

The triggers of competitiveness

Investing to compete: what are the bottlenecks? Evidence from EFIGE

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Bruegel

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 - provided you agree on the indicator to use, each one has certain drawbacks, as it might contain some measurement error (REER - ULC) or, in a world characterized by global value chains, it might be unrelated to the 'competitiveness' of domestic factors of production (export shares)

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- 4 briefly point out some shortcomings of the currently employed indicators of competitiveness
- 5 derive some policy prescriptions from the above

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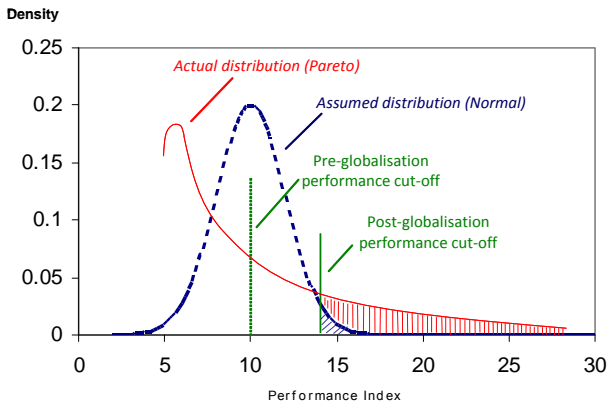
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- In this sense, Krugman's idea of competitiveness being 'a poetic way of saying productivity' is probably right
- Such a definition of competitiveness revolves around the individual firms' characteristics, leaving the macro variables on the background, and thus requires a novel set of (micro) indicators

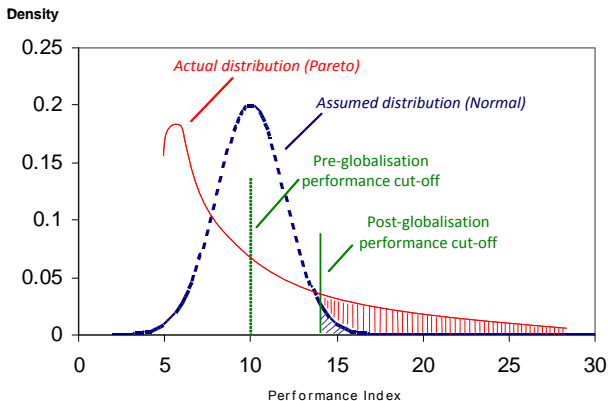
A micro foundation of competitiveness

- Almost any measure of firm-level performance (e.g. productivity) within an industry or country is typically distributed as in the graph below: there are not few very bad and very good firms (normal distribution), but many relatively 'bad' firms, and a number of (less numerous) particularly good ones (Pareto distribution)



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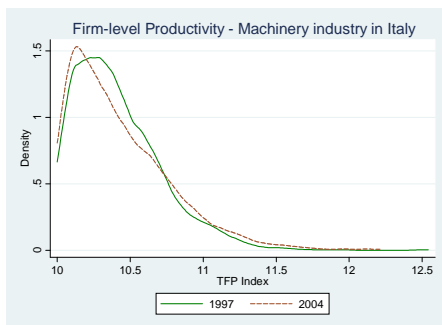
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- From an economic point of view, policies aimed at raising the *average* performance index (the pre-globalisation cut-off) could possibly be successful, but the latter would not be reflected in a significant change of the competitive position of the industry/country, as the number of firms above the post-globalisation cut-off would remain largely unchanged

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- What it matters for competitiveness is thus the ability to *reallocate* resources so that firms move from below to above the relevant cutoff

An example

- We plot the distribution of firms' productivity before (1997) and after (2004) the introduction of the euro for an Italian industry: the right-hand tail of very productive firms becomes thicker, while initially less productive firms are losing out, i.e. the competitiveness of the industry is increasing
- Policies aimed at competitiveness should concentrate on 'thickening' the right hand tail of firms fostering reallocation of resources from bad to good firms; policies aimed at social cohesion should deal with the exiting firms => two objectives = two distinct policies: there is no 'average' policy for the industry



The role of internationalization

- The latter effects are well known to the economic literature: trade liberalization has a positive impact on aggregate productivity through the selection of the most productive firms
- After the trade shock, initially active domestic firms end up being partitioned into three groups:
 - the least productive firms start making losses in their home markets without gaining access to foreign markets and have to exit;
 - the most productive firms compensate lost profits on domestic sales with new profits on foreign sales, thus being able to survive and expand their market shares abroad;
 - firms with intermediate productivity also survive but are not productive enough to gain access to foreign markets, and their market shares shrink
- In this framework, international trade integration suppresses the least productive firms and aggregate productivity rises thanks to the **reallocation** of productive resources from less to more efficient firms.

The role of internationalization - data

- Evidence from a new dataset built within the 7th RFP of the European Commission: Bruegel/Unicredit EFIGE dataset.
- Representative samples (see Navaretti *et al*, 2011) of manufacturing firms >10 employees across countries: the first comparable dataset in Europe assessing (among others) all the dimensions of internationalization of firms (export, imports, outsourcing, FDI) together with other structural characteristics not observable from balance sheet data. Stratification by industry and firm size

Table 1: The EFIGE dataset by country

| Country | Number of firms |
|---------|-----------------|
| Austria | 443 |
| France | 2,973 |
| Germany | 2,935 |
| Hungary | 488 |
| Italy | 3,021 |
| Spain | 2,832 |
| UK | 2,067 |
| Total | 14,759 |

Source: EFIGE Survey dataset.

Validation of EFIGE data

- We can check the representativeness of the samples by linking EFIGE samples to AMADEUS balance sheet data, and then compute the correlation over time between some measures of firm performance aggregated from our samples (with proper weights) at the country level vs. official statistics provided by Eurostat (Structural Business Statistics for manufacturing firms >10 employees).

Correlations between AMADEUS and Eurostat variables

| | |
|---------------------------|---------|
| Number of Employees | 0.61*** |
| Revenues/Production value | 0.52*** |
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| Labour Productivity | 0.84*** |

NOTE: Observations are country-year-specific averages (weighted in AMADEUS sample). Eurostat data are derived from Structural Business Statistics, Manufacturing, over 10 employees.

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- Correlations for countries with particularly good quality in balance sheet data (ES, FR, IT) is >.9

EFIGE: The Internationalization Dimension - 1

- Clear ranking of firm characteristics with respect to the degree of involvement in international activities:

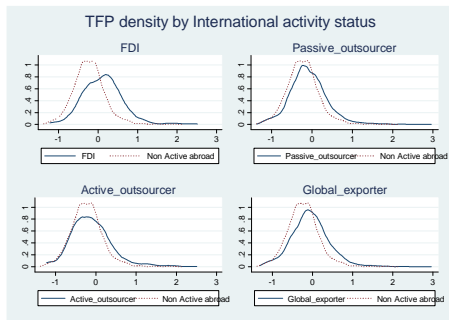
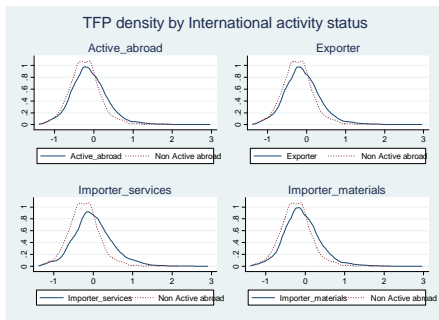
Table 2: International categories of firms – Descriptive statistics (full sample), 2008

| | N. of firms | Avg. turnover per firm (in 1,000 EUR) | Avg. n. of employees | Avg. Capital stock per employee (in 1,000 EUR) |
|--------------------|-------------|--|-------------------------|---|
| Non Active_abroad | 3,402 | 4,443.33 | 31.44 | 152.16 |
| Active_abroad | 11,357 | 19,273.46 | 139.85 | 196.4 |
| <i>of which</i> | | | | |
| Exporter | 9,849 | 20,494.21 | 151.42 | 199.03 |
| Importer_services | 3,449 | 38,659.98 | 332.12 | 223.57 |
| Importer_materials | 7,298 | 24,976.44 | 191.17 | 200.36 |
| FDI | 719 | 77,637.20 | 334.13 | 239.55 |
| Passive_outsourcer | 5,799 | 17,052.42 | 83.96 | 204.98 |
| Active_outsourcer | 590 | 24,657.11 | 119.55 | 225.28 |
| Global_exporter | 4,016 | 24,777.71 | 103.43 | 222.93 |
| Whole sample | 14,759 | 15,589.29 | 114.52 | 186.59 |

- Internationally active firms tend to be larger, have higher sales and are more capital intensive. Ranking tends to increase with the degree of complexity of international activities, from exporter, to importer of material / active outsourcing, to importer of services and FDI. Local firms involved in international value chains ('passive outsourcers') are somewhat smaller than the average of all internationally active firms, but larger than purely local firms.

EFIGE: The Internationalization Dimension - 2

- International activities of firms are strongly correlated to productivity measures. Here we compare the performance (log TFP) across seven EU countries of firms active internationally vs. those with only a domestic exposure.



Internationalization status and productivity premia

- The 'productivity premium' indeed increases with the complexity of internationalization activities, controlling for a number of characteristics

Table 5: International status and TFP premium

| Dep. variable: TFP | (1) | (2) | (3) | N |
|------------------------|-----------------------|-----------------------|----------------------|-------|
| | OLS | OLS | O.Probit | |
| Active abroad | 0.0906*** (0.0132) | 0.0353*** (0.0128) | 0.261*** (0.0290) | 7,259 |
| Exporter | 0.0999*** (0.0136) | 0.0399*** (0.0131) | 0.272*** (0.0298) | 6,563 |
| Importer of services | 0.171*** (0.0171) | 0.0626*** (0.0171) | 0.620*** (0.0531) | 3,334 |
| Importer of materials | 0.118*** (0.0142) | 0.0449*** (0.0138) | 0.394*** (0.0332) | 5,320 |
| FDI | 0.257*** (0.0329) | 0.0980*** (0.0357) | 0.750*** (0.0750) | 1,862 |
| Passive outsourcer | 0.122*** (0.0151) | 0.0558*** (0.0150) | 0.329*** (0.0342) | 4,372 |
| Active outsourcer | 0.134*** (0.0309) | 0.0477 (0.0306) | 0.364*** (0.0755) | 1,777 |
| Global exporter | 0.156*** (0.0168) | 0.0699*** (0.0167) | 0.425*** (0.0368) | 3,652 |
| Country fixed effects | Included | Included | Included | – |
| Industry fixed effects | Included | Included | Included | – |
| Firm size | Excluded | Included | Excluded | – |

Notes: Standard errors in parentheses. *** denotes statistical significance at the 1-percent level. One cross-sectional regression for each internationalization characteristic, with sector and country dummies. Column 2 controls also for the size class of firms (10-19; 20-49; 50-249; >=250 employees). The number of observations is given by the number of inactive firms plus the number of firms active in the selected international activity. All regressions control for country and industry fixed effects.

Competitiveness and ULC - 1

- ULC are derived from sector or economy-wide data, in which aggregate labor productivity is calculated as the ratio of nominal value added to a deflator, and then this is divided by the number of workers. One problem is in the aggregation: because of unknown firm-specific weights, the average productivity so calculated does not represent the productivity of the average firm

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- This is reflected in our micro-data as well: ULC are a worse predictor of international status than TFP or labor productivity

Competitiveness and ULC - 2

- Unit labour costs convey a slightly different message w.r. to productivity (TFP or labour prod). Results are comparable (sending a message of overall consistency across measures of competitiveness) but magnitudes and rankings change

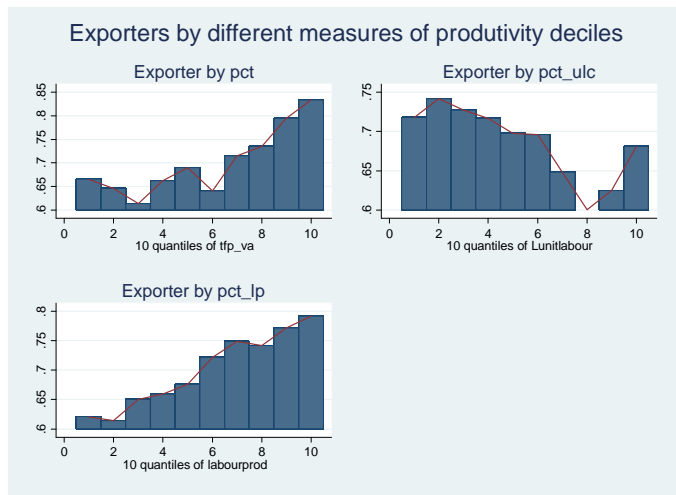
Table 8: International status and alternative competitiveness measures

| Variables | TFP | | Labour productivity | | Unit labour cost | |
|-----------------------|-----------------------|-------|----------------------|-------|-------------------------|-------|
| | OLS | N | OLS | N | OLS | N |
| Active abroad | 0.0906*** (0.0132) | 7,259 | 0.135*** (0.0145) | 7,260 | -0.0570*** (0.00960) | 9,230 |
| Exporter | 0.0999*** (0.0136) | 6,563 | 0.141*** (0.0149) | 6,564 | -0.0545*** (0.00991) | 8,281 |
| Importer of services | 0.171*** (0.0171) | 3,334 | 0.202*** (0.0188) | 3,334 | -0.0682*** (0.0121) | 4,246 |
| Importer of materials | 0.118*** (0.0142) | 5,320 | 0.162*** (0.0155) | 5,321 | -0.0703*** (0.0101) | 6,800 |
| FDI | 0.257*** (0.0329) | 1,862 | 0.226*** (0.0373) | 1,862 | -0.0927*** (0.0253) | 2,392 |
| Passive outsourcer | 0.122*** (0.0151) | 4,372 | 0.158*** (0.0169) | 4,372 | -0.0630*** (0.0111) | 5,672 |
| Active outsourcer | 0.134*** (0.0309) | 1,777 | 0.182*** (0.0359) | 1,777 | -0.0666*** (0.0212) | 2,330 |
| Global exporter | 0.156*** (0.0168) | 3,652 | 0.198*** (0.0184) | 3,652 | -0.0631*** (0.0122) | 4,588 |

Notes: Standard errors in parentheses. *** denotes statistical significance at the 1-percent level. One cross-sectional regression for each internationalization characteristic, with sector and country dummies. The number of observations is given by the number of inactive firms plus the number of firms active in the selected international activity.

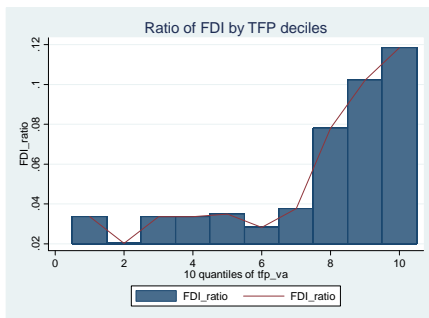
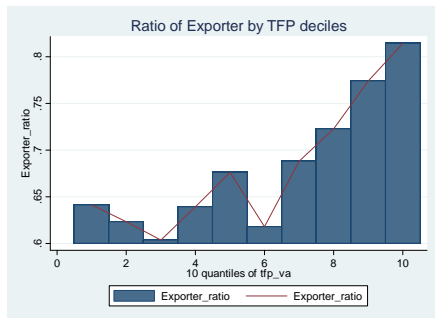
Competitiveness and ULC - 3

- ULCs less able to identify 'winners' above a critical performance threshold => more imperfect measure of firm-level based competitiveness (reallocation)



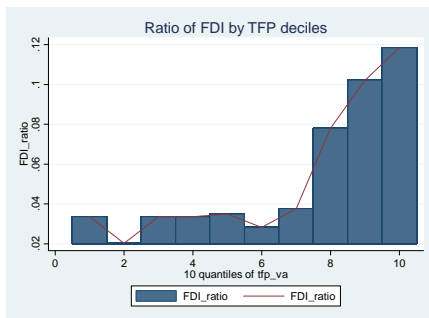
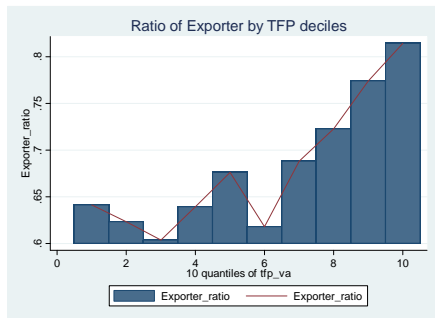
Causality links and policy implications

- Watch out for the causality link: from productivity to international status and then (possibly) to productivity, not the other way round => promoting the export activities of lemons does not turn them into winners



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- But internationalization is a powerful tool for the reallocation of firms around and above the performance cut-off (ALL forms of international exposure, including imports)

Which firms' characteristics drive reallocation ?

- We have assessed the strong relationship between productivity and internationalization, and we have argued that reallocation of firms above a given productivity cutoff is crucial for competitiveness. But what is driving this reallocation ?

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- ② identify those firms that between 2001-7 and 2008-09 switch from below to above such a decile of productivity: firms experiencing reallocation around the cutoff
- ③ test for the firms' characteristics associated with the probability of being a 'switching' firm vs. other firms in the sample

Switching firms: identifying the relevant cutoff

- We test the joint probability that deciles of TFP above a random one are significantly associated to a given international status, controlling for industry, country (1) as well as firm-size (2) fixed effects

Critical threshold of TFP

| Ho: $P_{\alpha_7}=0, P_{\alpha_8}=0, P_{\alpha_9}=0, P_{\alpha_{10}}=0$ | | | | |
|---|---------------|--------|----------|--------|
| | Active abroad | | Exporter | |
| | (1) | (2) | (1) | (2) |
| chi2(4) | 75.39 | 22.97 | 57.37 | 11.38 |
| Prob > chi2 | 0.0000 | 0.0001 | 0.0000 | 0.0226 |

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- We find this critical threshold to be the 7th decile of TFP (consistently with prev. figures): below this threshold, the probability of being internationally active is not significant

Switchers' Characteristics - 1 (Structural Features)

- We then identify 942 firms that between 2001-07 and 2008-09 switch above the 7th decile of TFP: these firms tend to be relatively small but are more capitalized and with lower ULC with respect to the average firm in the sample. Young Innovative Companies ?

Characteristics of firms with respect to their TFP dynamics

| Change in TFP w.r. to the cutoff (7 th TFP decile) | N. of firms | Avg. turnover per firm (in 1,000 EUR) | Avg. n. of employees | Avg. Capital stock per employee (in 1,000 EUR) | Total Factor Productivity | Unit labour cost (in EUR per unit of value added) | Labour productivity (value added per employee) |
|---|-------------|---------------------------------------|----------------------|--|---------------------------|---|--|
| Remain below | 3823 | 4146.1 | 27 | 157.9 | 0.653 | 0.845 | 39.346 |
| Move below | 1010 | 12271.1 | 66.5 | 188.5 | 0.821 | 0.886 | 48.652 |
| Move above | 942 | 7805.9 | 34 | 202.4 | 1.129 | 0.65 | 68.755 |
| Remain above | 2856 | 53921.1 | 341.9 | 248.8 | 1.546 | 0.649 | 79.394 |
| Total | 8631 | 19462.2 | 126.3 | 193.1 | 0.989 | 0.772 | 55.441 |

Switchers' Characteristics - 2 (Financial Features)

- Looking at financial characteristics, switching firms do not seem to differ systematically with respect to other firms in the sample, but for the fact that they appear to self-finance their activities (FII: capital + cash / tot. assets) to a larger extent

| Dynamics | Avg. FII | Avg. CashR | Avg. IFP | Avg. CurrR | Avg. LR | Avg. LevR |
|-------------------|----------|------------|----------|------------|---------|-----------|
| Remain below | 0.419 | 3.855 | 0.211 | 10.808 | 0.208 | 1.361 |
| Move below | 0.594 | 0.315 | 0.118 | 2.435 | 0.333 | 0.364 |
| Move above | 4.347 | 0.396 | 0.144 | 1.791 | 0.23 | 0.793 |
| Remain above | 0.607 | 0.611 | 0.099 | 2.773 | 0.315 | 1.031 |
| Total | 0.953 | 1.821 | 0.15 | 5.748 | 0.265 | 1.072 |

- Probit regressions to show the extent to which some firm characteristics influence the probability of switching. We include the following variables, derived from the EFIGE dataset:
 - **Structure:** size class, age, foreign ownership, facing competition, use of flexible contracts, quality certificates
 - **Management:** family managed (if $>$ national average), family CEO, decentralized management, performance-related bonus
 - **Innovation:** human capital (if graduate workers $>$ national average), R&D workers, product/process/market innovation
 - **Finance:** Financial Interdependency Index, Liquidity Ratio, bank credit requested & bank credit obtained

Note: other financial variables (Cash Ratio, Leverage Ratio, Index of Financial Pressure, Current Ratio) have been ruled out by a 2-step Heckman selection model where the (lagged) financial variable acts as a predictor of the internationalization status, controlling for (lagged) productivity in the first stage (to control for endogeneity)

Results on switching firms - 1

- **Financial variables:** Firms with higher human capital, higher financial stability and salaries linked to productivity (bonus) have a higher probability of switching in both specifications (change in control group, as sensitivity check)

| VARIABLES | Swing=1=Move Up | Swing=1=Move Up |
|---------------|--------------------------|---------------------|
| | Swing=0=Remain/get below | Swing=0=Remain |
| r_d | 0.102 (0.0802) | 0.0996 (0.0854) |
| age | -0.0296 (0.0865) | -0.0332 (0.0929) |
| hk | 0.167** (0.0827) | 0.185** (0.0886) |
| labour_flex | -0.128 (0.105) | -0.163 (0.114) |
| FI | 0.643*** (0.212) | 1.087*** (0.234) |
| LR | -0.493** (0.221) | -0.389 (0.238) |
| fam_managed | -0.0812 (0.0891) | -0.147 (0.0941) |
| fam_ceo | -0.0121 (0.0876) | -0.0353 (0.0936) |
| for_group | -0.00848 (0.252) | 0.377 (0.314) |
| decentr_manag | -0.110 (0.0928) | -0.0981 (0.0987) |
| bonus | 0.145* (0.0868) | 0.203** (0.0939) |
| qual_cert | 0.00311 (0.0792) | -0.0163 (0.0842) |
| comp | 0.0317 (0.0807) | 0.102 (0.0860) |

Results on switching firms - 2

- **Credit variables:** Firms that invest more in R&D and apply for quality certification have a higher propensity to switch. Firms family managed and requiring more credit have a lower probability. In the second spec., a higher probability of switching is associated to more human capital, being part of a foreign group and having productivity-based salaries.

| VARIABLES | Swing=1=Move Up | Swing=1=Move Up |
|---------------|--------------------------|----------------------|
| | Swing=0=Remain/get below | Swing=0=Remain |
| r_d | 0.128*** (0.0459) | 0.139*** (0.0485) |
| age | -0.0260 (0.0472) | 0.0269 (0.0504) |
| hk | 0.0598 (0.0473) | 0.0845* (0.0505) |
| labour_flex | -0.00658 (0.0601) | -0.0183 (0.0639) |
| fam_managed | -0.115** (0.0530) | -0.129** (0.0555) |
| fam_ceo | -0.0570 (0.0481) | -0.0823 (0.0511) |
| for_group | 0.154 (0.0989) | 0.244** (0.112) |
| decentr_manag | -0.00883 (0.0508) | 0.00512 (0.0544) |
| bonus | 0.0738 (0.0495) | 0.115** (0.0532) |
| qual_cert | 0.0769* (0.0457) | 0.103** (0.0480) |
| comp | -0.0420 (0.0455) | -0.0242 (0.0483) |
| credit_req | -0.231** (0.0989) | -0.278*** (0.104) |
| credit_obt | 0.140 (0.113) | 0.156 (0.119) |

Results on switching firms - 3

- **Innovation variables.** As in the previous case, family managed firms and those that have requested more credit have a lower probability of switching. Innovating (process) increases the same probability. The same is true for firms which are part of foreign group and partially link the salary to the performances of employees (only in the second specification).

| VARIABLES | Swing=1=Move Up | Swing=1=Move Up |
|---------------|--------------------------|----------------------|
| | Swing=0=Remain/get below | Swing=0=Remain |
| age | -0.0270 (0.0472) | 0.0254 (0.0504) |
| hk | 0.0714 (0.0473) | 0.0992** (0.0505) |
| labour_flex | -0.00468 (0.0601) | -0.0153 (0.0638) |
| fam_managed | -0.114** (0.0529) | -0.130** (0.0554) |
| fam_ceo | -0.0576 (0.0482) | -0.0823 (0.0511) |
| for_group | 0.148 (0.0989) | 0.238** (0.112) |
| decentr_manag | -0.00331 (0.0507) | 0.0121 (0.0542) |
| bonus | 0.0744 (0.0497) | 0.116** (0.0535) |
| qual_cert | 0.0815* (0.0458) | 0.109** (0.0481) |
| comp | -0.0319 (0.0453) | -0.0131 (0.0482) |
| credit_req | -0.225** (0.0988) | -0.274*** (0.104) |
| credit_obt | 0.131 (0.113) | 0.146 (0.119) |
| product_innov | 0.0641 (0.0579) | 0.0810 (0.0616) |
| process_innov | 0.0801* (0.0445) | 0.0824* (0.0475) |
| mkt_innov | -0.0815 (0.0632) | -0.109 (0.0675) |

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 - 3 fostering the reallocation of firms above a given productivity cutoff is crucial for enhancing competitiveness
 - 4 to that extent more efficient product and factor markets leading to higher innovation (R&D, human capital, quality certification), better managerial practices (wages linked to productivity and no family involvement) and greater access to financial resources (more equity financing) seem to be associated to a higher probability of reallocation and thus higher competitiveness

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