**USER MANUAL**

The files in this repository pertain to the research project titled “Do Alliance Portfolios Encourage or Impede New Business Practice Adoption? Theory and Evidence from the Private Equity Industry” which is accepted for publication at the Strategic Management Journal.

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**What the files contain**: Codes used to run machine learning algorithms for pattern detection in Private Equity deals data. **The authors of this study wish to publish these codes to enable researchers to replicate the results presented in the study without any restriction**. The codes have been written on Python. The base sample for our analysis comes from a secondary database used extensively in PE research called Preqin. The population comprises 59,192 global PE deals transacted by 4,505 PE firms spanning across more than 60 industrial sectors and 15 geographic regions in the period 1990-2016.

**Details of each file:**

1. **File 1:** “ANN\_optimization” **–** This file contains the optimization algorithm that was used for running an Artificial Neural Network algorithm on the sample
2. **File 2:** “ANN\_variable\_imp” – This file contains the code for obtaining the most important variables or predictors of the dependent variable (i.e., add-on deals) based on the ANN specification obtained from the optimization exercise described in File 1
3. **File 3:** “Random\_Forest” – This file contains the code used for running a random forest algorithm to predict the dependent variable. The codes include steps for optimization, variable importance and plotting the confusion matrix.
4. **File 4:** “LASSO” **–** This file contains the code used for running a LASSO procedure on the top 10 variables to have emerged from the ANN and random forest algorithms used in the steps above.

**Interpreting the variables and their labels**: The .py files (codes) enlist the predictor variables labelled as v1-v29. Note that “v0” is the target or the dependent variable which is the probability of the focal private equity deal to be an add-on deal. Below is a table that describes each of these variables and how they were operationalized in the sample of private equity deals

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **Variable class** | **Variable name** | **Operationalization** |
| v1 | 1. Properties of the PE firm | LBO experience (firm level) | CLE until focal deal of firm\* |
| v2 | LBO experience (fund level: sector) | CLE until focal deal of firm within the sector of focal deal |
| v3 | LBO experience (fund level: geo) | CLE until focal deal of firm within geo. region of focal deal |
| v4 | Add-on experience (firm level) | CAE until focal deal of firm\* |
| v5 | Add-on experience (fund level: sector) | CAE until focal deal of firm within the sector of focal deal |
| v6 | Add-on experience (fund level: geo) | CAE until focal deal of firm within geo. region of focal deal |
| v7 | 2. Syndicate composition | LP in focal deal | =1 if deal has LP as co-investor, =0 if not |
| v8 | Bank in focal deal | =1 if deal has bank as co-investor, =0 if not |
| v9 | Corporate in focal deal | =1 if deal has corporate as co-investor, =0 if not |
| v10 | Another GP/VC in focal deal | =1 if deal has another PE firm as co-investor, =0 if not |
| v11 | 3. Experience of PE firm with co-investors | % LBOs with coinv (LPs) | [CLE of deals with LPs as co-investors]/CLE |
| v12 | % LBOs with coinv (Banks) | [CLE of deals with banks as co-investors]/CLE |
| v13 | % LBOs with coinv (Corporates) | [CLE of deals with corporates as co-investors]/CLE |
| v14 | % LBOs with coinv (GP/VC) | [CLE of deals with other PE firms as co-investors]/CLE |
| v15 | % add-on with coinv (LPs) | [CAE of deals with LPs as co-investors]/CAE |
| v16 | % add-on with coinv (Banks) | [CAE of deals with banks as co-investors]/CAE |
| v17 | % add-on with coinv (Corporates) | [CAE of deals with corporates as co-investors]/CAE |
| v18 | % add-on with coinv (GP/VC) | [CAE of deals with other PE firms as co-investors]/CAE |
| v24 | 4. Experience of the syndicate members | Focal corporate relative add-on experience \*\* | =1 if CAE > CLE of corporate in focal deal, = 0 otherwise |
| v25 | Focal LP relative add-on experience \*\* | =1 if CAE > CLE of LP in focal deal, =0 otherwise |
| v26 | Focal Bank relative add-on experience \*\* | =1 if CAE > CLE of Bank in focal deal, =0 otherwise |
| v27 | Focal other GP relative add-on experience \*\* | =1 if CAE > CLE of other GP in focal deal, =0 otherwise |
| v19 | 5. Additional firm, deal, and industry level factors | Sector diversity of portfolio | Count of unique sectors represented by PE firm's investment portfolio at time of focal deal |
| v20 | Regional diversity of portfolio | Count of unique geo. regions represented by PE firm's investment portfolio at time of focal deal |
| v21 | Regime (“post crisis”) | =1 if year > 2008; =0 otherwise |
| v22 | Competitive intensity (sector level) | Count of unique investors who made deals in the year in the sector of the focal deal/ total deals in the sector |
| v23 | Industry add-on experience (sector level) | CAE/(CAE + CLE) in overall PE industry in the sector of the focal deal |
| v28 | Syndicate size | No. of co-investors in the focal deal |
| v29 | HHI of syndicate members | HHI score of co-investor types in the focal deal |

Note: \*CLE stands for cumulative LBO experience and CAE stands for cumulative add-on experience of the firm; Cumulative experience is measured as the sum of all deals starting with the first deal in the sample leading up to the focal deal for the given firm. \*\* If the deal comprised more than one member in a partner type (corporate, LP, bank, or another PE firm), the average relative add-on experience was measured for the members of a given type.