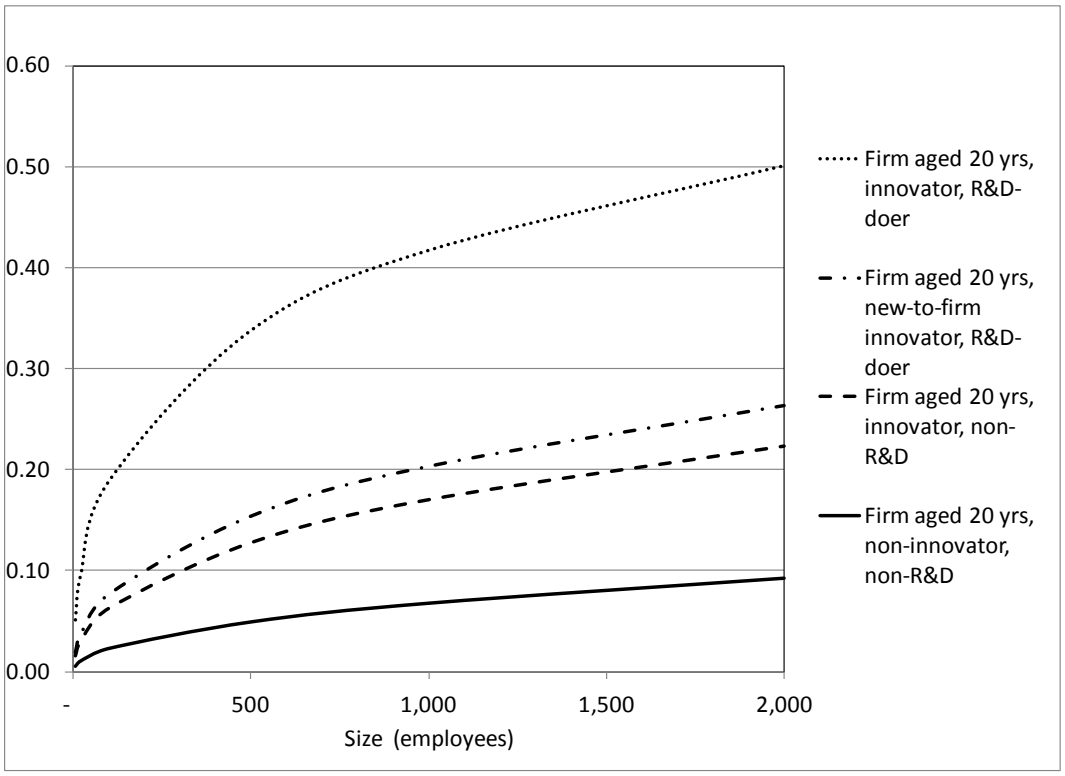


Fig. 3: Probability of patenting – metals and machinery sector

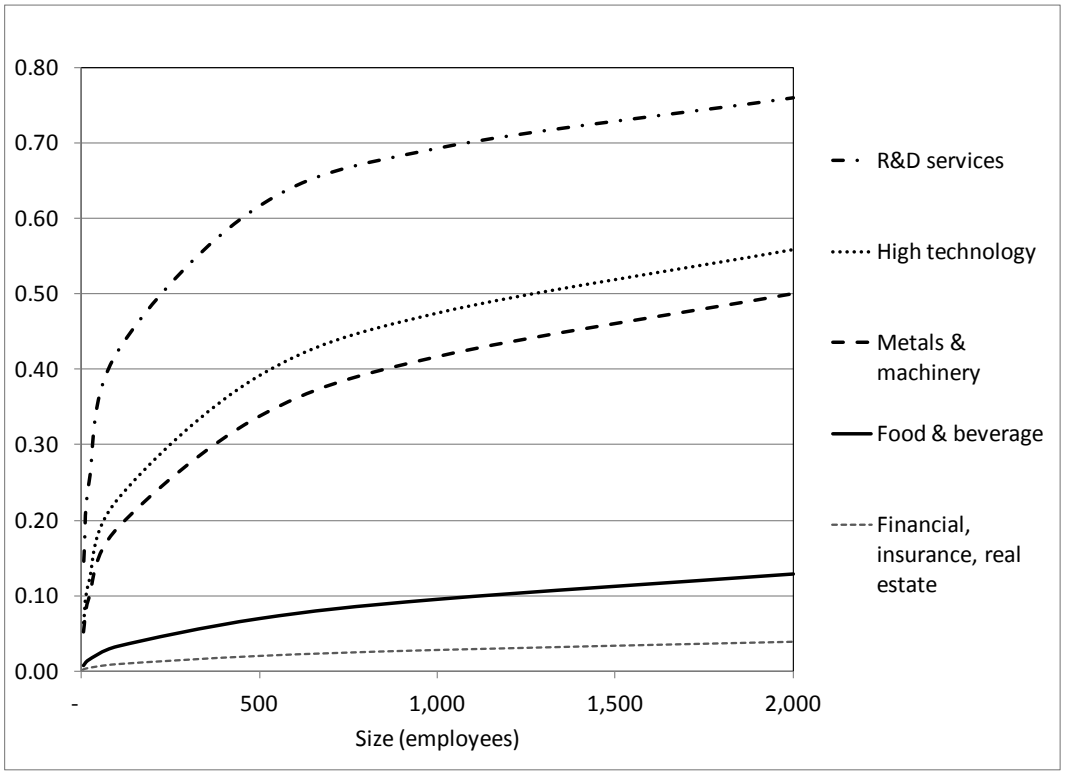


Fig. 4: Probability of patenting – Innovating, R&D-doing firms aged 20 years

## Tables

Table 1

Panel structure

| Number of firms | Share (%) | Sample firms* | Share (%) | CIS 3 | CIS 4 | CIS 5 |
|---|---|---|---|---|---|---|
| 485 | 2.0% | 98 | 1.1% | X | X | X |
| 396 | 1.7% | 148 | 1.7% | X | X | |
| 5,136 | 21.6% | 1,098 | 12.8% | | X | X |
| 214 | 0.9% | 74 | 0.9% | X | | X |
| 5,905 | 24.8% | 1,595 | 18.6% | X | | |
| 5,929 | 24.9% | 3,243 | 37.8% | | X | |
| 5,725 | 24.1% | 2,321 | 27.1% | | | X |
| **23,790** | | **8,577** | | | | |

Note: X indicates where data are available.

*The sample of innovating firms, cleaned, used for analysis

Table 2

Share of patenting firms (sample relative to the population)

| | All sectors | | | | Manufacturing | | | KIBS** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *All* | *Has UK or EPO patent* | *Share with patents* | *Pop share with patents* | *All* | *Has UK or EPO patent* | *Share with patents* | *All* | *Has UK or EPO patent* | *Share with patents* |
| Total | 30506 | 885 | 2.9% | 1.6% | 11151 | 662 | 5.9% | 8446 | 146 | 1.7% |
| Does R&D | 18610 | 747 | 4.0% | 2.3% | 7666 | 587 | 7.7% | 5115 | 131 | 2.6% |
| Innovates | 10345 | 645 | 6.2% | 3.9% | 4951 | * | * | 2723 | * | * |
| No R&D or innovation | 11018 | 113 | 1.0% | 0.6% | 3191 | 73 | 2.3% | 3104 | 20 | 0.6% |
| R&D but no innovation | 9143 | 127 | 1.4% | 0.6% | 3009 | 91 | 3.0% | 2619 | 23 | 0.9% |
| Innovation but no R&D* | 878 | 11 | 1.3% | 1.3% | 294 | * | * | 227 | * | * |
| Does R&D and innovates | 9467 | 634 | 6.7% | 4.2% | 4657 | 496 | 10.7% | 2496 | 99 | 4.0% |

*The cells with * are missing due to suppression of data due to confidentiality reasons.

** KIBS consists of business services including computing and R&D services.

Table 3

Types of innovation

| | *Innovators with* | | | |
|---|---|---|---|---|
| | *product new to the market* | *process new to the market* | *product new to the firm, but not the market* | *process new to the firm, but not the market* |
| All firms | 4015 | 1645 | 3095 | 4009 |
| R&D doers | 3797 | 1564 | 2893 | 3757 |
| R&D doers who patent | 433 | 178 | 107 | 216 |
| | Sample share innovating | | | |
| All firms | 13.2% | 5.4% | 10.1% | 13.1% |
| R&D doers | 20.4% | 8.4% | 15.5% | 20.2% |
| R&D doers who patent | 58.0% | 23.8% | 14.3% | 28.9% |

Note that a negligible number of firms patent but do not do R&D.

There are 31,722 firms in the sample, including non-innovators.

Table 4

The relative importance of formal vs. informal IP protection mechanisms
(10,093 observations)

| *Dependent variable* | *formal vs. informal* | | | *patents vs. secrecy* |
|---|---|---|---|---|
| | *OLS* | | | *Ordered probit* |
| *Variable* | (1) | (2) | (3) | (4) |
| Product innovation new to the market | -0.12 (0.02)*** | -0.13 (0.02)*** | -0.12 (0.02)*** | -0.05 (0.03)* |
| Process innovation new to the market | -0.17 (0.02)*** | -0.17 (0.02)*** | -0.16 (0.02)*** | -0.12 (0.03)*** |
| Product innovation new to the firm | -0.06 (0.02)*** | -0.06 (0.02)*** | -0.06 (0.02)*** | -0.07 (0.03)** |
| Process innovation new to the firm | -0.12 (0.02)*** | -0.12 (0.02)*** | -0.11 (0.02)*** | -0.12 (0.02)*** |
| Formal IP important in the 3-digit sector | | | 1.26 (0.07)*** | |
| Informal IP important in the 3-digit sector | | | -1.17 (0.07)*** | |
| D (financial constraints) | -0.02 (0.02) | -0.02 (0.02) | -0.02 (0.02) | -0.06 (0.02)*** |
| Log (R&D per employee) | -0.05 (0.01)*** | -0.05 (0.01)*** | -0.05 (0.01)*** | -0.05 (0.01)*** |
| D (no R&D) | -0.16 (0.04)*** | -0.16 (0.04)*** | -0.15 (0.04)*** | -0.15 (0.06)*** |
| Log age | 0.00 (0.01) | -0.00 (0.01) | -0.00 (0.01) | 0.03 (0.02)* |
| Log employment | 0.01 (0.01) | 0.01 (0.01)*** | 0.01 (0.01)*** | -0.02 (0.02) |
| Log employment squared | -0.00 (0.002) | -0.00 (0.002) | -0.00 (0.002) | -0.005 (0.003) |
| D (exports) | -0.05 (0.04) | -0.04 (0.04) | -0.04 (0.04) | -0.05 (0.05) |
| D (member of a group) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.04 (0.03) |
| D (foreign-owned) | 0.01 (0.02) | 0.01 (0.02) | 0.01 (0.02) | 0.03 (0.03) |
| 15 sector dummies | No | Yes | Yes | Yes |
| Standard error | 0.790 | 0.789 | 0.777 | |
| R-squared | 0.023 | 0.028 | 0.058 | 0.013 |

Heteroskedastic-consistent standard errors clustered on enterprise are shown in parentheses.
Period dummies for the three different CIS waves are included in all regressions.

Table 5
Probit estimation of the probability a firm patents
10,093 observations (8,577 enterprises)

| | | *Marginal effects (s.e.)* | | |
|---|---|---|---|---|
| *Variable* | *(1)* | *(2)* | *(3)* | *(4)* |
| Product innovation new to the market | 0.060 (0.006)*** | 0.047 (0.006)*** | 0.046 (0.006)*** | 0.033 (0.006)*** |
| Process innovation new to the market | 0.016 (0.006)*** | 0.015 (0.006)*** | 0.015 (0.006)*** | 0.013 (0.006)** |
| Product innovation new to the firm | 0.017 (0.007)** | 0.012 (0.007) | 0.012 (0.007)* | 0.011 (0.007) |
| Process innovation new to the firm | 0.002 (0.005) | 0.000 (0.005) | 0.000 (0.005) | 0.002 (0.005) |
| Formal IP important in 3-digit sector | | | -0.006 (0.018) | |
| Informal IP important in 3-digit sector | | | 0.026 (0.017) | |
| Formal IP important to the firm | | | | 0.031 (0.003)*** |
| Informal IP important to the firm | | | | 0.003 (0.003) |
| D (financial constraints) | -0.003 (0.005) | -0.007 (0.004) | -0.007 (0.004) | -0.015 (0.004)*** |
| D (has trademarks) | 0.084 (0.006)*** | 0.089 (0.006)*** | 0.089 (0.006)*** | 0.073 (0.005)*** |
| Log (R&D per employee) | -0.005 (0.003) | -0.000 (0.003) | 0.000 (0.003) | 0.003 (0.003) |
| D (no R&D) | -0.029 (0.011)** | -0.012 (0.011) | -0.011 (0.011) | 0.000 (0.010) |
| Log age | -0.001 (0.004) | -0.007 (0.004)* | -0.007 (0.004)* | -0.003 (0.004) |
| Log employment | 0.008 (0.003)** | 0.017 (0.004)*** | 0.017 (0.004)*** | 0.018 (0.004)*** |
| Log employment squared | -0.000 (0.000) | 0.001 (0.001)* | 0.001 (0.001)** | 0.002 (0.001)*** |
| D (exports) | 0.020 (0.008)** | 0.009 (0.009) | 0.009 (0.009) | 0.009 (0.009) |
| D (member of a group) | 0.035 (0.006)*** | 0.034 (0.005)*** | 0.034 (0.005)*** | 0.032 (0.005)*** |
| D (foreign-owned) | -0.001 (0.005) | -0.009 (0.005)* | -0.009 (0.005)* | -0.010 (0.005)* |
| Sector dummies | no | yes | yes | yes |
| Share with dep var=1 | 0.064 | 0.064 | 0.064 | 0.064 |
| Share correctly predicted | 0.936 | 0.939 | 0.939 | 0.939 |
| Share correctly predicted (dep var=1) | 0.074 | 0.155 | 0.155 | 0.159 |
| Share correctly predicted (dep var=0) | 0.995 | 0.993 | 0.993 | 0.992 |

Heteroskedastic-consistent standard errors clustered on enterprise are shown in parentheses.

Period dummies for the three different CIS waves are included in all regressions.

## Table 6: Performance regressions

| *Dependent variable* | *Log (Share/(1-Share))* | | | | *Average employment growth 1998-2006* | |
|---|---|---|---|---|---|---|
| | *Sales share product new to the mkt* | | *Sales share product new to the firm* | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| D (has EPO or UK patent) | 0.531 (0.082)*** | 0.518 (0.082)*** | -0.025 (0.064) | -0.029 (0.064) | 0.121 (0.078) | -0.194 (0.147) |
| D (has trademarks) | 0.202 (0.064)*** | 0.181 (0.063)*** | 0.076 (0.054) | 0.072 (0.055) | 0.055 (0.054) | 0.049 (0.054) |
| Formal IP important in the 3-digit sector | | 0.195 (0.139) | | -0.045 (0.122) | -0.119 (0.119) | -0.120 (0.120) |
| Informal IP important in the 3-digit sector | | 0.317 (0.135)** | | 0.208 (0.119)* | 0.071 (0.112) | 0.062 (0.112) |
| Log (R&D per employee) | -0.091 (0.027)*** | -0.085 (0.024)*** | 0.014 (0.022) | 0.016 (0.022) | -0.007 (0.027) | -0.011 (0.027) |
| D (no R&D) | -0.238 (0.084)*** | -0.214 (0.084)** | 0.057 (0.073) | 0.063 (0.073) | -0.077 (0.088) | -0.090 (0.087) |
| Log age | -0.225 (0.031)*** | -0.222 (0.031)*** | -0.220 (0.031)*** | -0.220 (0.031)*** | -0.412 (0.039)*** | -0.412 (0.039)*** |
| Log employment | -0.047 (0.028)* | -0.046 (0.028) | -0.021 (0.026) | -0.021 (0.026) | 0.104 (0.037)*** | 0.084 (0.041)** |
| Log employment squared | 0.010 (0.005)** | 0.011 (0.005)** | 0.009 (0.005)* | 0.008 (0.005) | 0.041 (0.009)*** | 0.037 (0.010)*** |
| D (exports) | -0.082 (0.071) | -0.081 (0.071) | 0.108 (0.029)*** | 0.108 (0.029)*** | -0.241 (0.063)*** | -0.249 (0.064)*** |
| D (member of a group) | 0.074 (0.044)* | 0.061 (0.044) | 0.091 (0.041)** | 0.087 (0.041)** | 0.115 (0.041)*** | 0.110 (0.041)*** |
| D (foreign-owned) | 0.080 (0.040) | 0.073 (0.040)* | 0.016 (0.037) | 0.014 (0.037) | -0.038 (0.036) | -0.041 (0.036) |
| Log (average #IPCs per pat) | | | | | | 0.002 (0.126) |
| Log (backward cites per pat) | | | | | | 0.104 (0.080) |
| Log (forward cites per pat) | | | | | | 0.028 (0.098) |
| Log (NPL cites per pat) | | | | | | 0.176 (0.212) |
| Sector dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.054 | 0.059 | 0.135 | 0.135 | 0.075 | 0.076 |
| Standard error | 1.56 | 1.56 | 1.54 | 1.54 | 1.36 | 1.36 |
| Observations | 10,093 | 10,093 | 10,093 | 10,093 | 6,712 | 6,712 |

Heteroskedastic-consistent standard errors clustered on enterprise are shown in parentheses.

Period dummies for the three different CIS waves are included in all regressions.

Table 7

Patenting and its relative importance by broad sector

| *Dependent variable* | *patents vs. secrecy* | | *D (patent app during the period)* | |
|---|---|---|---|---|
| | *Ordered probit coefficients* | | *Marginal effects (s.e.)* | |
| *Variable* | Manufacturing | KIBS | *Manufacturing* | *KIBS* |
| Product innovation new to the market | 0.07 (0.04)* | -0.14 (0.06)** | 0.05 (0.01)*** | 0.03 (0.01)*** |
| Process innovation new to the market | -0.12 (0.05)** | -0.09 (0.06) | 0.02 (0.01)* | 0.00 (0.01) |
| Product innovation new to the firm | 0.03 (0.04) | -0.15 (0.06)** | 0.03 (0.01)* | 0.01 (0.01) |
| Process innovation new to the firm | -0.09 (0.03)*** | -0.18 (0.05)*** | 0.00 (0.01) | -0.00 (0.01) |
| Formal IP important to the firm | | | 0.06 (0.005)*** | 0.03 (0.005)*** |
| Informal IP important to the firm | | | -0.00 (0.01) | 0.01 (0.00)* |
| D (financial constraints) | -0.03 (0.03) | -0.06 (0.04) | -0.03 (0.01)*** | -0.01 (0.01)** |
| Log (R&D per employee) | -0.05 (0.02)** | -0.04 (0.03) | 0.00 (0.00) | 0.00 (0.00) |
| D (no R&D) | -0.18 (0.08) | -0.08 (0.12) | 0.01 (0.02) | -0.01 (0.01) |
| Log age | 0.06 (0.03)** | 0.03 (0.03) | 0.00 (0.01) | -0.00 (0.00) |
| Log employment | -0.00 (0.02) | -0.01 (0.05) | 0.03 (0.01)*** | 0.01 (0.00)** |
| Log employment squared | -0.00 (0.00) | -0.00 (0.01) | 0.00 (0.00) | 0.002 (0.001)** |
| D (exports) | -0.06 (0.06) | 0.05 (0.11) | 0.01 (0.02) | 0.05 (0.02)** |
| D (member of a group) | 0.06 (0.04) | 0.02 (0.06) | 0.06 (0.01)*** | 0.02 (0.01)*** |
| D (foreign-owned) | 0.03 (0.04) | 0.00 (0.06) | -0.02 (0.01)* | -0.01 (0.01) |
| R-squared | 0.01 | 0.005 | | |
| Share with dep var=1 | | | 0.115 | 0.039 |
| Share correctly predicted | | | 0.906 | 0.962 |
| Share correctly predicted (dep var=1) | | | 0.210 | 0.029 |
| Share correctly predicted (dep var=0) | | | 0.984 | 0.999 |
| Observations | 4839 | 2668 | 4839 | 2668 |

Heteroskedastic-consistent standard errors clustered on enterprise are shown in parentheses.

Period dummies for the three different CIS waves and sector dummies are included in all regressions.

Table 8

Performance regressions by sector

| *Dependent variable* | *Log (Share/(1-Share))* | | | | *Average employment growth* | |
|---|---|---|---|---|---|---|
| | *Sales share - product new to the mkt* | | *Sales share - product new to the firm* | | *1998-2006* | |
| | *Manufacturing* | *KIBS* | *Manufacturing* | *KIBS* | *Manufacturing* | *KIBS* |
| D (has EPO or UK patent) | 0.453 (0.090)*** | 1.072 (0.239)*** | 0.032 (0.075) | -0.300 (0.148)** | 0.057 (0.067) | 0.272 (0.292) |
| D (has trademarks) | 0.047 (0.076) | 0.331 (0.169)** | 0.058 (0.068) | 0.079 (0.135) | 0.132 (0.062)** | -0.014 (0.157) |
| Formal IP important in the 3-digit sector | 0.279 (0.159)* | 0.086 (0.473) | -0.041 (0.132) | -0.461 (0.442) | -0.242 (0.118)** | 1.511 (0.841)* |
| Informal IP important in the 3-digit sector | 0.097 (0.162) | 0.798 (0.438)* | 0.218 (0.133) | -0.463 (0.413) | 0.175 (0.117) | -1.398 (0.786)* |
| Log (R&D per employee) | -0.107 (0.037) | -0.096 (0.053)* | 0.006 (0.029) | 0.113 (0.051)** | -0.018 (0.036) | 0.027 (0.065) |
| D (no R&D) | -0.220 (0.122) | -0.346 (0.194) | -0.002 (0.095) | 0.322 (0.161)** | -0.045 (0.104) | -0.108 (0.223) |
| Log age | -0.237 (0.046)*** | -0.265 (0.058)*** | -0.159 (0.039)*** | -0.295 (0.065)*** | -0.326 (0.055)*** | -0.482 (0.073)*** |
| Log employment | -0.031 (0.038) | -0.058 (0.069) | -0.060 (0.033)* | 0.146 (0.069)** | 0.126 (0.047)*** | 0.178 (0.104)* |
| Log employment squared | 0.013 (0.007)* | 0.013 (0.011) | -0.004 (0.006) | 0.029 (0.013)** | 0.053 (0.014)*** | 0.037 (0.021)* |
| D (exports) | -0.059 (0.095) | -0.012 (0.197) | 0.073 (0.035)** | 0.168 (0.060)*** | -0.219 (0.063)*** | -0.342 (0.151)** |
| D (member of a group) | 0.023 (0.059) | 0.105 (0.102) | 0.056 (0.058) | 0.108 (0.089) | 0.085 (0.036)** | 0.104 (0.122) |
| D (foreign-owned) | 0.148 (0.055)** | -0.119 (0.087) | 0.052 (0.046) | -0.039 (0.086) | 0.019 (0.038) | -0.145 (0.103) |
| R-squared | 0.055 | 0.086 | 0.168 | 0.106 | 0.084 | 0.055 |
| Standard error | 1.50 | 1.71 | 1.42 | 1.65 | 1.04 | 1.75 |
| Observations | 4,839 | 2,668 | 4,839 | 2,668 | 3,358 | 1,629 |

Heteroskedastic-consistent standard errors clustered on enterprise are shown in parentheses.

Period dummies for the three different CIS waves and sector dummies are included in all regressions.