

# **Insurance between firms**

## **The Role of Internal Labor Markets**

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# Research Question

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- ▶ **WHY ARE SOME FIRMS MORE RESILIENT TO SHOCKS THAN OTHERS?**

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  - ▶ **WHY ARE SOME FIRMS BETTER ABLE TO SCREEN AND ALLOCATE WORKERS  
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This paper: role of **INTERNAL LABOUR MARKET** across productive units that share the same owner **TO ACCOMMODATE SHOCKS**, minimizing the costs due to labour market frictions.

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Margin of adjustment so far unexplored

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Part of a broader research agenda on firm boundaries, relevant to assess the impact of labour market policies

## Related Literature

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Three strands of literature:

- The economic/finance literature has extensively studied the existence and activity of **INTERNAL CAPITAL MARKETS** within business groups
  - ▶ ICMs allow affiliated firms to respond to shocks better than stand-alone firms when financial constraints bind.
  - ▶ Gopalan, Nanda and Seru (2007); Almeida and Kim (2012); Cestone et al. (2013). See Maksimovic and Phillips (2002) for related results on multidivisional firms.

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- The labor literature has studied Internal Labor Markets (ILMs) **WITHIN FIRMS**.
  - ▶ Focus on **INTERNAL CAREERS** as solution to agency problems within the firm (Doeringer and Piore, 1971; Gibbons and Waldman, 1999; Ke, Li and Powell, 2014).
  - ▶ Tate and Yang (2014) on diversified multidivisional firms.

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- Insurance **WITHIN FIRMS**: wage (Guiso, Pistaferri, Schivardi, 2005) and employment insurance within family firms (Sraer and Thesmar, 2010; Ellul, Pagano, Schivardi, 2014).

Little attention to **CROSS-FIRM** insurance.

# Outline

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- 1 Data
- 2 Preliminaries: (average) intra- and extra-group (conditional) worker flows
- 3 Internal Labor Markets as a response to adverse shocks
- 4 Internal Labor Markets as a response to positive shocks



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## 3 INTERNAL LABOR MARKETS AS A RESPONSE TO ADVERSE SHOCKS

## 4 INTERNAL LABOR MARKETS AS A RESPONSE TO POSITIVE SHOCKS

# The Data

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We merge **DADS** (tracks workers year-to-year movements), **LIFI** (identifies firms affiliated with groups) and **FICUS** (includes firms balance sheets) for the period 2002-2010.

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- ▶ cover *all* employed people in the economy.
- ▶ for each individual, information on the plant/firm identifier **IN YEAR  $t$**  and **IN YEAR  $t - 1$** .
- ▶ for each year, information on: wage, number of working days, number of hours, type of occupation, full time/part time status, geographical location (of the plant and the firm), industry classification, etc.

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- LIFI Files: survey collected by INSEE

- ▶ unique data set for the study of BG activity
- ▶ available information: financial links between firms with identification of the head of a group and of all the firms (directly and indirectly) controlled by the head.
- ▶ covers the vast majority of French BGs.

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- FICUS: administrative fiscal data
  - ▶ based on mandatory reporting of firms income statements to tax authorities.
  - ▶ available information: usual balance sheet items.
  - ▶ covers the universe of French firms.

## AVERAGE INTRA- AND EXTRA-GROUP CONDITIONAL WORKER FLOWS

# Descriptives by firm and worker characteristics

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- Conditioning on
  - ▶ firm of origin
  - ▶ occupation of origin
  - ▶ occupation of destination

the probability to hire a worker from group **EXCEEDS BY 9 PERCENTAGE POINTS** the probability to absorb a worker not previously employed in its group.

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- **GROUP DIVERSIFICATION** (sectoral and geographical) favours intra-group mobility

- ▶ diversified groups are more likely to be hit by idiosyncratic shocks  $\implies$  more room for cross-firm insurance.



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- ▶ diversified groups are more likely to be hit by idiosyncratic shocks  $\implies$  more room for cross-firm insurance.

- intra-group mobility on average is larger for **HIGH-SKILLED WORKERS**

- ▶ suggesting a relevant role for informational frictions.

# INTERNAL LABOR MARKETS AS A RESPONSE TO ADVERSE SHOCKS

# Firm Closure

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- We identify **FIRM/PLANT CLOSURES**: firms/plants whose employment drops by more than 90% from one year to the other.
- We remove **FALSE CLOSURES**: cases in which more than 70% of the lost employment ends up in the same firm/plant.

# Firm Closure

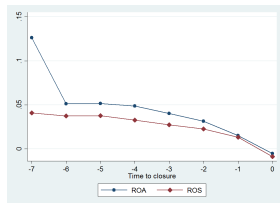
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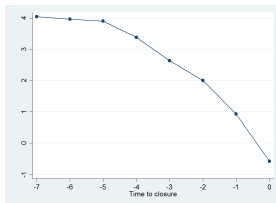
|      | Number of closing firms |                |                | Percentage of closing firms |                |                |
|------|-------------------------|----------------|----------------|-----------------------------|----------------|----------------|
|      | All firms               | < 10 employees | ≥ 10 employees | All firms                   | < 10 employees | ≥ 10 employees |
| 2002 | 134398                  | 117898         | 16500          | 9.03                        | 10.25          | 4.87           |
| 2003 | 130538                  | 114079         | 16459          | 8.68                        | 9.78           | 4.88           |
| 2004 | 135848                  | 123211         | 12637          | 8.92                        | 10.30          | 3.73           |
| 2005 | 123244                  | 109912         | 13332          | 8.13                        | 9.38           | 3.88           |
| 2006 | 128429                  | 114978         | 13451          | 8.21                        | 9.49           | 3.82           |
| 2007 | 136002                  | 121576         | 14426          | 8.54                        | 9.91           | 3.95           |
| 2008 | 115529                  | 105122         | 10407          | 7.15                        | 8.40           | 2.74           |
| 2009 | 158014                  | 139456         | 18558          | 9.63                        | 10.99          | 5.01           |

# Why do BG affiliated firms close?

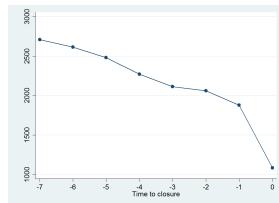
Figure: Performance of group affiliated closing firms



(a) ROA and ROS



(b) Coverage



(c) Sales

Note: ROA denotes return on assets; ROS return on sales; coverage is the ratio of EBITDA over interest payments. Sales are measured in thousands of Euros. Time to closure indicates the number of years before the closure event.

# DID on bilateral flows exploiting closures

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- **DIFF-IN-DIFF APPROACH:** compare flows at closure with flows in normal times with an ILM (same group) partner as opposed to an external labour market partner.

$$f_{ijt} = \alpha_t + \beta_{ij} + BG_{jt} + SameBG_{ijt} + c_{it} + c_{it} \times BG_{jt} + c_{it} \times SameBG_{ijt} + \varepsilon_{ijt}$$

where  $f_{ijt}$  = ratio of workers moving from firm  $i$  to firm  $j$  in year  $t$  to total number of job-to-job movers from firm  $i$  in year  $t$ .



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- COUNTERFACTUAL:** employment flow that occurs between the closing firm and a destination firm not affiliated with the same group, holding constant the intensity of the bilateral flow

# Bilateral flows: descriptive statistics

|                       | Years to closure | Extra-group flows | Intra-group flows |
|-----------------------|------------------|-------------------|-------------------|
| Normal times          | -7               | 0.025             | 0.103             |
|                       |                  | (0.112)           | (0.246)           |
|                       |                  | [57209]           | [1728]            |
|                       | -6               | 0.023             | 0.090             |
|                       |                  | (0.100)           | (0.247)           |
|                       |                  | [101167]          | [3240]            |
|                       | -5               | 0.026             | 0.101             |
|                       |                  | (0.115)           | (0.242)           |
|                       |                  | [152979]          | [5339]            |
| (Dropped in baseline) | -4               | 0.026             | 0.101             |
|                       |                  | (0.116)           | (0.241)           |
|                       |                  | [224543]          | [7423]            |
|                       | -3               | 0.029             | 0.108             |
|                       |                  | (0.123)           | (0.252)           |
|                       |                  | [281617]          | [9869]            |
|                       | -2               | 0.034             | 0.117             |
|                       |                  | (0.133)           | (0.259)           |
|                       |                  | [328681]          | [12251]           |
| Closure times         | -1               | 0.037             | 0.284             |
|                       |                  | (0.142)           | (0.380)           |
|                       |                  | [362870]          | [15611]           |
|                       | 0                | 0.041             | 0.362             |
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# Bilateral flows: closures vs. normal times

| Variables                                       | (1)                          | (2)                          |
|---|------------------------------|------------------------------|
| Firm of destination group affiliated            | -0.0013***<br>(0.0003)       | 0.0011<br>(0.0007)           |
| Same Group                                      | 0.0334***<br>(0.0019)        | -0.0122**<br>(0.0041)        |
| Closure × firm of destination group affiliated  | 0.0004<br>(0.0004)           | 0.0025***<br>(0.0006)        |
| Closure × same group                            | <b>0.1487***</b><br>(0.0039) | <b>0.1187***</b><br>(0.0050) |
| Same group × Managers                           |                              |                              |
| Same group × Intermediate Occupations           |                              |                              |
| Same group × Clerical Support                   |                              |                              |
| Closure × same group × Managers                 |                              |                              |
| Closure × same group × Intermediate Occupations |                              |                              |
| Closure × same group × Clerical Support         |                              |                              |
| <i>N</i>  | 1,171,552                    | 1,171,552                    |
| Firm of origin FE                               | YES                          | NO                           |
| Pair FE   | NO                           | YES                          |
| Year dummies                                    | YES                          | YES                          |
| Time to closure dummies                         | YES                          | YES                          |

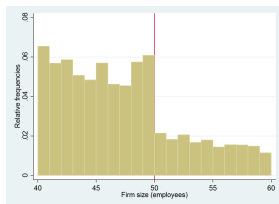
# Bilateral flows: closures vs. normal times

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|---|------------------------------|------------------------------|------------------------------|------------------------------|
| Firm of destination group affiliated            | -0.0013***<br>(0.0003)       | 0.0011<br>(0.0007)           | -0.0021***<br>(0.000)        | 0.0015***<br>(0.000)         |
| Same Group                                      | 0.0334***<br>(0.0019)        | -0.0122**<br>(0.0041)        | 0.0018<br>(0.001)            | -0.0096***<br>(0.001)        |
| Closure × firm of destination group affiliated  | 0.0004<br>(0.0004)           | 0.0025***<br>(0.0006)        | -0.0001<br>(0.000)           | 0.0005<br>(0.000)            |
| Closure × same group                            | <b>0.1487***</b><br>(0.0039) | <b>0.1187***</b><br>(0.0050) | <b>0.0452***</b><br>(0.002)  | <b>0.0378***</b><br>(0.002)  |
| Same group × Managers                           |                              |                              | 0.0161***<br>(0.002)         | 0.0161***<br>(0.002)         |
| Same group × Intermediate Occupations           |                              |                              | 0.0093***<br>(0.001)         | 0.0093***<br>(0.001)         |
| Same group × Clerical Support                   |                              |                              | 0.0010<br>(0.001)            | 0.0010<br>(0.001)            |
| Closure × same group × Managers                 |                              |                              | <b>-0.0082**</b><br>(0.002)  | <b>-0.0082**</b><br>(0.002)  |
| Closure × same group × Intermediate Occupations |                              |                              | <b>-0.0129***</b><br>(0.002) | <b>-0.0129***</b><br>(0.002) |
| Closure × same group × Clerical Support         |                              |                              | <b>-0.0112***</b><br>(0.002) | <b>-0.0112***</b><br>(0.002) |
| <i>N</i>  | 1,171,552                    | 1,171,552                    | 4,686,112                    | 4,686,112                    |
| Firm of origin FE                               | YES                          | NO                           | YES                          | NO                           |
| Pair FE   | NO                           | YES                          | NO                           | YES                          |
| Year dummies                                    | YES                          | YES                          | YES                          | YES                          |
| Time to closure dummies                         | YES                          | YES                          | YES                          | YES                          |

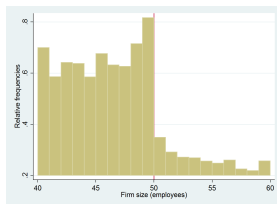
# Labour market frictions: The role of EPL

Firms above 50 employees are subject to stricter labour regulation (higher EPL, higher union bargaining power)

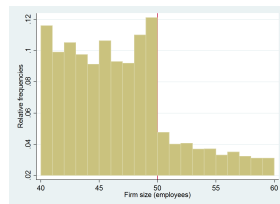
Figure: Firm size distribution around the 50 employee threshold (year 2006)



(a) Stand-alone firms



(b) Business group affiliated firms



(c) All firms

# Labour market frictions: The role of EPL

Look at the differential behaviour above and below 50.

Sorting around the threshold addressed **INSTRUMENTING** current size with (average) firm size in normal times, i.e. at least four years before closure.

| Firm size window                            | FE estimates               |                           | IV estimates                 |                            |                            |
|---|----------------------------|---------------------------|------------------------------|----------------------------|----------------------------|
|   | 40-60                      | 40-60                     | 40-60                        | 35-65                      | 45-55                      |
| Same Group                                  | 0.0381***<br>(0.0093)      | 0.0073<br>(0.0198)        | 0.0325**<br>(0.0113)         | 0.0165<br>(0.0097)         | 0.0135<br>(0.0165)         |
| Destination firm group affiliated           | -0.0023<br>(0.0019)        | -0.0027<br>(0.0045)       | -0.0029<br>(0.0052)          | 0.0020<br>(0.0047)         | 0.0051<br>(0.0084)         |
| Closure × destination firm group affiliated | 0.0018<br>(0.0027)         | 0.0080*<br>(0.0037)       | 0.0072<br>(0.0042)           | -0.0013<br>(0.0042)        | -0.0131<br>(0.0075)        |
| Closure × Same Group                        | 0.1211***<br>(0.0158)      | 0.0785***<br>(0.0222)     | 0.0810***<br>(0.0107)        | 0.0970***<br>(0.0106)      | 0.0933***<br>(0.0171)      |
| Closure × same group × Firm size > 50       | <b>0.0515*</b><br>(0.0261) | <b>0.0705</b><br>(0.0370) | <b>0.0817***</b><br>(0.0182) | <b>0.0421*</b><br>(0.0195) | <b>0.0647*</b><br>(0.0312) |
| N   | 53,544                     | 53,544                    | 40,795                       | 56,387                     | 17,855                     |
| Firm of origin FE                           | YES                        | NO                        | NO                           | NO                         | NO                         |
| Firm of origin × destination firm FE        | NO                         | YES                       | YES                          | YES                        | YES                        |
| Year dummies                                | YES                        | YES                       | YES                          | YES                        | YES                        |
| Time to closure dummies                     | YES                        | YES                       | YES                          | YES                        | YES                        |



## Job stability: flows to unemployment

Dependent variable: ratio of workers moving from firm  $i$  to **UNEMPLOYMENT** to total number of workers leaving firm  $i$ .

|   | (1)                           | (2)                           |
|---|-------------------------------|-------------------------------|
| Firm of origin group affiliated                                       | 0.0538***<br>(0.0030)         | 0.0143***<br>(0.0015)         |
| Closure $\times$ Firm of origin group affiliated                      | <b>-0.0785***</b><br>(0.0030) | <b>-0.0376***</b><br>(0.0016) |
| Closure $\times$ Firm of origin affiliated $\times$ Managers          |                               | <b>0.0324***</b><br>(0.0020)  |
| Closure $\times$ Firm of origin affiliated $\times$ Intermediate Occ. |                               | <b>0.0218***</b><br>(0.0020)  |
| Closure $\times$ Firm of origin affiliated $\times$ Clerical Support  |                               | <b>0.0171***</b><br>(0.0021)  |
| $N$   | 1,606,734                     | 6,593,384                     |
| Firm of origin FE   | YES                           | YES                           |
| Year dummies  | YES                           | YES                           |
| Time to closure dummies   | YES                           | YES                           |

# Wage impact of intra-group job stability

Worker-level dataset of job-to-job movers. Dependent variable: wage change

| Variables                                      | CHANGE IN HOURS WORKED<br>(1) | (2)                        | HOURLY WAGE CHANGE<br>(3) | (4)                       | ANNUAL WAGE CHANGE<br>(5) | (6)                        |
|--|-------------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|
| Firm of destination group affiliated           | 0.0904***<br>(0.018)          | 0.0483<br>(0.055)          | 0.0426***<br>(0.006)      | 0.0295<br>(0.032)         | 0.1357***<br>(0.018)      | 0.0724<br>(0.055)          |
| Same Group                                     | 0.1667***<br>(0.033)          | 0.0482<br>(0.046)          | 0.0174<br>(0.017)         | -0.0157<br>(0.028)        | 0.1873***<br>(0.035)      | 0.0374<br>(0.054)          |
| Closure × firm of destination group affiliated | -0.0008<br>(0.024)            | 0.0353<br>(0.053)          | -0.0123<br>(0.008)        | -0.0142<br>(0.031)        | -0.0136<br>(0.025)        | 0.0229<br>(0.054)          |
| Closure × same group                           | <b>-0.0962*</b><br>(0.043)    | <b>-0.1005*</b><br>(0.044) | <b>0.0160</b><br>(0.019)  | <b>-0.0079</b><br>(0.026) | <b>-0.0806</b><br>(0.045) | <b>-0.1104*</b><br>(0.051) |
| <i>N</i>                                       | 905,089                       | 905,089                    | 905,087                   | 905,087                   | 909,556                   | 909,556                    |
| Firm of origin FE                              | YES                           | NO                         | YES                       | NO                        | YES                       | NO                         |
| Pair FE  | NO                            | YES                        | NO                        | YES                       | NO                        | YES                        |
| Year dummies                                   | YES                           | YES                        | YES                       | YES                       | YES                       | YES                        |
| Time to closure dummies                        | YES                           | YES                        | YES                       | YES                       | YES                       | YES                        |
| Individual controls                            | YES                           | YES                        | YES                       | YES                       | YES                       | YES                        |

# Wage impact of intra-group job stability

Worker-level dataset of job-to-job movers. Dependent variable: wage change

| Variables                                       | CHANGE IN HOURS WORKED     |                            | HOURLY WAGE CHANGE          |                           | ANNUAL WAGE CHANGE        |                            |
|---|----------------------------|----------------------------|-----------------------------|---------------------------|---------------------------|----------------------------|
|   | (1)                        | (2)                        | (3)                         | (4)                       | (5)                       | (6)                        |
| Firm of destination group affiliated            | 0.0904***<br>(0.018)       | 0.0483<br>(0.055)          | 0.0426***<br>(0.006)        | 0.0295<br>(0.032)         | 0.1357***<br>(0.018)      | 0.0724<br>(0.055)          |
| Same Group                                      | 0.1667***<br>(0.033)       | 0.0482<br>(0.046)          | 0.0174<br>(0.017)           | -0.0157<br>(0.028)        | 0.1873***<br>(0.035)      | 0.0374<br>(0.054)          |
| Closure × firm of destination group affiliated  | -0.0008<br>(0.024)         | 0.0353<br>(0.053)          | -0.0123<br>(0.008)          | -0.0142<br>(0.031)        | -0.0136<br>(0.025)        | 0.0229<br>(0.054)          |
| Closure × same group                            | <b>-0.0962*</b><br>(0.043) | <b>-0.1005*</b><br>(0.044) | <b>0.0160</b><br>(0.019)    | <b>-0.0079</b><br>(0.026) | <b>-0.0806</b><br>(0.045) | <b>-0.1104*</b><br>(0.051) |
| Same group × Managers                           | -0.0985*<br>(0.049)        | 0.0045<br>(0.044)          | 0.1079***<br>(0.026)        | 0.0491<br>(0.038)         | 0.0157<br>(0.050)         | 0.0629<br>(0.053)          |
| Same group × Intermediate Occupations           | -0.0214<br>(0.044)         | 0.0934<br>(0.062)          | 0.0370*<br>(0.018)          | 0.0142<br>(0.024)         | 0.0086<br>(0.046)         | 0.1085<br>(0.065)          |
| Same group × Clerical Support                   | -0.0364<br>(0.057)         | -0.0104<br>(0.067)         | 0.0091<br>(0.022)           | 0.0216<br>(0.029)         | -0.0261<br>(0.062)        | 0.0109<br>(0.070)          |
| Closure × same group × Managers                 | <b>0.0830</b><br>(0.051)   | <b>0.0141</b><br>(0.044)   | <b>-0.0840**</b><br>(0.028) | <b>-0.0330</b><br>(0.039) | <b>-0.0092</b><br>(0.051) | <b>-0.0280</b><br>(0.053)  |
| Closure × same group × Intermediate Occupations | <b>-0.0098</b><br>(0.046)  | <b>-0.0888</b><br>(0.063)  | <b>-0.0262</b><br>(0.019)   | <b>0.0019</b><br>(0.025)  | <b>-0.0280</b><br>(0.048) | <b>-0.0873</b><br>(0.065)  |
| Closure × same group × Clerical Support         | <b>0.0415</b><br>(0.069)   | <b>-0.0047</b><br>(0.068)  | <b>-0.0238</b><br>(0.025)   | <b>-0.0175</b><br>(0.031) | <b>0.0187</b><br>(0.071)  | <b>-0.0211</b><br>(0.071)  |
| N   | 905,089                    | 905,089                    | 905,087                     | 905,087                   | 909,556                   | 909,556                    |
| Firm of origin FE                               | YES                        | NO                         | YES                         | NO                        | YES                       | NO                         |
| Pair FE   | NO                         | YES                        | NO                          | YES                       | NO                        | YES                        |
| Year dummies                                    | YES                        | YES                        | YES                         | YES                       | YES                       | YES                        |
| Time to closure dummies                         | YES                        | YES                        | YES                         | YES                       | YES                       | YES                        |
| Individual controls                             | YES                        | YES                        | YES                         | YES                       | YES                       | YES                        |

# Do firms in expanding sectors absorb more workers?

| Variables  | (1)                         | (2)                         | (3)                          |
|--|-----------------------------|-----------------------------|------------------------------|
| Destination firm group affiliated                                      | -0.004<br>(0.001)           | -0.0004<br>(0.001)          | -0.0107***<br>(0.0026)       |
| Same Group   | -0.0291***<br>(0.006)       | -0.0240***<br>(0.007)       | -0.0345***<br>(0.0157)       |
| Closure × destination firm group affiliated                            | -0.0007<br>(0.001)          | -0.0007<br>(0.001)          | 0.0084***<br>(0.0025)        |
| Closure × same group   | <b>0.1499***</b><br>(0.008) | <b>0.1662***</b><br>(0.009) | <b>0.1255***</b><br>(0.0187) |
| Destination firm sector in Boom  | -0.0001<br>(0.001)          |                             |                              |
| Destination in booming sector × Closure                                | -0.0007<br>(0.001)          |                             |                              |
| Destination in booming sector × Same Group                             | -0.0028<br>(0.009)          |                             |                              |
| Destination in booming sector × Closure × Same Group                   | <b>0.0314*</b><br>(0.014)   |                             |                              |
| Destination firm in busting sector                                     |                             | -0.0011<br>(0.000)          |                              |
| Destination in busting sector × Closure                                |                             | 0.0005<br>(0.001)           |                              |
| Destination in busting sector × Same Group                             |                             | -0.0141<br>(0.009)          |                              |
| Destination in busting sector × Closure × Same Group                   |                             | <b>-0.0159</b><br>(0.013)   |                              |
| Long-run real sales sectoral growth below 10pct × Closure × Same Group |                             |                             | <b>-0.0317*</b><br>(0.0135)  |
| Long-run real sales sectoral growth above 50pct × Closure × Same Group |                             |                             | <b>-0.0098</b><br>(0.0153)   |
| Long-run real sales sectoral growth above 90pct × Closure × Same Group |                             |                             | <b>0.0318*</b><br>(0.0143)   |
| N  | 688,390                     | 688,390                     | 844,031                      |
| Firm of origin × destination firm FE                                   | YES                         | YES                         | YES                          |
| Year dummies   | YES                         | YES                         | YES                          |
| Time to closure dummies  | YES                         | YES                         | YES                          |

# Do firms with better economic prospects absorb more workers?

| Variables                                | (1)                          | (2)                         | (3)                          | (4)                          | (5)                          |
|--|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|
| Closure × same group                     | <b>0.0562*</b><br>(0.0256)   | <b>0.0622**</b><br>(0.0218) | <b>0.0933***</b><br>(0.0155) | <b>0.1416***</b><br>(0.0081) | <b>0.1541***</b><br>(0.0094) |
| TA below 10pct × Closure × Same Group    | <b>-0.0188</b><br>(0.0925)   |                             |                              |                              |                              |
| TA above 50pct × Closure × Same Group    | <b>0.0561*</b><br>(0.0216)   |                             |                              |                              |                              |
| TA above 90pct × Closure × Same Group    | <b>0.0570***</b><br>(0.0118) |                             |                              |                              |                              |
| TFP below 10pct × Closure × Same Group   |                              | <b>-0.0296</b><br>(0.0674)  |                              |                              |                              |
| TFP above 50pct × Closure × Same Group   |                              | <b>0.0528*</b><br>(0.0245)  |                              |                              |                              |
| TFP above 90pct × Closure × Same Group   |                              | <b>0.0187</b><br>(0.0145)   |                              |                              |                              |
| CAPEXbelow 10pct × Closure × Same Group  |                              |                             | <b>-0.0290</b><br>(0.0253)   |                              |                              |
| CAPEX above 50pct × Closure × Same Group |                              |                             | <b>0.0528**</b><br>(0.0179)  |                              |                              |
| CAPEX above 90pct × Closure × Same Group |                              |                             | <b>-0.0122</b><br>(0.0104)   |                              |                              |
| LEV below 10pct × Closure × same group   |                              |                             |                              | <b>-0.0456</b><br>(0.0236)   |                              |
| LEV above 50pct × Closure × same group   |                              |                             |                              | <b>0.0133</b><br>(0.0118)    |                              |
| LEV above 90pct × Closure × same group   |                              |                             |                              | <b>-0.0483*</b><br>(0.0233)  |                              |
| COV below 10pct × Closure × same group   |                              |                             |                              |                              | <b>-0.0367**</b><br>(0.0107) |
| COV above 50pct × Closure × same group   |                              |                             |                              |                              | <b>-0.0004</b><br>(0.0130)   |
| COV above 90pct × Closure × same group   |                              |                             |                              |                              | <b>-0.0153</b><br>(0.0156)   |
| N  | 705,413                      | 495,042                     | 788,004                      | 700,253                      | 637,665                      |
| Firm of origin × destination firm FE     | YES                          | YES                         | YES                          | YES                          | YES                          |
| Year dummies                             | YES                          | YES                         | YES                          | YES                          | YES                          |
| Time to closure dummies                  | YES                          | YES                         | YES                          | YES                          | YES                          |

## INTERNAL LABOR MARKETS AS A RESPONSE TO POSITIVE SHOCKS

## Reaction to unexpected growth opportunity: Parmalat exit

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Focus on the **EXIT** of a large industry competitor as the source of the shock.

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- Case study: collapse of Parmalat in December 2003
  - ▶ Large multinational owning over 130 subsidiaries in 30 different countries
  - ▶ Parmalat defaulted on €150 million in bonds; subsequently Bank of America revealed that a €3.9 billion account held by Parmalat at the bank did not exist. Following this revelation, Parmalat filed for bankruptcy



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- Was Parmalat's exit a positive shock for other Parmalat's competitor?

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- Was Parmalat's exit a positive shock for other Parmalat's competitor?
- **PRELIMINARY STEP:**
  - ▶ Look at the (differential change in) performance, around Parmalat's 2004 collapse of the largest French competitors in the five different 4-digit sectors where Parmalat was active (the treated sectors), and compare it with the (change in) performance in all other 4-digit sectors within the broader food sale and production 2-digit industries (the control group).  
(Triple diff)

## **Preliminary step: Parmalat collapse and competitors' performance**

|                  |  |
|------------------|--|
| Sample:          | firms in 2-digit sector in which Parmalat was present      |
| Treatment group: | firms in 4-digit sectors in which Parmalat was present     |
| Control group:   | firms in 4-digit sectors in which Parmalat was not present |

# Preliminary step: Parmalat collapse and competitors' performance

Sample: firms in 2-digit sector in which Parmalat was present

Treatment group: firms in 4-digit sectors in which Parmalat was present

Control group: firms in 4-digit sectors in which Parmalat was not present

| Variables                             | Sales<br>(1)          | Employment<br>(2)      | Total Assets<br>(3)   | Net PPE<br>(4)         |
|---------------------------------------|-----------------------|------------------------|-----------------------|------------------------|
| Top 10 × Wholesale Milk Trade × Post  | 0.1779***<br>(0.0459) | 0.2383***<br>(0.0324)  | 0.1210*<br>(0.0511)   | 0.1278**<br>(0.0466)   |
| Top 10 × Other Milk Production × Post | 0.4343***<br>(0.0466) | 0.2282***<br>(0.0324)  | 0.5029***<br>(0.0509) | 0.3438***<br>(0.0473)  |
| Top 10 × Milk Production × Post       | 0.0124<br>(0.0459)    | -0.3459***<br>(0.0324) | 0.2670***<br>(0.0512) | -0.1436**<br>(0.0468)  |
| Top 10 × Butter × Post                | 0.1058*<br>(0.0467)   | 0.0637<br>(0.0327)     | 0.0661<br>(0.0539)    | -0.9385***<br>(0.0472) |
| Top 10 × Cheese × Post                | -0.1081*<br>(0.0465)  | 0.0253<br>(0.0324)     | -0.1438**<br>(0.0511) | -0.0537<br>(0.0471)    |
| <i>N</i>                              | 1,489,260             | 1,004,524              | 1,321,175             | 1,215,149              |
| Sector FE                             | YES                   | YES                    | YES                   | YES                    |
| Year dummies                          | YES                   | YES                    | YES                   | YES                    |

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Sample: firms in 2-digit sector in which Parmalat was present

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Control group: firms in 4-digit sectors in which Parmalat was not present

| Variables                             | Sales<br>(1)          | Employment<br>(2)      | Total Assets<br>(3)   | Net PPE<br>(4)         |
|---------------------------------------|-----------------------|------------------------|-----------------------|------------------------|
| Top 10 × Wholesale Milk Trade × Post  | 0.1779***<br>(0.0459) | 0.2383***<br>(0.0324)  | 0.1210*<br>(0.0511)   | 0.1278**<br>(0.0466)   |
| Top 10 × Other Milk Production × Post | 0.4343***<br>(0.0466) | 0.2282***<br>(0.0324)  | 0.5029***<br>(0.0509) | 0.3438***<br>(0.0473)  |
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| <i>N</i>                              | 1,489,260             | 1,004,524              | 1,321,175             | 1,215,149              |
| Sector FE                             | YES                   | YES                    | YES                   | YES                    |
| Year dummies                          | YES                   | YES                    | YES                   | YES                    |

Shocked sectors: **WHOLESALE MILK TRADE** and **OTHER MILK PRODUCTION**

# Bilateral employment flows following Parmalat shock

Evolution of bilateral flows of workers hired by firms in shocked sectors:

$$f_{i(s)jt} = \alpha_t + \beta_{i(s)j} + BG_{jt} + SameBG_{i(s)jt} + shock_{i(s)t} + shock_{i(s)t} \times BG_{jt} + shock_{i(s)t} \times SameBG_{i(s)jt} + \varepsilon_{i(s)jt}$$

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Use non shocked sectors as placebo

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Use non shocked sectors as placebo

| Variables                                   | NON SHOCKED SECTORS        |                            | SHOCKED SECTORS            |                            |
|---|----------------------------|----------------------------|----------------------------|----------------------------|
|   | (1)                        | (2)                        | (3)                        | (4)                        |
| Same Group                                  | 0.0277***<br>(0.0055)      | 0.0230*<br>(0.0107)        | 0.0135<br>(0.0096)         | 0.0066<br>(0.0217)         |
| Firm of Origin group affiliated             | -0.0010<br>(0.0014)        | -0.0013<br>(0.0027)        | 0.0003<br>(0.0037)         | -0.0020<br>(0.0070)        |
| Post 2004 × firm of origin group affiliated | -0.0009<br>(0.0017)        | -0.0002<br>(0.0018)        | -0.0040<br>(0.0046)        | -0.0038<br>(0.0054)        |
| <b>POST 2004 × SAME GROUP</b>               | <b>-0.0035</b><br>(0.0066) | <b>-0.0013</b><br>(0.0071) | <b>0.0293*</b><br>(0.0118) | <b>0.0350*</b><br>(0.0143) |
| N   | 50,013                     | 50,013                     | 22,219                     | 22,219                     |
| Firm of destination FE                      | YES                        | NO                         | YES                        | NO                         |
| Firm of origin × firm of destination FE     | NO                         | YES                        | NO                         | YES                        |
| Year dummies                                | YES                        | YES                        | YES                        | YES                        |



## Reaction to unexpected growth opportunity: beyond Parmalat

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- Identify 116 **LARGE CLOSURE EVENTS** taking place in 102 sector: 500+ employees on average at least 3 years prior to the closure event.

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- Identify 16 shocked sectors: those in which competitors' sales and employment (at least) react in **DDD regressions**

# Reaction to unexpected growth opportunity: beyond Parmalat

- Identify 116 **LARGE CLOSURE EVENTS** taking place in 102 sector: 500+ employees on average at least 3 years prior to the closure event.
- Identify 16 shocked sectors: those in which competitors' sales and employment (at least) react in **DDD regressions**

| Sector Code | Sector description   | Number of closures | Size of closing firm in normal times | Year of closure |
|-------------|--|--------------------|--------------------------------------|-----------------|
| 158H        | Manufacture of sugar   | 1                  | 1689.5                               | 2008            |
| 159S        | Production of mineral water  | 1                  | 4339.75                              | 2004            |
| 159T        | Production of soft drinks  | 1                  | 620                                  | 2004            |
| 221E        | Publishing of journals and periodicals                               | 1                  | 578.5                                | 2004            |
| 241E        | Manufacture of other inorganic basic chemicals                       | 1                  | 915.7                                | 2006            |
| 292D        | Manufacture of lifting and handling equipment                        | 1                  | 847.5                                | 2004            |
| 295G        | Manufacture of machinery for textile, apparel and leather production | 1                  | 830.75                               | 2005            |
| 314Z        | Manufacture of accumulators, primary cells and primary batteries     | 1                  | 1244.5                               | 2005            |
| 452B        | Construction of sundry buildings                                     | 1                  | 513.25                               | 2007            |
| 513W        | Non specialized wholesale of food                                    | 2                  | 2471.9                               | 2004            |
| 514N        | Wholesale of pharmaceutical goods                                    | 3                  | 999.1                                | 2007            |
| 518L        | Wholesale of electric equipment                                      | 5                  | 1103.2                               | 2006            |
| 526B        | Specialized retail sale via mail order                               | 1                  | 767                                  | 2007            |
| 526H        | Vending machine sale   | 1                  | 1065.25                              | 2005            |
| 631B        | Non harbour cargo handling   | 1                  | 713.25                               | 2008            |
| 743B        | Technical analyses, testing and inspections                          | 1                  | 1063.5                               | 2005            |

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- Identify 16 shocked sectors: those in which competitors' sales and employment (at least) react in **DDD regressions**

| Sector Code | Sector description   | Number of closures | Size of closing firm in normal times | Year of closure |
|-------------|--|--------------------|--------------------------------------|-----------------|
| 158H        | Manufacture of sugar   | 1                  | 1689.5                               | 2008            |
| 159S        | Production of mineral water  | 1                  | 4339.75                              | 2004            |
| 159T        | Production of soft drinks  | 1                  | 620                                  | 2004            |
| 221E        | Publishing of journals and periodicals                               | 1                  | 578.5                                | 2004            |
| 241E        | Manufacture of other inorganic basic chemicals                       | 1                  | 915.7                                | 2006            |
| 292D        | Manufacture of lifting and handling equipment                        | 1                  | 847.5                                | 2004            |
| 295G        | Manufacture of machinery for textile, apparel and leather production | 1                  | 830.75                               | 2005            |
| 314Z        | Manufacture of accumulators, primary cells and primary batteries     | 1                  | 1244.5                               | 2005            |
| 452B        | Construction of sundry buildings                                     | 1                  | 513.25                               | 2007            |
| 513W        | Non specialized wholesale of food                                    | 2                  | 2471.9                               | 2004            |
| 514N        | Wholesale of pharmaceutical goods                                    | 3                  | 999.1                                | 2007            |
| 518L        | Wholesale of electric equipment                                      | 5                  | 1103.2                               | 2006            |
| 526B        | Specialized retail sale via mail order                               | 1                  | 767                                  | 2007            |
| 526H        | Vending machine sale   | 1                  | 1065.25                              | 2005            |
| 631B        | Non harbour cargo handling   | 1                  | 713.25                               | 2008            |
| 743B        | Technical analyses, testing and inspections                          | 1                  | 1063.5                               | 2005            |

Use “non shocked sectors” (those in which competitors' sales and employment did not react to a large closure event) to run placebos.

## Descriptives on bilateral flows in shocked sectors

Unconditional evolution of bilateral flows of workers before and after the shock, within and outside the group

|                  | Extra-group Flows               | Within-group Flows             |
|------------------|---------------------------------|--------------------------------|
| Before the shock | 0.0215<br>(0.0983)<br>[183,429] | 0.0638<br>(0.1875)<br>[6,173]  |
| After the shock  | 0.0218<br>(0.1000)<br>[374,814] | 0.0717<br>(0.1957)<br>[10,950] |

# Bilateral flows and closures of large competitors

| Variables  | SHOCKED SECTORS              |                          |                         |                          | NON SHOCKED SECTORS      |                          |
|--|------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
|  | (1)                          | (2)                      | (3)                     | (4)                      | (5)<br>Full sample       | (6)<br>Restricted sample |
| Firm of origin group affiliated                    | 0.00041<br>(0.00037)         | 0.00369***<br>(0.00087)  | 0.00427***<br>(0.00088) | -0.00329***<br>(0.00042) | 0.00141***<br>(0.00031)  | 0.00198***<br>(0.00046)  |
| Same Group   | 0.02709***<br>(0.00253)      | 0.00058<br>(0.00489)     | 0.00053<br>(0.00498)    | -0.00123<br>(0.00158)    | 0.00208<br>(0.00169)     | 0.00317<br>(0.00231)     |
| Post shock × firm of origin group affiliated       | -0.00276***<br>(0.00050)     | -0.00365***<br>(0.00060) |                         | -0.00009<br>(0.00038)    | -0.00367***<br>(0.00027) | -0.00444***<br>(0.00040) |
| Post shock × Same Group                            | <b>0.00583*</b><br>(0.00287) | 0.01153***<br>(0.00303)  |                         | 0.00128<br>(0.00148)     | 0.00062<br>(0.00137)     | 0.00079<br>(0.00184)     |
| Closure year × Same Group                          |                              |                          | 0.00618<br>(0.00401)    |                          |                          |                          |
| Closure year+1 × Same Group                        |                              |                          | 0.01116*<br>(0.00427)   |                          |                          |                          |
| Closure year+2 × Same Group                        |                              |                          | 0.01065*<br>(0.00416)   |                          |                          |                          |
| Closure year +3 × Same Group                       |                              |                          | 0.01996***<br>(0.00462) |                          |                          |                          |
| Closure year+4 × Same Group                        |                              |                          | 0.01159<br>(0.00704)    |                          |                          |                          |
| Closure year+5 or more × Same Group                |                              |                          | 0.00782<br>(0.00687)    |                          |                          |                          |
| Post shock × Same Group × Managers                 |                              |                          |                         | 0.00531*<br>(0.00236)    |                          |                          |
| Post shock × Same Group × Intermediate Occupations |                              |                          |                         | -0.00095<br>(0.00197)    |                          |                          |
| Post shock × Same Group × Clerical Support         |                              |                          |                         | 0.00207<br>(0.00148)     |                          |                          |
| N  | 575,366                      | 575,366                  | 575,366                 | 2,301,464                | 3,817,969                | 1,956,489                |
| Firm of destination FE                             | YES                          | NO                       | NO                      | NO                       | NO                       | NO                       |
| Firm of origin × firm of destination FE            | NO                           | YES                      | YES                     | YES                      | YES                      | YES                      |
| Year dummies                                       | YES                          | YES                      | YES                     | YES                      | YES                      | YES                      |
| Time to shock dummies                              | YES                          | YES                      | YES                     | YES                      | YES                      | YES                      |

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| Post shock × Same Group                            | 0.00583*<br>(0.00287)    | <b>0.01153***</b><br>(0.00303) |                         | 0.00128<br>(0.00148)     | 0.00062<br>(0.00137)     | 0.00079<br>(0.00184)     |
| Closure year × Same Group                          |                          |                                | 0.00618<br>(0.00401)    |                          |                          |                          |
| Closure year+1 × Same Group                        |                          |                                | 0.01116*<br>(0.00427)   |                          |                          |                          |
| Closure year+2 × Same Group                        |                          |                                | 0.01065*<br>(0.00416)   |                          |                          |                          |
| Closure year +3 × Same Group                       |                          |                                | 0.01996***<br>(0.00462) |                          |                          |                          |
| Closure year+4 × Same Group                        |                          |                                | 0.01159<br>(0.00704)    |                          |                          |                          |
| Closure year+5 or more × Same Group                |                          |                                | 0.00782<br>(0.00687)    |                          |                          |                          |
| Post shock × Same Group × Managers                 |                          |                                |                         | 0.00531*<br>(0.00236)    |                          |                          |
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| Firm of origin × firm of destination FE            | NO                       | YES                            | YES                     | YES                      | YES                      | YES                      |
| Year dummies                                       | YES                      | YES                            | YES                     | YES                      | YES                      | YES                      |
| Time to shock dummies                              | YES                      | YES                            | YES                     | YES                      | YES                      | YES                      |

# Bilateral flows and closures of large competitors

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| Closure year+1 × Same Group                        |                          |                          | 0.01116*<br>(0.00427)   |                          |                          |                          |
| Closure year+2 × Same Group                        |                          |                          | 0.01065*<br>(0.00416)   |                          |                          |                          |
| Closure year +3 × Same Group                       |                          |                          | 0.01996***<br>(0.00462) |                          |                          |                          |
| Closure year+4 × Same Group                        |                          |                          | 0.01159<br>(0.00704)    |                          |                          |                          |
| Closure year+5 or more × Same Group                |                          |                          | 0.00782<br>(0.00687)    |                          |                          |                          |
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# Findings

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  - ▶ particularly so for firms in diversified and large business groups
  - ▶ and for high-skilled workers.

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  - ▶ ILMs allow groups to provide **EMPLOYMENT INSURANCE** to workers.
- Important to take ILM into account when assessing the impact of labour market policies

# Future Research

---

- **FIRM BOUNDARIES, FIRM ORGANIZATION AND LABOUR MARKETS:**

- ▶ Do firms that create/add a new unit change their internal organization (number of hierarchies, composition of the workforce)?
- ▶ How do firms launch a new product? Existing plant, new plant, new firm?

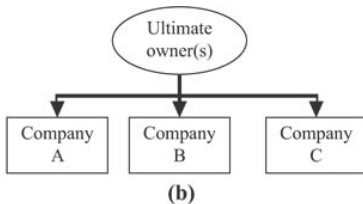
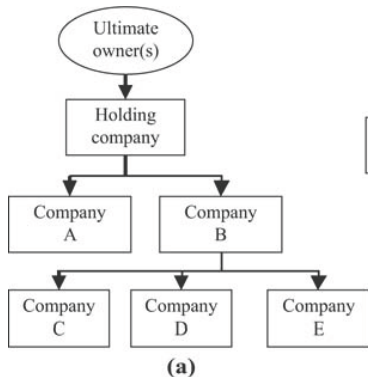
- Efficiency of internal **LABOR** markets and interaction with internal **CAPITAL** markets:

- ▶ Following a closure within a group, do firms that absorb displaced workers reduce their hires from the external labour market? Do they cut back on investment?



# What are Business Groups?

Collection of **LEGALLY INDEPENDENT** firms, possibly operating in multiple industries, partly or wholly owned by a single family or firm that **CONTROLS** the member firms' assets.



# 1. Business Groups are prominent

---

BGs account for a **LARGE FRACTION OF THE ECONOMIC ACTIVITY** both in **EMERGING** and in **DEVELOPED** economies:

- In India, in 2006 affiliated firms accounted for 80% of total assets of the top 100 firms. (Sarkar, 2010)
- In 1996, the 30 largest chaebols accounted for 40% of Korean's total output. (Chang and Hong, 2000)
- In Germany, from 1996 to 1999, top 15 family groups controlled 25% of listed corporate assets, 22% in Italy. (Faccio and Lang, 2002)

[◀ Back](#)

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- *Comprehensive data for France:*
  - ▶ Affiliated firms are **LARGER, MORE PRODUCTIVE, MORE LIKELY TO EXPORT** than stand-alone firms.
  - ▶ From 1999 to 2010, affiliated firms (on average 5%) accounted for around **40%** of total employment and **60%** of value added.
  - ▶ In manufacturing, such a percentage is as high as 70% (above 90% in automotive and energy).

[◀ Back](#)

## 2. (French) Business Groups are highly heterogenous

The size distribution of French business groups is highly **ASYMMETRIC**:

- **FEW LARGE GROUPS**, with many large affiliates, that are **DIVERSIFIED** both from a sectoral and geographical perspective

Groups in the top decile, on average:

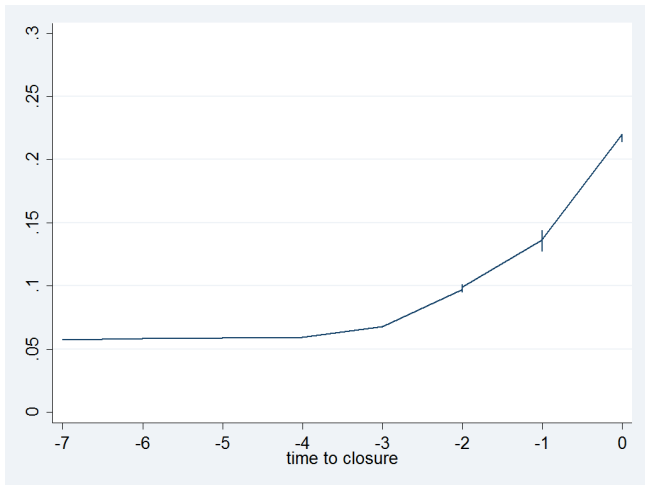
- ▶ have 20 firms (top percentile: more than 100 firms).
- ▶ employ in each firm from 600 to 1000 workers (in 1999-2010).
- ▶ operate in 7 different 4-digit industries (top percentile: 15 industries) and in 2 different macrosectors.
- ▶ have firms located in 4 different regions (top percentile: more than 7).

- **MANY SMALL GROUPS**, with few small affiliates, that are **HARDLY DIVERSIFIED**.

Groups in the rest of the population:

- ▶ have less than 6 firms.
- ▶ employ less than 50 workers per firm.
- ▶ operate in less than 3 different 4-digit sectors.
- ▶ have firms mostly located in the same region.

# Excess probability to originate from a closing firm of the same group



# Classification of occupations

| CODE     | CATEGORY   |
|----------|--|
| 10       | Farmers  |
| <b>2</b> | <b>TOP MANAGER/CHIEF OF FIRMS</b>  |
| 21       | Top managers/chiefs of handicraft firms  |
| 22       | Top managers/chiefs of industrial/commercial firms with less than 10 employees |
| 23       | Top managers of industrial/commercial firms with more than 10 employees        |
| <b>3</b> | <b>MANAGEMENT AND SUPERIOR INTELLECTUAL OCCUPATIONS</b>                        |
| 31       | Healthcare professionals, legal professionals and other professionals          |
| 33       | Managers of the 'Fonction publique'  |
| 34       | Professors, researchers, scientific occupations                                |
| 35       | Journalists, media, arts and entertainment occupations                         |
| 37       | Administrative and commercial managers   |
| 38       | Engineers and technical managers   |
| <b>4</b> | <b>INTERMEDIATE OCCUPATIONS</b>  |
| 42       | Teachers and other education, training and library occupations                 |
| 43       | Healthcare support occupations and social services occupations                 |
| 44       | Clergy and religious occupations   |
| 45       | Intermediate administrative occupations in the 'Fonction publique'             |
| 46       | Intermediate administrative and commercial occupations in firms                |
| 47       | Technicians  |
| 48       | Supervisors and 'agents de maitrise'   |
| <b>5</b> | <b>WHITE COLLAR OCCUPATIONS</b>  |
| 52       | White collar occupations in the 'Fonction publique'                            |
| 53       | Surveillance and security occupations  |
| 54       | Administrative white collars in firms  |
| 55       | Sales and related occupations  |
| 56       | Personal service occupations   |
| <b>6</b> | <b>BLUE COLLAR OCCUPATIONS</b>   |
| 62       | Industrial qualified workers   |
| 63       | Handicraft qualified workers   |
| 64       | Drivers  |
| 65       | Maintenance, repair and transport qualified workers                            |
| 67       | Industrial non qualified workers   |
| 68       | Handicraft non qualified workers   |
| 69       | Agricultural worker  |

# Preliminary step on large closure events: shocked sectors

Coefficients of triple interaction term: Top 10 × Shocked Sector × Post shock

| Code | Sector   | Sales              | Employment         | Net PPE            | Total Assets       |
|------|--|--------------------|--------------------|--------------------|--------------------|
| 158H | Manufacture of sugar   | 2.2373*** (0.1121) | 0.1247** (0.0641)  | 0.8866*** (0.0973) | 1.7234*** (0.0950) |
| 159S | Production of mineral water  | 0.2529*** (0.0763) | 0.219*** (0.0573)  | 0.1773** (0.0695)  | 0.4395*** (0.0652) |
| 159T | Production of soft drinks  | 0.8036*** (0.0765) | 0.3133*** (0.0572) | 0.3011*** (0.0696) | 0.455*** (0.0659)  |
| 221E | Publishing of journals and periodicals                               | 0.2976*** (0.0705) | 0.1672** (0.0784)  | 0.0845 (0.1149)    | 0.4163*** (0.0817) |
| 241E | Manufacture of other inorganic basic chemicals                       | 0.2732** (0.1450)  | 0.3624*** (0.0867) | 0.0841 (0.1785)    | 0.2643** (0.1190)  |
| 292D | Manufacture of lifting and handling equipment                        | 0.3458*** (0.0382) | 0.1203*** (0.0333) | 0.1852*** (0.0421) | 0.2665*** (0.0397) |
| 295G | Manufacture of machinery for textile, apparel and leather production | 0.1213** (0.0463)  | 0.1413*** (0.0356) | 0.1135*** (0.0413) | 0.0172 (0.0427)    |
| 314Z | Manufacture of accumulators, primary cells and primary batteries     | 0.3991** (0.1289)  | 0.3628*** (0.0841) | 0.1303 (0.0888)    | 0.3601*** (0.0881) |
| 452B | Construction of sundry buildings                                     | 0.2568*** (0.0667) | 0.3657*** (0.0621) | 0.2931*** (0.0681) | 0.2557*** (0.0591) |
| 513W | Non specialized wholesale of food                                    | 0.8191*** (0.0506) | 0.6718*** (0.0429) | 1.0424*** (0.0690) | 0.6735*** (0.0511) |
| 514N | Wholesale of pharmaceutical goods                                    | 0.2061*** (0.0761) | 0.4194*** (0.0599) | 0.6825*** (0.0940) | 0.1433** (0.0631)  |
| 518L | Wholesale of electric equipment                                      | 0.3374*** (0.0730) | 0.2548*** (0.0528) | 0.1609** (0.0750)  | 0.6672*** (0.0592) |
| 526B | Specialized retail sale via mail order                               | 0.317*** (0.0743)  | 0.2065** (0.0787)  | 0.2187** (0.1166)  | 0.3587*** (0.0861) |
| 526H | Vending machine sale   | 0.5171*** (0.0717) | 0.1334** (0.0581)  | 0.5503*** (0.1044) | 0.6267*** (0.0674) |
| 631B | Non harbour cargo handling   | 0.9739** (0.2930)  | 0.4194** (0.2032)  | 1.3155** (0.5487)  | 0.9637** (0.4063)  |
| 743B | Technical analyses, testing and inspections                          | 0.5515*** (0.1431) | 0.5986*** (0.1444) | 0.6417*** (0.1279) | 0.6094*** (0.1957) |

# Preliminary step on large closure events: non shocked sectors

Coefficients of triple interaction term: Top 10 × Shocked Sector × Post shock

| Code    | Sector  | Sales   |          | Employment |          | Net PPE    |          | Total Assets |          |
|---------|---|---------|----------|------------|----------|------------|----------|--------------|----------|
|         |   | Coeff.  | St.Err.  | Coeff.     | St.Err.  | Coeff.     | St.Err.  | Coeff.       | St.Err.  |
| Panel A |   |         |          |            |          |            |          |              |          |
| 155C    | Manufacture of cheese   | 0.0567  | (0.1120) | 0.056      | (0.0653) | -0.0538    | (0.0973) | -0.0885      | (0.0948) |
| 158A    | Industrial manufacture of bread and fresh pastry                          | 0.0979  | (0.0762) | 0.0184     | (0.0572) | 0.1365**   | (0.0696) | 0.1462**     | (0.0653) |
| 158P    | Processing of tea and coffee  | 0.182   | (0.1342) | -0.0227    | (0.0951) | 0.3542**   | (0.1309) | 0.4039***    | (0.135)  |
| 174C    | Manufacture of other made-up textile articles                             | -0.0828 | (0.0860) | 0.0076     | (0.0691) | -0.1659    | (0.0992) | -0.101       | (0.0626) |
| 211C    | Manufacture of paper and paperboard                                       | 0.4775  | (0.2567) | 0.0643     | (0.1506) | 0.2749     | (0.3059) | 0.415        | (0.2286) |
| 212E    | Manufacture of household and sanitary goods and of toilet requisites      | 0.2567  | (0.3281) | 0.2485     | (0.1699) | -0.1344    | (0.2956) | 0.3329       | (0.2191) |
| 222C    | Printing n.e.c.   | -0.0648 | (0.1245) | -0.1083    | (0.1394) | -0.0294    | (0.1385) | -0.1544      | (0.1018) |
| 241J    | Manufacture of fertilizers and nitrogen compounds                         | 0.2246  | (0.1708) | 0.0677     | (0.0800) | 0.0539     | (0.1530) | -0.0719      | (0.1234) |
| 251E    | Manufacture of other rubber products                                      | -0.1245 | (0.1126) | -0.1283    | (0.1078) | -0.2645**  | (0.1045) | -0.1652**    | (0.0769) |
| 252C    | Manufacture of plastic packing goods                                      | -0.0712 | (0.1114) | -0.2103    | (0.1057) | -0.1239    | (0.1036) | -0.1026      | (0.0767) |
| 252H    | Manufacture of plastic-based technical parts                              | -0.0422 | (0.1054) | -0.0152    | (0.0968) | 0.0148     | (0.0793) | -0.0055      | (0.1009) |
| 271Y    | Manufacture of basic iron and steel and of ferro-alloys                   | -0.3344 | (0.3665) | -0.3019    | (0.2671) | -0.4736    | (0.4892) | -0.6421      | (0.4019) |
| 284B    | Cutting, pressing   | -0.3154 | (0.2233) | -0.1033    | (0.2154) | -0.3335    | (0.2529) | -0.3579      | (0.2532) |
| 287G    | Manufacture of fasteners and screw machine products                       | -0.0202 | (0.0761) | -0.0299    | (0.0585) | 0.2717***  | (0.0830) | -0.0394      | (0.0784) |
| 312A    | Manufacture of low tension electricity distribution and control apparatus | -0.2312 | (0.1588) | 0.0022     | (0.1029) | -0.2777    | (0.1737) | -0.0323      | (0.1285) |
| 321C    | Manufacture of electronic active components                               | 0.121   | (0.1953) | 0.1131     | (0.1553) | 0.1836**   | (0.0358) | 0.4451       | (0.2184) |
| 332B    | Manufacture of scientific instruments                                     | 0.0783  | (0.1251) | 0.0791     | (0.1001) | -0.0199    | (0.1377) | 0.244        | (0.1410) |
| 333Z    | Manufacture of industrial process control equipment                       | 0.3769  | (0.4855) | 0.2413     | (0.4318) | 0.1533     | (0.4911) | 0.3922       | (0.5689) |
| 361C    | Manufacture of other office and shop furniture                            | -0.0731 | (0.1005) | 0.1156     | (0.1006) | -0.0469    | (0.1334) | -0.0115      | (0.0835) |
| 503A    | Wholesale of motor vehicle parts and accessories                          | -0.1897 | (0.1397) | 0.0043     | (0.1005) | -0.1746    | (0.2648) | -0.317       | (0.1991) |
| 524H    | Retail sale of furniture  | -0.1131 | (0.0745) | 0.0526     | (0.0787) | -0.1463    | (0.1165) | 0.0388       | (0.0861) |
| 551A    | Tourism hotels and motels with restaurant                                 | -0.0594 | (0.1271) | 0.0069     | (0.0691) | -0.1728    | (0.0995) | 0.0406       | (0.0661) |
| 552E    | Other provision of tourist lodgings                                       | -0.2419 | (0.2629) | 0.0171     | (0.1911) | -0.2134    | (0.2096) | -0.0791      | (0.1732) |
| 553B    | Fast food restaurants   | -0.2298 | (0.2077) | -0.0248    | (0.1311) | -0.0279    | (0.1629) | -0.11        | (0.1164) |
| 602M    | Interurban freight transports by road                                     | -0.0489 | (0.1773) | -0.3054    | (0.185)  | -0.0777    | (0.2802) | -0.1931      | (0.2364) |
| 634B    | Chartering  | 0.1338  | (0.2922) | 0.3158     | (0.2025) | 0.9454     | (0.5502) | 0.3389       | (0.4055) |
| 642C    | Telecommunications, except radio and television transmission              | -0.2472 | (0.5263) | 0.0374     | (0.2398) | -0.3482    | (0.3337) | -0.2823      | (0.3509) |
| 702A    | Letting of dwellings  | 0.2723  | (0.1662) | 0.213      | (0.1452) | 0.4838     | (0.2982) | 0.2892**     | (0.1412) |
| 703C    | Management of residential building on a fee or contract basis             | 0.1791  | (0.2393) | 0.1279     | (0.2041) | 0.091      | (0.34)   | -0.0779      | (0.216)  |
| 723Z    | Data processing   | -0.0441 | (0.2258) | 0.1219     | (0.1764) | 0.0632     | (0.2057) | -0.083       | (0.2981) |
| 745B    | Temporary work  | -0.0899 | (0.12)   | -0.1679    | (0.1389) | -0.3882*** | (0.1147) | -0.0843      | (0.1707) |
| 748B    | Film processing   | -0.4295 | (0.2528) | -0.0335    | (0.2390) | -0.1931    | (0.2152) | -0.5176      | (0.3689) |
| 748D    | Packaging activities  | -0.0827 | (0.2016) | 0.0939     | (0.1922) | 0.1277     | (0.1695) | 0.1059       | (0.2850) |

[Back](#)



# Preliminary step on large closure events: non shocked sectors

Coefficients of triple interaction term: Top 10 × Shocked Sector × Post shock

| Code    | Sector  | Sales      |          | Employment |          | Net PPE    |          | Total Assets |          |
|---------|---|------------|----------|------------|----------|------------|----------|--------------|----------|
|         |   | Coeff.     | St.Err.  | Coeff.     | St.Err.  | Coeff.     | St.Err.  | Coeff.       | St.Err.  |
| Panel B |   |            |          |            |          |            |          |              |          |
| 151E    | Industrial production of meat products  | -0.1239    | (0.0907) | -0.1562*** | (0.0544) | -0.1699**  | (0.0794) | -0.0827      | (0.0791) |
| 158V    | Manufacture of other food products n.e.c.                                     | 0.125      | (0.0765) | -0.1083**  | (0.0562) | 0.1323**   | (0.0661) | 0.0044       | (0.0646) |
| 159J    | Manufacture of cider and other fruit wines                                    | -0.0005    | (0.0770) | -0.207***  | (0.0572) | -0.0242    | (0.0697) | -0.0194      | (0.0667) |
| 177C    | Manufacture of knitted and crocheted pullovers and similar articles           | -0.1914**  | (0.0693) | -0.2983*** | (0.0459) | -0.2584*** | (0.0859) | -0.4604***   | (0.0525) |
| 193Z    | Manufacture of footwear   | 0.0465     | (0.0470) | -0.1751*** | (0.0081) | 0.0972     | (0.0447) | 0.0058       | (0.0491) |
| 262C    | Manufacture of ceramic sanitary fixtures                                      | -0.2108**  | (0.1016) | 0.5602***  | (0.2001) | -1.2667*** | (0.1480) | 0.732***     | (0.0800) |
| 273G    | Wire drawing  | -0.7209*** | (0.1384) | -0.481***  | (0.1054) | -0.076     | (0.1905) | -0.3254**    | (0.1407) |
| 274C    | Production of basic aluminium   | -0.1579    | (0.1741) | -0.4672*** | (0.1300) | -0.4488**  | (0.2304) | -0.4841**    | (0.1608) |
| 274D    | First processing of aluminium   | -0.4707*** | (0.1388) | -0.1522    | (0.1018) | -0.5858*** | (0.1919) | -0.4055**    | (0.1398) |
| 275E    | Casting of light metals   | -0.4709*** | (0.1307) | -0.203**   | (0.0886) | -0.634**   | (0.1381) | -0.2364**    | (0.1075) |
| 282D    | Manufacture of central heating radiators and boilers                          | -0.2071**  | (0.0747) | 0.04       | (0.0593) | -0.0837    | (0.0839) | -0.1415**    | (0.0769) |
| 285D    | Machining, except turning   | -0.3001**  | (0.1090) | -0.2024**  | (0.0975) | -0.2093    | (0.1272) | -0.2665**    | (0.1135) |
| 297C    | Manufacture of non-electric domestic appliances                               | -0.2412*** | (0.0632) | -0.4931*** | (0.0526) | 0.0298     | (0.0629) | -0.3638***   | (0.0526) |
| 311B    | Manufacture of high power electric motors, generators and transformers        | -0.5346*** | (0.0927) | -0.051     | (0.0529) | -0.0374    | (0.0731) | -0.5803***   | (0.0694) |
| 316A    | Manufacture of electrical equipment for engines and vehicles n.e.c.           | -0.5783*** | (0.1686) | -0.876***  | (0.1224) | -0.8024**  | (0.2476) | -0.3809**    | (0.1795) |
| 316D    | Manufacture of electric equipments n.e.c                                      | -0.291**   | (0.0928) | -0.0673    | (0.0528) | 0.3278**   | (0.0733) | -0.0895      | (0.0697) |
| 322B    | Manufacture of wired telecommunication equipment                              | 0.0708     | (0.1713) | -0.2625**  | (0.0839) | -0.4345*** | (0.0190) | -0.1622      | (0.1865) |
| 351B    | Building of civilian ships  | -0.1356    | (0.1288) | -0.3016**  | (0.1390) | -0.632**   | (0.1319) | 0.1637       | (0.1135) |
| 351E    | Building and repairing of pleasure and sporting boats                         | -0.6868**  | (0.3232) | -0.0656    | (0.2613) | 0.283      | (0.3742) | 0.0203       | (0.3353) |
| 361A    | Manufacture of chairs and seats   | -0.3415*** | (0.0949) | -0.3873*** | (0.1114) | -0.3353**  | (0.1370) | -0.2785**    | (0.0892) |
| 402C    | Distribution and trade of gaseous fuels through mains                         | -0.1741**  | (0.0719) | -0.7448**  | (0.0736) | 0.4156**   | (0.1277) | -0.6247**    | (0.2069) |
| 452C    | Construction of civil engineering structures                                  | -0.2342*** | (0.0528) | 0.1135**   | (0.0463) | -0.0794    | (0.0482) | -0.2134***   | (0.0444) |
| 452D    | Underground works   | 0.1282**   | (0.0531) | -0.1348*** | (0.0464) | -0.301***  | (0.0491) | -0.1686***   | (0.0444) |
| 511R    | Agents specializing in the sale of particular products                        | -0.1839**  | (0.0756) | -0.1707**  | (0.0597) | -0.2969*** | (0.0964) | -0.3787***   | (0.0644) |
| 512A    | Wholesale of grain, seeds and animal feeds                                    | -0.2002**  | (0.0954) | 0.1315**   | (0.0740) | -0.0365    | (0.1151) | 0.2076**     | (0.0864) |
| 521A    | Retail sale of frozen products  | -0.3019*** | (0.0626) | -0.0868    | (0.0656) | -0.0194    | (0.0970) | -0.3047***   | (0.0703) |
| 524L    | Retail sale of electrical household appliances and radio and television goods | -1.329***  | (0.0563) | -1.6156*** | (0.0567) | -1.4642*** | (0.0567) | -1.6079***   | (0.0482) |
| 526G    | Home sale   | 0.5699***  | (0.0798) | -0.1062**  | (0.0581) | -0.0692    | (0.1179) | 0.0769       | (0.0714) |
| 553A    | Traditional style restaurants   | -0.8844*** | (0.1963) | -0.8128*** | (0.1301) | -0.8072*** | (0.1646) | -0.7193***   | (0.1165) |
| 555C    | Collective catering on contract basis   | -0.4964**  | (0.1819) | -0.296***  | (0.0785) | -0.4052**  | (0.1298) | -0.1986**    | (0.0895) |
| 631D    | Refrigerated storage and warehousing  | -0.408**   | (0.1364) | -0.5204*** | (0.1078) | -0.4738    | (0.2593) | -0.3923**    | (0.1796) |
| 632C    | Activities of travel agencies and tour operators                              | -0.3732    | (0.2202) | -0.4932**  | (0.1548) | -0.4787    | (0.3994) | -0.4167      | (0.3130) |
| 741G    | Business and management consultancy activities                                | -2.8802*** | (0.2653) | -2.3639*** | (0.2432) | -4.8498*** | (0.2156) | -5.0473***   | (0.3677) |
| 748K    | Related services to production  | -1.5058**  | (0.1512) | -1.7771*** | (0.1508) | -2.9374**  | (0.1247) | -2.0213***   | (0.1920) |
| 900G    | Sanitation, remediation and similar activities                                | -0.144     | (0.1125) | -0.2912**  | (0.0799) | -0.7629*** | (0.0336) | -0.2052      | (0.1154) |

[← Back](#)

# Preliminary step on large closure events: non shocked sectors

Coefficients of triple interaction term: Top 10 × Shocked Sector × Post shock

| Code    | Sector   | Sales     |          | Employment |          | Net PPE    |          | Total Assets |          |
|---------|--|-----------|----------|------------|----------|------------|----------|--------------|----------|
|         |  | Coeff.    | St.Err.  | Coeff.     | St.Err.  | Coeff.     | St.Err.  | Coeff.       | St.Err.  |
| Panel C |  |           |          |            |          |            |          |              |          |
| 143Z    | Mining of chemical and fertilizer minerals                                     | 0.1258    | (0.0979) | 0.1313**   | (0.0681) | 0.329      | (0.2403) | -0.0478      | (0.0935) |
| 151F    | Cooked meats production and trade  | 0.22**    | (0.0764) | -0.0787    | (0.0562) | 0.0467     | (0.0661) | 0.004        | (0.0641) |
| 152Z    | Processing and preserving of fish and fish products                            | 0.242**   | (0.1342) | -0.0409    | (0.0951) | -0.1257    | (0.1310) | -0.0761      | (0.1352) |
| 157C    | Manufacture of prepared pet foods  | 0.0389    | (0.0907) | 0.1064**   | (0.0548) | -0.3305*** | (0.0798) | -0.1236      | (0.0806) |
| 202Z    | Manufacture of veneer sheets, plywood, laminboard, and other panels and boards | 0.6224**  | (0.1862) | 0.2908     | (0.2051) | 0.5575**   | (0.2670) | 0.1015       | (0.2067) |
| 241A    | Manufacture of industrial gases  | 1.9225*** | (0.1857) | 0.115      | (0.0904) | -0.1902    | (0.1573) | 1.542***     | (0.1373) |
| 244A    | Manufacture of basic pharmaceutical products                                   | -0.1494   | (0.1453) | 0.2146**   | (0.0864) | 0.6171***  | (0.1769) | -0.1511      | (0.1187) |
| 287C    | Manufacture of light metal packaging   | -0.1113   | (0.0764) | 0.1103**   | (0.0586) | -0.2248**  | (0.0831) | -0.4511***   | (0.0791) |
| 361M    | Manufacture of mattresses  | 0.5525**  | (0.1925) | 0.1852     | (0.1653) | 0.4356**   | (0.2012) | 0.3459**     | (0.1623) |
| 365Z    | Manufacture of games and toys  | 0.5282*** | (0.1206) | -0.1344    | (0.1266) | 0.0669     | (0.1580) | -0.1034      | (0.1055) |
| 515C    | Wholesale of metals and metal ores   | 0.1712**  | (0.0754) | 0.0838     | (0.0598) | 0.0112     | (0.0932) | 0.2622***    | (0.0631) |
| 518G    | Wholesale of computers, computer peripheral equipment and software             | 0.2305**  | (0.0948) | 0.08       | (0.0740) | 0.3952***  | (0.1146) | 0.2939***    | (0.0840) |
| 602B    | Road scheduled passenger land transport  | 0.3344**  | (0.1505) | -0.2067    | (0.15)   | -0.1365    | (0.2971) | 0.0184       | (0.2183) |
| 631E    | Non refrigerated storage and warehousing                                       | 0.3621**  | (0.1351) | 0.0562     | (0.1106) | 0.6717**   | (0.2004) | 0.3072       | (0.1531) |
| 711A    | Short term renting of automobiles  | 0.6906    | (0.545)  | 0.727**    | (0.2702) | -0.1302    | (0.5357) | 0.3021       | (0.4980) |
| 713C    | Renting of construction and civil engineering machinery and equipment          | 0.332     | (0.413)  | 0.631***   | (0.1898) | 0.3129     | (0.3595) | 0.2874       | (0.3235) |
| 725Z    | Maintenance and repair of office, accounting and computing machinery           | 0.7115**  | (0.2189) | -0.0148    | (0.1543) | 0.7034**   | (0.1743) | 0.4174       | (0.2911) |
| 744B    | Advertising agency, advertising consultant                                     | 0.1095    | (0.1662) | 0.4813**   | (0.1624) | 0.0836     | (0.1412) | 0.0727       | (0.2475) |

[← Back](#)