README

Optimal Regulation of Noncompete Contracts

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November 2022

1 Overview

This replication package contains two sets of codes organized into two folders:

1. `empirical`: contains the files to construct the data and produce the empirical patterns in Section 4. The empirical results are produced with `Stata/SE16.1`.
2. `quantitative`: contains the files to produce the quantitative analysis in Section 5. The quantitative results are produced with `MATLAB_R2022b`.

2 Empirical Results

This section explains the procedures for replicating the empirical tables and figures. The files are included in the `empirical` folder and the following sub-folder directories:

- `build`: contains the files to construct the data.
- `analysis`: contains the files to reproduce the empirical analysis and plots.

2.1 Data Description

The empirical results use a new proprietary dataset on noncompete contracts for executives in public-listed U.S. firms. Details for the data collection is described in Appendix F.1 of the paper. This contract data is merged with the standard datasets for these listed firms, which can be obtained from `Wharton Research Data Services`.

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Noncompete contract data. The noncompete contract data is organized at the contract level. The data can be conveniently reorganized to measure noncompete arrangements at the firm-executive match level and at the firm level. The following table describes the data variables:[1]

Table 1: Description of variables in the noncompete contract data

Variable	Description
`execid`:	Executive identifier in `ExecuComp`.
`gvkey`:	Company identifier in `Compustat`.
`date`:	Date the contract is disclosed.
`year`:	Year the contract is disclosed.
`contract_N`:	Total number of contracts found for the firm-executive match.
`contract_n`:	Chronological number of the contract for the firm-executive match.
`count_nc`:	Word count of "noncompete" in the contract.
`nc_contract`:	Whether a noncompete clause is included in the contract. Yes (1) if `count_nc`$\geq$1. No (0) otherwise.
`nc`:	Whether a noncompete clause is ever used for the firm-executive match.
`dur`:	Duration (years) of the noncompete clause in the contract.
`dur_max`:	Maximum noncompete duration (years) for the firm-executive match.
`dur_min`:	Minimum noncompete duration (years) for the firm-executive match.

Data files. The `build/input` folder contains the following data inputs:

- `noncompete_executive.csv`: the noncompete contract data mentioned above.
- `bei.csv`: the Bishara enforcement index. The indices are the factor analysis weighted indices constructed by Starr (2019) (taken from Table B1 contained in the online appendix of the paper) and based on the scores by Bishara (2011).
- `cpi.csv`: the CPI annual series to deflate the nominal variables. Downloaded from `FRED` (data series `CPALTT01USA661S`).

In addition to the data included, download the following datasets from `Wharton Research Data Services` and save in the corresponding folders. The downloaded data should include the years 1992-2015 at the minimum. Users may find it useful to extend the data range to prior years to capture longer employment history.

[1]The noncompete contract data is subject to update and correction in the future, which may be obtained either from the author's webpage https://www.liyanshi.com or at request.

- `compustat`: download the "North America Fundamentals Annual" firm-level panel data and save as `compustat_annual.csv`. Download the "Peters and Taylor Total Q" intangible capital data constructed according to Peters and Taylor (2017) and save as `compustat_intangible.csv`.

- `execucomp`: download the "Annual Compensation" executive compensation data and save as `execucomp_annual.csv`.

- `boardex`: download the "Individual Profile Details" director profile data and save as `individual_profile.csv`. Download the "Individual Profile Employment" director employment history data and save as `individual_employemnt.csv`. Download the "Company Profile Details" data and save as `company_profile.csv`.

- `link`: download the "Linking Suite by WRDS" link files. The link files available in WRDS has improved over time. Users may find link files that allow for an easy one-step merge between the `execucomp` data and the `boardex` data, without going through some of the cumbersome steps outlined in the next section for data construction.

2.2 Construct Data Sample

To merge the datasets and construct the final sample, run the programs in the `build/code` folder in the order of:

- Run `0_clean_contract.do`, `0_clean_bei.do`, `0_clean_cpi.do`, and `0_clean_link.do`.

- In sub-folder `1_clean_compustat`, run the following codes (and sub-codes) step by step:

  - `0_clean_compustat_intangible.do`.
  - `1_clean_compustat_4exec.do`.
  - `2_clean_compustat_industry_measure.do`.
  - `3_create_firm_panel.do`.

- In sub-folder `2_clean_boardex`, run the following codes (and sub-codes) step by step:

  - `1_clean_individual_profile.do`.
  - `2_clean_company_profile.do`.
  - `3_clean_individual_employment.do`.
  - `4_create_boardex_employment_history.do`.

This part of the data construction involves steps of merges the company and director names in the `boardex` data to the names in the `execucomp` data. There are steps that may lead to small marginal improvements in data merging. Users may skip some of these steps for ease of replication. Doing so will only lead to minor discrepancies in the final data sample. The results are not sensitive to such discrepancies.

- In sub-folder `3_clean_execucomp`, run the following codes (and sub-codes) step by step:
  - `1_clean_execucomp.do`.
  - `2_define_variables.do`.

2.3 Reproduce Tables and Figures

The programs in the `analysis/code` folder reproduce the empirical tables and figures:

- `fig_use.do`: plots the patterns of noncompete contracts.
- `summary_statistics.do`: generates the summary statistics of the data.
- `reg_use.do`: conducts the regression analysis for the use of noncompete clauses.
- `reg_mobility.do`: conducts the regression analysis for the mobility patterns
- `reg_investment.do`: conducts the regression analysis for the investment patterns.
- `reg_comp.do`: conducts the regression analysis for the compensation patterns.
- `reg_comp_plot.do`: produce the corresponding figures for compensation. It saves in the folder `empirical/analysis/output/data` an empirical wage-tenure profile file named `tdc2_tenure.csv` to be used as data moments for the quantitative part.

The following table summarizes the programs and output file names.

Table 2: List of empirical tables and figures

Table/Figure #	Program	File Name
Table 1	`reg_use.do`	`reg_use.tex`
Table 2	`reg_mobility.do`	`reg_mobility.tex`
Table 3	`reg_investmnet.do`	`reg_investment.tex`
Table F.1	`summary_statistics.do`	`summary_statistics.tex`
Table F.2	`reg_comp.do`	`reg_comp.tex`
Figure 2(a)	`fig_use.do`	`nc_state.eps`
Figure 2(b)	`fig_use.do`	`dur_state.eps`
Figure 3(a)	`fig_use.do`	`nc_year.eps`
Figure 3(b)	`fig_use.do`	`nc_state_time.eps`
Figure 4(a)	`reg_comp_plot.do`	`tdc2_tenure.eps`
Figure 4(b)	`reg_comp_plot.do`	`tdc1_tenure.eps`
Figure F.5	`fig_use.do`	`bei_1991_2009.eps`

3 Quantitative Results

3.1 Description of Files

This section explains the procedures for replicating the quantitative tables and figures in the paper. The files are included in the `quantitative` folder and sub-folder directories:

- `solution_algorithm.pdf`: a companion document of the solution algorithm.
- `code`:
  - `baseline`: includes the main programs for the baseline model.
  - `robustness`: includes the main programs for the extensions and robustness exercises.
  - `parameters`: includes the sub-scripts for specifying and calibrating the model parameters from the data moments.
  - `grids`: includes the sub-scripts for defining the grids for the variables.
  - `solve`: includes the sub-scripts for solving the equilibrium and social optimum.
  - `plot_display`: includes the sub-scripts for plotting and displaying the results.
- `output`:

- `data`: stores the mat data files from the programs.
- `figures`: stores the figures from the programs.

3.2 Baseline Model

1. To reproduce the results for the baseline model in Sections 5.1 and 5.2, run `main_baseline.m`. This program runs several sub-scripts, including:
   - `parameters_baseline.m` to calibrate the parameters;
   - `solve_equilibrium.m` to solve the laissez-faire equilibrium;
   - `solve_social_optimum_t0.m` to solve the social optimum; and
   - `solve_social_optimum_ss.m` to compare steady states.

   To run the program for different purposes, use the following settings:
   - For the baseline case, set `kappa_case = 1`. This program also solves two alternative specifications of the selection channel. For the *exogenous-selection* economy, set `kappa_case = 2`. For the *no-selection* economy, set `kappa_case = 3`.
   - For the policy results of weakening enforcement, set `case_weaken_p = 1`.
   - To solve for the wage setting, set `case_solve_wage = 1`. The program then runs the sub-scripts `solve_wage.m` and `solve_wage_tenure.m`.
2. Once the main program has been run, run `plot_prevalence.m` and `plot_wage_tenure.m` to plot the model-generated data moments in Figure 5.
3. To reproduce the results for a duration-cap-only policy, run `welfare_cap_baseline.m`.

3.3 Extensions and Robustness

The following programs reproduces the results for the model extensions and robustness checks in Section 5.3 and Online Appendix B.6 and C.

1. To reproduce the results for the selection channel, run `welfare_cap_selection.m`.
2. To reproduce the results for the investment elasticity, run `welfare_cap_elasticity.m`.
3. To reproduce the results for the mobility distortion, run `welfare_cap_distortion.m`.
4. To reproduce the results for the free-entry extension, run `welfare_cap_entry.m`.

5. To reproduce the sensitivity check for the discount rate, run `welfare_cap_discount.m`.

The following table summarizes the programs and output file names.

Table 3: List of quantitative tables and figures

Figure #	Program	File Name
Figure 5(a)	`plot_prevalence.m`	`data_moment_prevalence.eps`
Figure 5(b)	`plot_wage_tenure.m`	`data_moment_wage_tenure.eps`
Figure 6(a)	`welfare_cap_baseline.m`	`welfare_cap_baseline.eps`
Figure 6(b)	`main_baseline.m`	`welfare_enforcement_baseline.eps`
Figure 7(a)	`welfare_cap_elasticity.m`	`welfare_cap_epsilon.eps`
Figure 7(c)	`welfare_cap_elasticity.m`	`dcmu_cap.eps`
Figure 7(b)	`welfare_cap_distortion.m`	`welfare_cap_alpha.eps`
Figure 7(d)	`welfare_cap_distortion.m`	`deta_cap.eps`
Figure 8(a)	`welfare_cap_selection.m`	`welfare_cap_selection.eps`
Figure 8(b)	`welfare_cap_entry.m`	`welfare_cap_entry.eps`
Figure B.1	`welfare_cap_discount.m`	`welfare_cap_discount.eps`
Figure C.1(a)	`welfare_cap_distortion.m`	`pdf_theta.eps`
Figure C.1(b)	`welfare_cap_distortion.m`	`hazard_rate_theta.eps`
Figure C.2(a)	`main_baseline.m`	`welfare_cap_kappa_binary.eps`
Figure C.2(b)	`main_baseline.m`	`welfare_enforcement_kappa_binary.eps`
Figure C.3(a)	`welfare_cap_entry.m`	`arrival_rate_cap_entry.eps`
Figure C.3(b)	`welfare_cap_entry.m`	`worker_welfare_cap_entry.eps`

References

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