platforms

cov5a2__1 - Business Administration

cov5a2__2 - Production planning

cov5a2__3 - Supply Chain Management

cov5a2__4 - Marketing

cov5a2__5 - Sale

cov5a2__6 - Payment methods

cov5a2__7 - Service delivery

cov5b - Share of sales using digital platforms

investment_digital - Establishment invested in digital solutions

cov5e - Share of workers working from home

repackage - Establishment changed its product mix

innovation - Establishment offering brand new product

cov5h - Competition during past 30 days

cov5h1 - Reason competition increased

cov5h2 - Reason competition decreased

cov5i - Price of product

cov5i1 - % change price of product

cov5j - Cost of product

cov5j1 - % change cost of product

cov5k2 - Implementing health protocols?

protocol_1 - Health protocols for workers

protocol_2 - Modification in workers' shifts

protocol_3 - Health protocols for customers

protocol_4 - Change layout of the establishment

protocol_5 - Adoption of alternative payment methods

protocol_6 - Other protocols

cov5k4 - Investment in health protocols

ratio_protocols_sales - Investment in health protocols (% monthly sales)

cov6e1 - Outstanding Liabilities (Jan 2020)

cov6e2 - Outstanding Liabilities (Sep 2020)

cov0f - Occupation of respondent

base_wt - Sampling weights (within country-wave)

weight - Country-wave weights (1/number of obs)

stringencyindexfordisplay - Oxford Stringency Index

smooth_severity_crisis - Weighted Google mobility trends around transit stations (smoothed)

cov0b - product or service largest sales

cov3a_1 - Sales change - Regular scenario

cov3a_1a - Increase Sales- Regular

cov3a_1b - Decrease Sales- Regular

cov3a_1L - Likelihood - Regular

cov3a_2 - Sales change - Optimistic scenario

cov3a_2a - Increase Sales- Optimistic

cov3a_2b - Decrease Sales- Optimistic

cov3a_2L - Likelihood - Optimistic

cov3a_3 - Sales change - Pessimistic scenario

cov3a_3a - Increase Sales- Pessimistic

cov3a_3b - Decrease Sales- Pessimistic

cov3a_3L - Likelihood - Pessimistic

cov3d - arrears in outstanding liabilities

cov6b - share of exports

cov3a_1L_orig, cov3a_2L_orig, cov3a_3L_orig

sales_normal - Regular

sales_opt - Optimistic

sales_pess - Pessimistic

received_1_w1 - Received: Grants

received_2_w1 - Received: Deferral of payments (rent, mortgage payments, utility bills)

received_3_w1 - Received: Deferral of credit payments (interest rate or debt refinancing)

received_4_w1 - Received: Access to new credit

received_5_w1 - Received: Loans with subsidized interest rates

received_6_w1 - Received: Fiscal exemptions

received_7_w1 - Received: Tax deferrals

received_8_w1 - Received: Wage subsidies

received_9_w1 - Received: Others

income_class

transit_m1 - ma: x(t)= smooth_transit: window(29 1 0)

bps_period

pseudo - Retrospective questions to create pseudo-panel

pseudo_full - Full wave from retrospective information

cov1c3, cov3d1, cov0a - cov0a, cov0cw1 - cov0cw1, cov0cw2 - cov0cw2

cov1a - cov1a, cov1b0 - cov1b0, cov1b1 - cov1b1, cov1b3 - cov1b3, cov1c1 - cov1c1, cov1c2 - cov1c2, cov1c7, cov1c8, cov1c9, cov1d1 - cov1d1, cov1d2 - cov1d2, cov1d3a - cov1d3a, cov1d3b - cov1d3b, cov1d4 - cov1d4, cov1d5 - cov1d5, cov1d3, cov1d1plus - cov1d1plus, cov1d2plus - cov1d2plus, cov2a1, cov2a2, cov7a - cov7a, cov7b - cov7b

cov2g - cov2g, cov2g1 - cov2g1, cov2g2 - cov2g2, cov2g2B - cov2g2b, cov3d2 - cov3d2 cov2h__1 - cov2h1 cov2h__2 - cov2h2, cov2h__3 - cov2h3, cov2h__4 - cov2h4, cov2h__5 - cov2h5, cov2h__6 - cov2h6, cov2h__7 - cov2h7, cov2h__8 - cov2h8, cov4b - cov4b, cov4c__1, cov4c__2, cov4c__3, cov4c__4,cov4c__5, cov4c__6, cov4c__7, cov4c__8, cov4c__9, cov4c__10, cov4d - cov4d, cov4d__1, cov4d__2, cov4d__3, cov4d__4, cov4d__5, cov4d__6, cov4d__7, cov5d - cov5d, cov5a2a1 - cov5a2a1. cov5a2a2 - cov5a2a2, cov5a2a3 - cov5a2a3. cov5a2a4 cov5a2a4, cov5a2b1, cov5a2b2. cov5a2b3, cov5a2b4, cov5a2c1 - cov5a2c1, cov5g - cov5g, cov5g1 - cov5g1, cov8a1 - cov8a1, cov8a2 - cov8a2, cov8a3 - cov8a3, cov8b1, cov8b2, cov8b3, covt1 - covt1, covt1a - covt1a, covt2 - covt2, covt3a, covt3b, covt3c, covt4a, covt4b, covt4c, covt5a, covt5b, covt5c, covt6a,

covt6b, covt6c, cov1c16 - cov1c16, cov6a1, cov6b2 -cov6b2, cov6e3 - cov6e3, cov6c, cov6c1cov6e4 - cov6e4, cov6e5 - cov6e5, cov6a6

cov0p, cov0g - cov0g, cov0h - cov0h, cov0i - cov0i, cov0j - Alternative contact information (phone), cov0k - cov0k, global_region2, plants, size_t3, L, size_W3, change_sales_2020 - % change in sales during past 30 days compared to same period in 2020, hired, fired, absence, wages_cut, hours_cut, add, fix_add, growth_sales_1, growth_sales_2, growth_sales_3, received_1 - Received: Grants

received_2 - Received: Deferral of payments (rent, mortgage payments, utility bills)

received_3 - Received: Deferral of credit payments (interest rate or debt refinancing)

received_4 - Received: Access to new credit

received_5 - Received: Fiscal exemptions

received_6 - Received: Wage subsidies

received_7 - Received: Support for tech adoption

received_8 - Received: Support for innovation

received_9 - Received: Skills training

received_10 - Received: Other

reason_1 - I was not aware

reason_2 - Too cumbersome or costly to apply

reason_3 - I am not eligible

reason_4 - I don't have the right connections

reason_5 - I applied but not received it

reason_6 - Do not need it

reason_7 - Other reason for not receiving government support, country, num_region

sector_w3 - RECODE of cov0a (cov0a), merged, round

received_1_harm - Received: Grants

received_2_harm - Received: Deferral of payments (rent, utilities, credit)

received_3_harm - Received: Access to new credit

received_4_harm - Received: Fiscal exemptions

received_5_harm - Received: Wage subsidies

received_6_harm - Received: Support for tech adoption

received_7_harm - Received: Support for innovation

received_8_harm - Received: Skills training

received_9_harm - Received: Other

ratio_debt_sales_t1 - ratio_debt_sales_t1

ratio_debt_sales_t0 - ratio_debt_sales_t0

ratio_debt_sales_t2 - ratio_debt_sales_t2

ym_int - Month of interview, transit - transit, smooth_transit - ma: x(t)= transit: window(3 1 3)

smooth_std_severity - ma: x(t)= std_severity: window(3 1 3)

cov0d1 - cov0d1, cov1b01 - cov1b01, cov1d2a - cov1d2a, cov1d6 - cov1d6, cov1d61 - cov1d61, cov7b1 - cov7b1, cov2h, cov2h1 - cov2h1

cov4c - Why did this establishment not receive any national or local government measures, cov4c2 - cov4c2a, cov4c3 - cov4c3a, cov5d1 - cov5d1, cov5a2d1 - cov5a2d1, cov5a2d2 - cov5a2d2, cov5a2d2a - cov5a2d2a, cov5e1 - cov5e1, cov8a3a - cov8a3a, cov8b3a - cov8b3a, covt4a1 - covt4a1, covt4b1 - covt4b1, covt4c1 - covt4c1, covt6a1 - covt6a1, covt6b1 - covt6b1, covt6c1 - covt6c1, covInv1 - covInv1, covInv1a, covInv1a__1 - covInv1a1, covInv1a__2 - covInv1a2, covInv1a__3 - covInv1a3, covInv1a__4 - covInv1a4, covInv1a__5 - covInv1a5, covInv1a1i - covInv1a1i, covInv1b - covInv1b, covInv1c - covInv1c

covEne1 - covEne1, covEne2 - covEne2, covEne3 - covEne3, covEne4 - covEne4, covEne5 - covEne5, covEne6 - covEne6

covEne7 - covEne7, covEne8 - covEne8, cov6e6 - cov6e6, cov0f1 - cov0f1, cov9 - cov9, intensive_VNM, size_t4, size_w4, resigned, intensive_all, plants_resigned, plants_intensive_all, workers_resigned , workers_intensive_all, cancel_imported_order, rcv_monetary, value_support_2020, value_support_2021, value_investment_digital

sector_w4 - RECODE of cov0a (cov0a), pctile_sales_2020,gdppc_current - GDP per capita (2019), current USD

gdppc_constant - GDP per capita (2019), constant USD

List of indicators Mapping of BPS sector codes to ISIC codes

unique_id - Firm id (unique), wave - Wave, cov0 - Suvey date, isic - Final ISIC classification, isic4