README: "Colluding Against Workers" by Vincent Delabastita and Michael Rubens

Overview

This file documents the programs and datasets used to generate the results in the paper. The programs were run using Stata 17 and MATLAB R2022b, but should equally work with older versions of Stata and MATLAB. The code was last run on an Intel-based MacBook Pro (2020 version, 2.0GHz quad-core 10th-generation Intel Core i5, Turbo Boost up to 3.8GHz, with 6MB shared L3 cache) with MacOS version 10.15.7. Using a computer with similar characteristics, the entire code should run within 10 hours.

Data Availability and Provenance Statements

Statement about Rights

- ☐ We certify that the authors of the manuscript have legitimate access to and permission to use the data used in this manuscript.
- ☐ We certify that the authors of the manuscript have documented permission to redistribute/publish the data contained within this replication package.

Summary of Availability

- ☐ All data are publicly available.

Dataset list

We provide all data used in our analysis in the `.xlsx` format, readable in Microsoft Excel or various open-source alternatives. These data were digitized by the authors of this manuscript, unless otherwise acknowledged. Any use of the data should acknowledge the underlying sources as well. We list the data files in alphabetical order:

- `employment_province.xlsx`: This file contains total employment counts by province, as from the Belgian population censuses following Buyst (forthcoming)
- `indices.xlsx`: This file contains index measures for the following variables (and their source): sector-level wages (Scholliers, 1995; Segers, 2003), cost of living (Scholliers, 1995; Segers, 2003), industrial and agricultural production (Gadisseur, 1979), sector-level employment (Buyst, forthcoming), coal trade volumes and values (Degrève, 1982), and aggregate production and labor statistics from the *Administration des Mines* (Wibail, 1934). The variables are also named according their source.
- `Leboutte 1991.xlsx`: This file contains figures on mortality in Belgian coal mining, as cited in Leboutte (1991).

- `postalcodes.xlsx`: This file contains the concordance table between communities and their postal codes.
- `revuedutravail_petroleum.xlsx`: This file contains market-year level lamp oil prices collected by the Belgian labor inspection services, derived from their annual reports (Office du Travail du Belgique, 1896–1913).
- `Société Générale.xlsx`: This file contains the yearly composition of the portfolio of the *Société Générale*. We thank Gertjan Verdickt and SCOB at the University of Antwerp for providing this data.
- `Statistiques_Grèves_DATA.xlsx`: This file contains year-level statistics collected by the Belgian labor inspection services on striking activity in both coal mining and industry overall, derived from their annual reports (Office du Travail du Belgique, 1896–1913).
- The folder `main/data/agriculture` contains the following data:
  - `Buyst forthcoming.xlsx` This file contains agricultural employment counts, as from the Belgian population censuses following Buyst (forthcoming).
  - `Degrève 1982 data final.xlsx` and `Degrève 1982 products.xlsx`: These files contain the Belgian trade statistics, derived from Degrève (1982). The former file also contains our manual codification of the traded products into the *Standard International Trade Classification* (SITC revision 2), which we converted into the *International Standard Industrial Classification of All Economic Activities* (ISIC revision 2) using the concordance table provided by Muendler (2009).
  - `Gadisseur 1979.xlsx`: This file contains an agricultural production index, derived from Gadisseur (1979).
- The folder `main/data/cartel` contains the following data:
  - `cartel_new.xlsx` This file contains the cartel membership identifiers, indicating participation in the *Syndicat des Charbonnages liégeois*.
  - `Membership Union.xlsx`: This file contains the yearly member lists of the *Union des charbonnages Liégeois* on a sheet-by-sheet basis, derived from their year reports (Union des charbonnages (...), 1869–1913).
- The folder `main/data/commuting-transport` contains the following data:
  - `commuting_data.xlsx`: This file contains firm-level data on its workers' place of residence, derived from Mahaim (1911).
  - `town_railconnections.xlsx`: This file contains the list of mining communities, which we manually linked to the opening years of (light) railway stops in the respective communities. Sources are the attached network maps of the yearly reports of the Belgian National (Light) Railways (Ministre des Chemins de Fer, Postes et Télégraphes, 1845–1913; Société Nationale des Chemins de Fer Vicinaux, 1888–1913), which we verified using the invaluable work by Quetelet Center (n.d.-b). We thank the Quetelet Center at the University of Ghent and Sven Vrielinck specifically for allowing access to the latter source.

- The folder `main/data/politics` contains the following data:
  - `town_politics_categories.xlsx`: This file contains the list of mining communities, and the political composition of their local elections of 1895 and 1899. We manually calculated these shares based on the work by Quetelet Center (n.d.-a). We thank the Quetelet Center at the University of Ghent and Sven Vrielinck specifically for allowing access to this source.
- The folder `main/data/population` contains the following data:
  - `town_popcensuses.xlsx`: This file contains the list of mining communities, and their respective population counts from the Belgian population censuses (Statistique de la Belgique, n.d.).
- The folder `main/data/production` contains the digitized mine-level reports of the *Administration des Mines* on a year-by-year basis. The respective files, which are stored in the subfolder `data sheets`, are named after their number in the inventory guide of the State Archives of Belgium (Administration des Mines, 1831–1933). For example, `DATA_Series 196.xlsx` contains the data from Series 196 for year 1869. We refer to `README - Data entry - Administration des Mines.docx` for more information on the data entry procedures. This folder also contains seven Stata do-files which are called and documented in `dr_data.do` (see below).

Computational requirements

Software Requirements

- The programs were run using Stata 17, but should equally work with older versions of Stata.
  - The package `estout` should be installed and can be installed using the following command: `ssc install estout, replace`.
  - The package `ftools` should be installed and can be installed using the following command: `ssc install ftools, replace`.
  - The package `ivreg2` should be installed and can be installed using the following command: `ssc install ivreg2, replace`.
  - The package `ivreghdfe` should be installed and can be installed using the following command: `ssc install ivreghdfe, replace`.
  - The package `mdesc` should be installed and can be installed using the following command: `ssc install mdesc, replace`.
  - The package `ranktest` should be installed and can be installed using the following command: `ssc install ranktest, replace`.
  - The package `reghdfe` should be installed and can be installed using the following command: `ssc install reghdfe, replace`.
- The program Stata `dr_main.do` calls `uwm_master.m`, which was run in MATLAB R2022b but should equally work with older versions of MATLAB. `uwm_master.m` calls the objective function `uwm_obj.m`.

Controlled Randomness

☐ Random seeds are set at:
- line 80 of program `dr_main_bs.do`
- line 118 of program `dr_appendix_bs.do`

Memory and Runtime Requirements

Summary Approximate time needed to reproduce the analyses on a standard 2024 desktop machine:

☐ 10 hours

Details The code was last run on an Intel-based MacBook Pro (2020 version, 2.0GHz quad-core 10th-generation Intel Core i5, Turbo Boost up to 3.8GHz, with 6MB shared L3 cache) with MacOS version 10.15.7.

Description of programs/code

- Programs in the folder `main/` generate all tables, figures and results in the main text. The file `main/dr_master.do` runs all executable files within this folder.
- The folder `data/` contains all the data files to run the code
- The folder `data/temp` contains all temporary data files that are internally generated by the code.
- The folder `ouput/` contains all output files used in the manuscript.

Instructions to Replicators

All output used to write the manuscript can be generated using the following steps:

1. Edit `/main/master.do` to adjust the default path
2. Run `/main/master.do`

Details

- `dr_master.do:` This is the master do-file that calls all the other programs.
- `dr_main.do:` This is the do-file that provides the analyses presented in the main text.
  - This do-file also calls the MATLAB code `uwm_master.m`, which is used to calibrate material and capital prices.
- `dr_appendix.do:` This is the do-file that provides the analyses presented in the appendix.
- `dr_data.do:` This is the do-file that prepares the data files for analysis.

- `dr_figures-descriptives.do` This auxiliary do-file generates various descriptive graphs and tables throughout the manuscript.
- `dr_redform.do` This auxiliary do-file provides the additional reduced-form evidence referred to in our manuscript.
- The standard errors are bootstrapped in separate do-files, that carry the same name as the file they are providing the bootstrapped standard errors for, but with '_bs' added. Specifically, we provide:
  - `dr_main_bs.do`
  - `dr_appendix_bs.do`
- The number of bootstrap iterations is defined as B=200 in `dr_master.do` on line 7. In each of the bootstrapping do-files, the seeds are set equal to 'b' for each iteration 1<b<B, with 'b' being the number of the bootstrap iteration.
- `uwm_master.m`: This MATLAB code is called by `dr_main.do`. `uwm_master.m` calls the objective function `uwm_obj.m`.

List of tables, figures and programs

The provided code in this replication package produces the following:

- ☐ All numbers provided in text in the paper
- ☐ All tables and figures in the paper, as summarized below:

Figure/Table #	Program	Line Number	Output file
Figure 1a	dr_redform.do	39	fig_lqemp.pdf
Fig. 1b	dr_redform.do	64	fig_csl.pdf
Fig. 2	dr_redform.do	98	fig_cartel.pdf
Fig. 3	dr_main.do	1618	fig_md1.pdf
Fig. 4a	dr_main.do	573	fig_mmd_decomp_dq4.pdf
Fig. 4b	dr_main.do	1677	fig_medcol_se10.pdf
Table 1	dr_main.do	1748	table1.tex
Table 2	dr_main.do	1785	table3.tex
Table 3	dr_main.do	1812	table_mdcorr.tex
Table 4	dr_main.do	1537	table_cf.tex
Figure B1	dr_main.do	1883	fig_cost.pdf
Fig. B2	dr_figures-descriptives.do	322	fig_SG.pdf
Fig. B3	NA	NA	NA
Table B1	NA	NA	NA
Table B2	NA	NA	NA
Table B3	dr_data.do	577	table_dep.tex
Table B4	dr_data.do	629	table_estcap.tex
Table B5	dr_figures-descriptives.do	475	table_summary.tex
Table B6	NA	NA	NA
Figure C1	dr_appendix.do	1153	fig_medcol_robnu.pdf
Fig. C2	dr_figures-descriptives.do	117	fig_inputprice.pdf
Fig. C3	dr_appendix.do	1184	fig_medcol_rob1.pdf
Fig. C4	dr_appendix.do	1188	fig_medcol_rob2.pdf
Fig. C5	dr_appendix.do	1472	fig_costdyn.pdf
Fig. C6	dr_appendix.do	614	fig_medcol_iv.pdf
Fig. C7	dr_appendix.do	1384	fig_medcol_bertrand.pd
Fig. C8	dr_appendix.do	888	fig_medcol_tv.pdf
Fig. C9a	dr_main.do	573	fig_mmd_decomp_dq1.pdf
Fig. C9b	dr_main.do	573	fig_mmd_decomp_dq2.pdf
Fig. C9c	dr_main.do	573	fig_mmd_decomp_dq3.pdf
Fig. C9d	dr_main.do	573	fig_mmd_decomp_dq4.pdf
Fig. C10a	dr_appendix.do	976	fig_mmd_rob2.pdf
Fig. C10b	dr_appendix.do	968	fig_mmd_rob1.pdf
Fig. C11	dr_figures-descriptives.do	25	fig_mortality.pdf
Fig. C12a	dr_appendix.do	1054	fig_md_weights.pdf
Fig. C12b	dr_appendix.do	1060	fig_kappa_weights.pdf

Figure/Table #	Program	Line Number	Output file
Fig. C13a	dr_figures-descriptives.do	502	fig_votes.pdf
Fig. C13b	dr_main.do	881	fig_pol.pdf
Table C1	dr_appendix.do	1581	table_pfnu.tex
Table C2	dr_appendix.do	1724	table_apmu.tex
Table C3	dr_appendix.do	1698	table_pf_timev.tex
Table C4	dr_appendix.do	1790	table_difpf.tex
Table C5	dr_appendix.do	1777	table_revpf.tex
Table C6	dr_appendix.do	1750	table_cs.tex
Table C7	dr_appendix.do	1611	table_bnu.tex
Table C8	dr_appendix.do	1636	table_b_iv.tex
Table C9	dr_main.do	1849	table_r2.tex
Table C9	dr_appendix.do	752	table_labdif.tex
Table C11	dr_appendix.do	1563	table_bertrand.tex
Table C12	dr_appendix.do	1017	table_labsup_tv.tex
Table C13	dr_main.do	1835	table_drivers.tex
Figure D1	dr_figures-descriptives.do	228	fig_emps.pdf
Fig. D2	dr_figures-descriptives.do	201	fig_wind.pdf
Fig. D3a	dr_figures-descriptives.do	73	fig_strikesn.pdf
Fig. D3b	dr_figures-descriptives.do	86	fig_strikesemp.pdf
Fig. D4	NA	NA	NA
Fig. D5a	dr_redform.do	132	fig_mech.pdf
Fig. D5b	dr_redform.do	117	fig_winv.pdf
Fig. D6a	dr_figures-descriptives.do	390	fig_srail.pdf
Fig. D6b	dr_figures-descriptives.do	380	fig_semprail.pdf
Fig. D7	dr_figures-descriptives.do	347	fig_commuters.pdf
Fig. D8a	dr_main.do	1006	fig_exityr.pdf
Fig. D8b	dr_main.do	1021	fig_exitt.pdf
Fig. D9a	dr_main.do	1131	fig_fc_winv_exg.pdf
Fig. D9b	dr_main.do	1429	fig_fc_winv_end.pdf
Fig. D10a	dr_redform.do	177	fig_impresp_l.pdf
Fig. D10b	dr_redform.do	181	fig_impresp_m.pdf
Fig. D10c	dr_redform.do	185	fig_impresp_k.pdf
Fig. D11	dr_main.do	1610	fig_agmd1.pdf
Fig. D12	dr_main.do	1681	fig_medcol_se.pdf
Table D1	dr_main.do	1490	table_exit.tex
Table D2	dr_appendix.do	1805	table_mucar.tex
Table D3	dr_main.do	1306	table_coaldemand.tex
Table D4	dr_main.do	89	table_pf_stage1.tex

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