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# The Internationalization Process of Firms: from Exports to FDI?

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# Introduction

- Do firms follow an **internationalization process**, serving foreign markets via **exports** first, before engaging in horizontal **FDI**?

- Vast literature in international business from Johanson and Vahlne (1977):

  – **Market-specific knowledge** (e.g., cultural patterns, consumers' tastes, local regulations) can only be gained through **experience**.

  – Firms follow a process of **gradual involvement** in foreign markets, first exporting and eventually, in some cases, establishing foreign subsidiaries.

# Our paper

- Simple **theoretical model** in which firms enter the foreign markets via **exports** and **switch to FDI** if they discover that they are profitable enough.

- **Empirical analysis** of firms' decisions of how to serve foreign markets over time, using data from NBB covering **exports and FDI** in **individual destinations** for all companies registered in Belgium during **1997-2008**.

# Outline of the presentation

- Related literature
- The model
- Descriptive statistics
- Empirical strategy and preliminary results
- Future work

# Related literature

- **"Proximity-concentration" trade-off**: in choosing how to serve foreign markets, firms face trade-off between higher **variable trade costs** of exporting and higher **fixed set-up costs** of establishing foreign subsidiaries.

  - Standard models (e.g., Horstmann and Markusen, 1992; Markusen and Venables, 2000) and empirical studies (e.g., Brainard, 1997).

  - Within-sector productivity differences across domestic firms (e.g., Helpman, Melitz, and Yeaple, 2004; Head and Ries, 2003).

- **Our paper**: focus on the role of **uncertainty** and **knowledge acquisition** in foreign markets, which can lead firms to switch from export to FDI.

# Related literature (cont.)

- **Firms' export dynamics**:
  - Eaton, Eslava, Kugler, and Tybout (2008)
  - Ruhl and Willis (2008)
  - Lawless (2009)
  - Aeberhardt, Buono, and Fadinger (2009)
  - Eaton, Eslava, Krizan, Kugler, and Tybout (2010)
  - Freund and Pierola (2010)
  - Albornoz, Calvo-Pardo, Corcos, and Ornelas (2010)

- **Our paper**: dynamics of firms' **export** and **FDI** choices.

# Model setup

- A **representative domestic firm** must decide whether or not to sell good $k$ in foreign market $i$, and whether to do so via exports or FDI.

- **Variable costs**: unit production costs, distribution costs ($c_{ik}$) and trade costs ($\tau_{ik}$)

- **Fixed costs** of exports ($F_{ik}^{E}$) and of FDI ($F_{ik}^{I}$), with $F_{ik}^{I} > F_{ik}^{E}$

- **Demand** in the foreign market:

  $q_{ik}(p_{ik}) = a_{ik} - p_{ik}$

# Model setup (cont.)

- Ex-ante, the firm does not know the unit cost of serving the foreign market ($c_{ik}$) and foreign consumers' willingness to pay for its product ($a_{ik}$).

- **Uncertainty** about the **profitability in the foreign market**:

$$\mu_{ik} \equiv a_{ik} - c_{ik},$$

where $\mu_{ik}$ is a random variable with continuous cumulative distribution function $G(.)$ on the support $[\underline{\mu}_{ik}, \overline{\mu}_{ik}]$.

# Model setup (cont.)

- **Assumption 1** guarantees that **exports can be profitable**:

$$\underline{\mu} < \tau \text{ and } \overline{\mu} > \mu^E \equiv (F^E)^{1/2} + \frac{\tau}{2}$$

- **Assumption 2** guarantees that **FDI can be profitable**:

$$\overline{\mu} > \mu^I \equiv (F^I)^{1/2}$$

- **Assumption 3** guarantees that **FDI does not always dominate exports**:

$$\mu^I > \mu^E$$

# Timing

- ***t* = 1**: the firm chooses between **no entry, exports**, or **FDI**. If it enters via exports (FDI), it pays $F^E$ ($F^I$) and chooses how much to sell. At the end of the period, if it has sold a positive amount, it **discovers its profitability** $\mu$.

- ***t* = 2**: if the firm has not entered at $t = 1$, it decides whether or not to do so. If it has entered, it decides whether to **exit**, stay under the **same mode**, or **switch mode**.

# Entry strategies

- **No entry** in the foreign market.

- **Entry via exports**: at $t = 1$, the firm pays $F^E$ and exports to market $i$, learning its profitability $\mu$; at $t = 2$, it continues exporting, switches to FDI, or exits.

- **Entry via FDI**: at $t = 1$, the firm pays $F^I$ and sells in market $i$, learning its profitability $\mu$; at $t = 2$, it continues doing FDI, switches to exports, or exits.

# Period $t = 2$

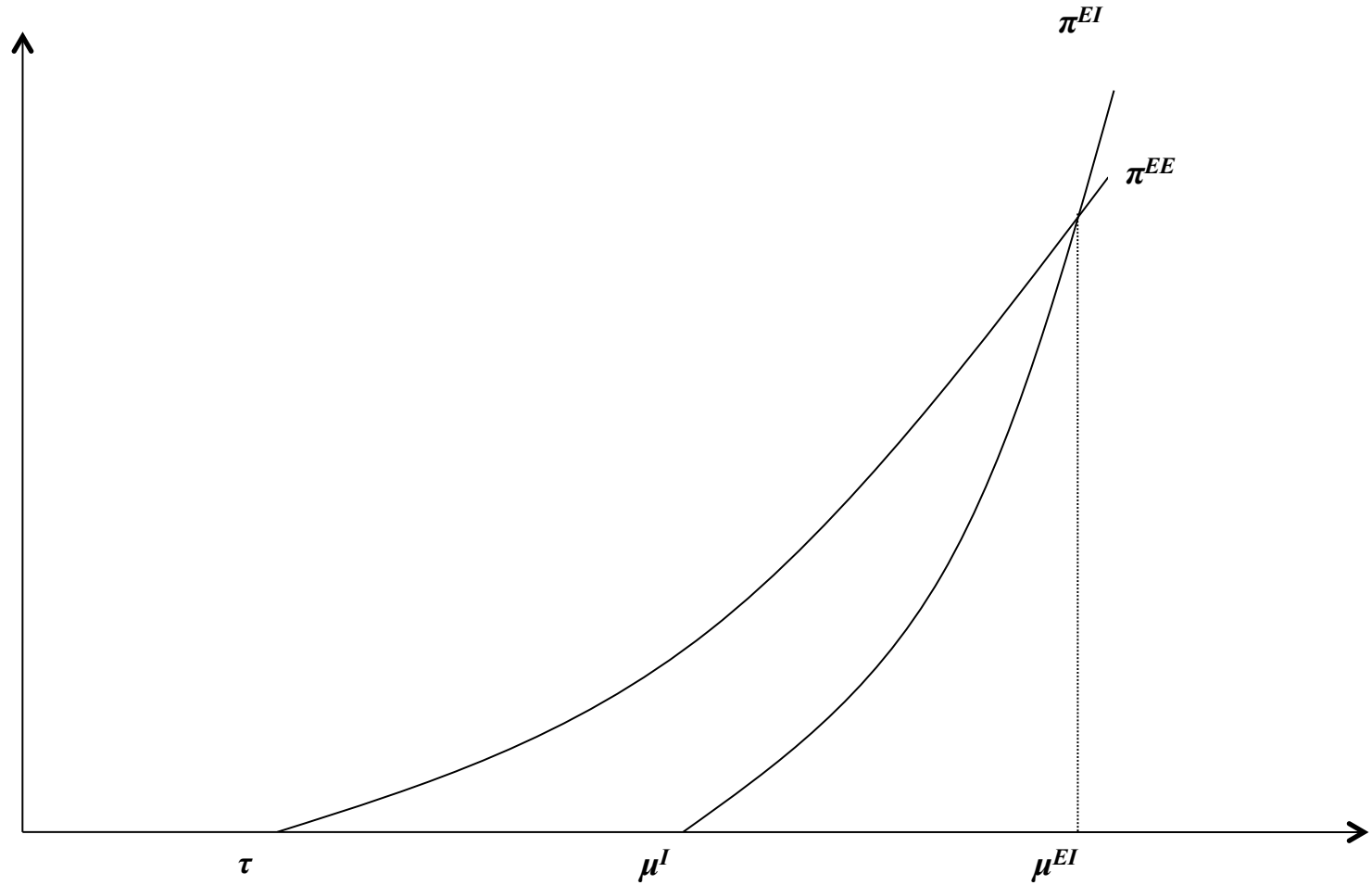
- **Entry via exports at $t = 1$**:

  Second-period export profits: $\pi^{EE}(\tau) = K_{\{\mu>\tau\}}(\frac{\mu-\tau}{2})^2$

  Second-period FDI profits: $\pi^{EI}(F^I) = K_{\{\mu>\mu^I\}}(\frac{\mu^2}{4} - F^I)$

- **Proposition 1**: a firm entering the foreign market via exports at $t = 1$ will **switch to FDI** at $t = 2$ if its profitability exceeds $\mu^{EI} \equiv \frac{2F^I}{\tau} + \frac{\tau}{2}$. The switch is more likely the higher the trade costs $\tau$ and the lower the fixed costs $F^I$.

# Export and FDI profits at $t = 2$ following export entry at $t = 1$



# Period $t = 2$

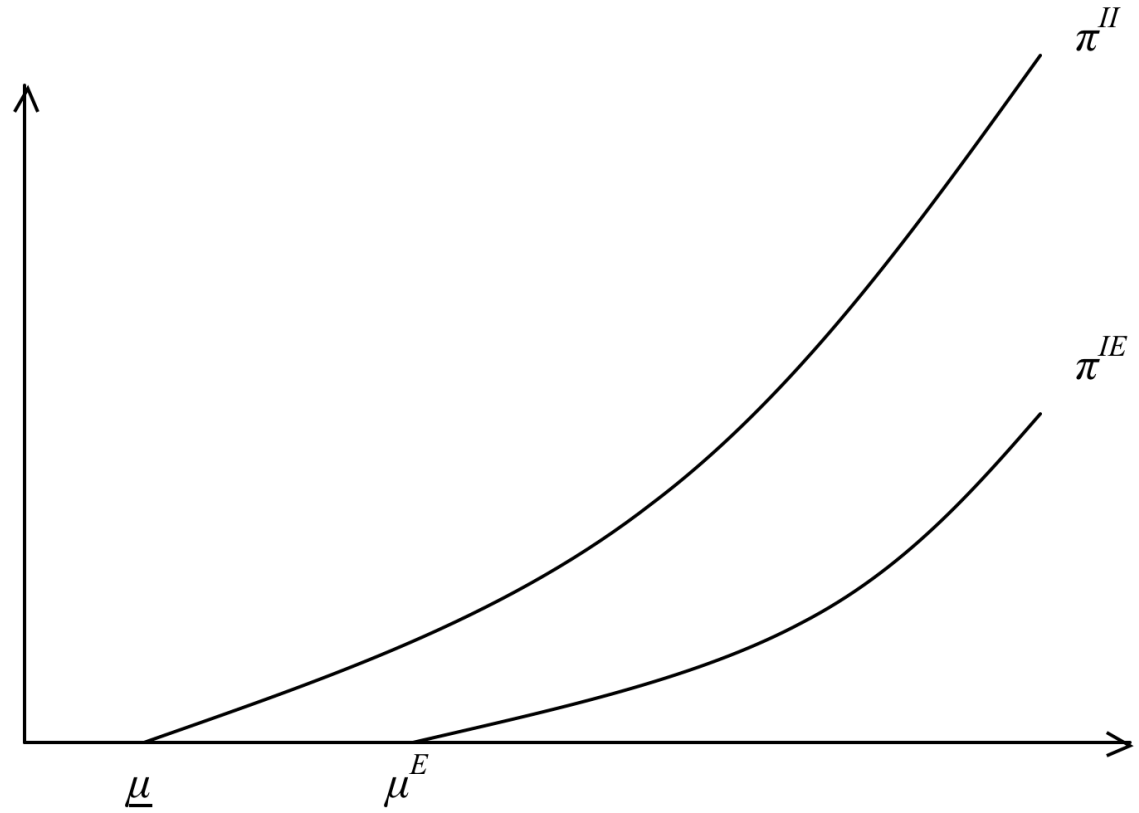
- **Entry via FDI at $t = 1$**

  Second-period FDI profits: $\pi^{II} = \frac{\mu^2}{4}$

  Second-period export profits: $\pi^{IE}(\tau, F^E) = K_{\{\mu > \mu^E\}}((\frac{\mu - \tau}{2})^2 - F^E)$

- **Proposition 2**: a firm entering the foreign market via FDI at $t = 1$ will **never switch to exports** or **exit** the market at $t = 2$.

# Export and FDI profits at $t = 2$ following FDI entry at $t = 1$



# Period $t = 1$

- **Entry via exports at $t = 1$**

Ex-ante expected profits from entering the foreign market via exports:

$$\Omega^E(\tau, F^I, F^E, q^E) \equiv \int_{\mu^E}^{\overline{\mu}} (\frac{\mu - \tau}{2})^2 dG(\mu) - F^E + K_{\{q^E>0\}}\{\int_{\tau}^{\mu^{EI}} (\frac{\mu - \tau}{2})^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} (\frac{\mu^2}{4} - F^I) dG(\mu)\}$$

If $E\mu \leq \mu^E$, the firm may **"experiment"**, exporting an arbitrarily small amount at a loss to discover whether serving the foreign market is actually profitable.

# Period $t = 1$

- **Entry via FDI at $t = 1$**

  Ex-ante expected profits from entering the foreign market via FDI:

$$\Omega^I(F^I, q^I) \equiv \int_{\mu^I}^{\overline{\mu}} \frac{(\mu)^2}{4} dG(\mu) - F^I + K_{\{q^I>0\}} \int_{\underline{\mu}}^{\overline{\mu}} \frac{\mu^2}{4} dG(\mu)$$

- **Proposition 3**: if $\Omega^E(\tau, F^I, F^E) > 0$ and $\Omega^E(\tau, F^I, F^E) > \Omega^I(F^I)$, the firm will follow an **internationalization process**, entering the foreign market via exports at $t = 1$, and switching to FDI at $t = 2$ with probability 1- G($\mu^{EI}$).

# Empirical predictions

- **Uncertainty** about the profitability of serving foreign markets can lead firms to **"experiment"** via **exports**.

- Following an initial a "trial phase", firms will either exit, expand export volumes, or **switch to FDI**.

- The likelihood of a switch from export to FDI increases with a firm's **export experience** and with the extent of the **trade costs**.

# Sample

- **Destinations**
  - Countries outside the EU Single Market (tariff variation)
  - Members of the WTO (tariff data availability)

- **Firms**
  - Manufacturing industries
  - Exporting to at least one country outside Single Market over 1997-2008
  - At least 5 (or at least 20) employees

# Descriptive statistics

- An average 63% of firms export (42% outside SM)
- An average 4.6% of firms have foreign subsidiaries (0.84% outside SM)
- Firms export to 11 countries on average  (7 outside SM)
- Firms have subsidiaries in 3.08 countries on average (4 outside the SM)

# Descriptive statistics (cont.)

Table 1: Population of firms by export and FDI status

| Year | Total Firms | World | | Outside SM | |
|---|---|---|---|---|---|
| | in Belgium | Exporting | With FDI | Exporting | With FDI |
| 1997 | 8,527 | 5,694 | 308 | 3,536 | 42 |
| 1998 | 8,763 | 5,490 | 346 | 3,567 | 47 |
| 1999 | 8,839 | 5,516 | 347 | 3,593 | 51 |
| 2000 | 8,787 | 5,526 | 360 | 3,603 | 60 |
| 2001 | 8,667 | 5,568 | 435 | 3,568 | 77 |
| 2002 | 8,499 | 5,521 | 446 | 3,532 | 74 |
| 2003 | 8,416 | 5,467 | 451 | 3,489 | 76 |
| 2004 | 8,350 | 5,391 | 464 | 3,526 | 84 |
| 2005 | 8,345 | 5,307 | 388 | 3,548 | 83 |
| 2006 | 8,369 | 5,040 | 391 | 3,579 | 91 |
| 2007 | 8,372 | 5,064 | 379 | 3,702 | 90 |
| 2008 | 7,168 | 4,561 | 323 | 3,371 | 76 |

# Descriptive statistics (cont.)

Table 2: Export and FDI relationships (i.e., all bilateral relationships)

| Year | Export Relationships | | FDI Relationships | |
|---|---|---|---|---|
| | World | Outside SM | World | Outside SM |
| 1997 | 55,572 | 23,420 | 807 | 173 |
| 1998 | 55,822 | 23,119 | 974 | 214 |
| 1999 | 56,025 | 22,923 | 1,004 | 230 |
| 2000 | 57,330 | 23,748 | 1,127 | 283 |
| 2001 | 58,603 | 24,135 | 1,335 | 330 |
| 2002 | 58,693 | 24,172 | 1,383 | 332 |
| 2003 | 58,846 | 24,025 | 1,369 | 336 |
| 2004 | 60,046 | 24,517 | 1,324 | 334 |
| 2005 | 60,774 | 25,194 | 1,222 | 322 |
| 2006 | 57,155 | 25,366 | 1,312 | 390 |
| 2007 | 57,156 | 25,591 | 1,296 | 387 |
| 2008 | 53,408 | 24,764 | 1,147 | 349 |

# Empirical methodology

1. What determines **whether** and **how** a firm serves a foreign market?

   Methodology: **multiple choice models** (order probit, multinomial logit)

2. What determines whether a firm switches **from export to FDI**?

   Methodology: **survival analysis** (Cox model, Weibull model)

# Multiple choice models

- The dependent variable takes on the following values:

  $Y_{fit}$ = 0 if firm *f* **does not serve** foreign market *i* at time *t*

  $Y_{fit}$ = 1 if firm *f* **exports** to foreign market *i* at time *t*

  $Y_{fit}$ = 2 if firm *f* has a **foreign affiliate** in foreign market *i* at time *t*

- In the **ordered probit** model, the three outcomes are assumed to be ordered.

- In the **multinomial logit** model, there is no logical ordering to the outcomes.

# Ordered probit model: preliminary results

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| | All countries | | All countries | | OECD high income | |
| | Exports | FDI | Exports | FDI | Exports | FDI |
| Employment$_{ft}$ | 6.68%*** | 6.00%*** | 5.45%*** | 4.70%*** | 0.78%*** | 6.46%*** |
| Productivity$_{ft}$ | 0.73%*** | 0.65%*** | 0.60%*** | 0.52%*** | 1.80%*** | 14.81%*** |
| MNE$_{ft}$ | 139.16%*** | 118.71%*** | 113.44%*** | 91.81%*** | -0.71% | -5.69% |
| Export experience$_{fit}$ | 2533.39%*** | 124.43%*** | 4752.24%*** | 120.30%*** | 83.16%*** | 113.93*** |
| Applied tariff$_{kit}$ | -41.17%*** | -37.02%*** | -4.02% | -3.47% | 0.37% | 3.08% |
| Distance$_i$ | | | 0.25% | 0.22% | | |
| GDP$_{it}$ | | | -0.004%*** | -0.004%*** | | |
| GDP per capita$_{it}$ | | | 1.34%*** | 1.15%*** | | |
| Rule of law$_{it}$ | | | 7.93%*** | 6.84%*** | | |
| Year fixed effects | included | | included | | included | |
| Sector fixed effects | included | | included | | included | |
| Destination fixed effects | included | | not included | | included | |
| Cutpoint 1 | 2.70 | | 3.04 | | 0.53 | |
| Cutpoint 2 | 6.31 | | 6.63 | | 3.79 | |
| Observations | 3,529,921 | | 3,442,793 | | 59,701 | |
| Log pseudolikelihood | -93,194.15 | | -93,954.64 | | -27,555.07 | |
| Pseudo $R^2$ | 0.87 | | 0.87 | | 0.26 | |

*Notes*: The dependent variable equals 0 if firm *f* does not export and does not engage in FDI in country *i* at time *t*, equals 1 if it exports to country *i* , and equals 2 if it has subsidiaries in country *i*. Marginal effects calculated at the sample mean (except those for employment and productivity for the 'FDI' outcome, which are set at the average value of the observations for which the dependent variable equals 1). Marginal effects expressed as percentage changes in estimated baseline probability for aninfinitesimal change in each regressor (calculated as discrete changes from 0 to 1 for dummy variables). Statistical significance based on robust standard errors in parenthesis; *** denotes significance at 1% level; ** 5% level.

# Survival analysis

- The dependent variable is the probability that firm *f* **opens a foreign subsidiary** in market *i* at time *t,* after having entered a market via exports:

$$h_{fit}(t) = h_0(t)\exp(\beta X_{fit})$$

$h_0(t)$: baseline hazard rate
$X_{ijt}$: explanatory regressors
$\beta$: vector of coefficients to be estimated

- Alternative assumptions about **baseline hazard rate**:
  - Unspecified in semi-parametric models (e.g., Cox model)
  - Specific functional form parametric models (e.g., exponential, Weibull)

# Survival analysis (cont.)

- **Export entry** is defined as positive exports after 4 years of no export activity to that market (2 years of no export activity as a robustness).

- Since we have export data from 1993 and our sample begins in 1997, we do not have left censoring (i.e., we observe all "entries" from 1997 onwards).

- We measure **export experience** in two ways:

  Export experience1: years since export entry with positive export sales

  Export experience2: years since export entry

- Average experience upon FDI entry: 3.26 (experience1) and 3.79 (experience2)

# An example

Exports of firm *f* to market *i* (1 = positive exports):

| 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

FDI of firm *f* in market *i* (1 = positive FDI):

| 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

Export entry: 1998

FDI entry: 2003

Export experience1 at time of FDI entry: 4 years

Export experience2 at time of FDI entry: 5 years

# Cox model: preliminary results

| | New exporter (at least 4 years of inactivity) | | | | | |
|---|---|---|---|---|---|---|
| Regressor | (1) | (2) | (3) | (4) | (5) | (6) |
| Export experience1 | 1.272*** | 1.267*** | 1.250*** | | | |
| | (0.062) | (0.065) | (0.064) | | | |
| Export experience2 | | | | 1.206*** | 1.203*** | 1.193*** |
| | | | | (0.055) | (0.057) | (0.056) |
| Employment | 1.392*** | 1.473*** | 1.713*** | 1.377*** | 1.472*** | 1.720*** |
| | (0.119) | (0.209) | (0.257) | (0.116) | (0.206) | (0.252) |
| Productivity | 1.05 | 1.077 | 1.131 | 1.075 | 1.092 | 1.145 |
| | (0.119) | (0.141) | (0.121) | (0.116) | (0.138) | (0.118) |
| MNE | 2.554*** | 2.301*** | 2.253*** | 2.824*** | 2.520*** | 2.424*** |
| | (0.811) | (0.729) | (0.714) | (0.867) | (0.771) | (0.747) |
| Tariff | 0.826 | 1.652 | 5.243** | 0.832 | 1.640 | 5.371** |
| | (0.629) | (1.585) | (3.990) | (0.637) | (1.616) | (3.990) |
| Distance | 1.064 | 1.060 | | 1.065 | 1.062 | |
| | (0.047) | (0.047) | | (0.048) | (0.047) | |
| GDP | 1.150*** | 1.143** | | 1.154*** | 1.150*** | |
| | (0.062) | (0.063) | | (0.062) | (0.063) | |
| GDP per capita | 1.037* | 1.038 | | 1.036* | 1.037* | |
| | (0.020) | (0.020) | | (0.020) | (0.020) | |
| Rule of law | 0.929 | 0.941 | | 0.947 | 0.956 | |
| | (0.228) | (0.228) | | (0.232) | (0.232) | |
| Bilateral Investment Treaty | 3.251*** | 3.159*** | | 3.270*** | 3.199*** | |
| | (1.082) | (1.058) | | (1.089) | (1.073) | |
| Sector effects | | included | included | | included | included |
| Country effects | | | included | | | included |
| Observations | 161,457 | 161,457 | 168,494 | 161,457 | 161,457 | 168,494 |
| Firms included | 5,049 | 5,049 | 5,083 | 5,049 | 5,049 | 5,083 |
| New exporter occurences | 29,307 | 29,307 | 30,475 | 29,307 | 29,307 | 30,475 |
| FDI occurences | 61 | 61 | 61 | 61 | 61 | 61 |
| Log likelihood | -582.03 | -563.37 | -526.81 | -585.14 | -566.20 | -529.12 |

*Notes*: The table reports hazard ratios with standard errors clustered at the firm/destination level in brackets. A coefficient above (below) 1 implies that the variable has a positive (negative) effect on the likelihood of FDI. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

# Cox model: robustness checks

| | New exporter (at least 2 years of inactivity) | | | High income OECD | | | Firms with more than 20 employees | | |
|---|---|---|---|---|---|---|---|---|---|
| Regressor | (1) | (2) | (3) | (4) | (5) | (6) | (4) | (5) | (6) |
| Export experience1 | 1.296*** | 1.306*** | 1.280*** | 1.240*** | 1.230*** | 1.220*** | 1.258*** | 1.254*** | 1.235*** |
| | (0.053) | (0.056) | (0.056) | (0.092) | (0.094) | (0.093) | (0.061) | (0.063) | (0.062) |
| Employment | 1.334*** | 1.493*** | 1.682*** | 1.634*** | 1.781** | 2.021** | 1.321*** | 1.366*** | 1.595*** |
| | (0.094) | (0.180) | (0.204) | (0.260) | (0.421) | (0.644) | (0.126) | (0.206) | (0.244) |
| Productivity | 1.073 | 1.140 | 1.200* | 1.283*** | 1.320** | 1.318** | 1.113 | 1.162 | 1.209* |
| | (0.123) | (0.143) | (0.121) | (0.120) | (0.152) | (0.147) | (0.143) | (0.170) | (0.128) |
| MNE | 1.881** | 1.764** | 1.766** | 2.971** | 2.646** | 2.626** | 1.996** | 1.886** | 1.843** |
| | (0.557) | (0.510) | (0.512) | (1.578) | (1.330) | (1.339) | (0.607) | (0.569) | (0.553) |
| Tariff | 0.897 | 1.017 | 2.520 | 2.52e-08** | 3.37e-10 | 2.27e-11 | 0.766 | 1.541 | 4.491* |
| | (0.572) | (1.017) | (1.849) | (2.22e-07) | (4.93e-10) | (3.36e-10) | (0.609) | (1.571) | (3.585) |
| Distance | 1.048 | 1.046 | | 0.970 | 0.964 | | 1.060 | 1.055 | |
| | (0.042) | (0.042) | | (0.066) | (0.065) | | (0.048) | (0.048) | |
| GDP | 1.148*** | 1.142*** | | 1.045 | 1.053 | | 1.164*** | 1.160*** | |
| | (0.060) | (0.059) | | (0.071) | (0.070) | | (0.063) | (0.063) | |
| GDP per capita | 1.021 | 1.020 | | 1.030 | 1.021 | | 1.038* | 1.038** | |
| | (0.019) | (0.019) | | (0.036) | (0.039) | | (0.020) | (0.020) | |
| Rule of law | 1.066 | 1.076 | | 4.576** | 5.258*** | | 0.935 | 0.944 | |
| | (0.225) | (0.224) | | (3.031) | (4.254) | | (0.231) | (0.231) | |
| Bilateral Investment Treaty | 3.186*** | 3.128*** | | | | | 3.260*** | 3.142*** | |
| | (0.988) | (0.967) | | | | | (1.080) | (1.053) | |
| Sector effects | | included | included | | included | included | | included | included |
| Country effects | | | included | | | included | | | included |
| Observations | 155,173 | 155,173 | 161,818 | 31,597 | 31,597 | 31,597 | 131,062 | 131,062 | 136,857 |
| Firms included | 5,027 | 5,027 | 5,059 | 3,198 | 3,198 | 3,198 | 3,220 | 3,220 | 3,238.00 |
| New exporter occurences | 36,404 | 36,404 | 37,918 | 5,701 | 5,701 | 5,701 | 23,231 | 23,231 | 24,154 |
| FDI occurences | 72 | 72 | 72 | 22 | 22 | 22 | 61 | 61 | 61 |
| Log likelihood | -691.18 | -666.23 | -627.08 | -171.15 | -159.92 | -156.36 | -569.31 | -551.07 | -514.06 |

*Notes*: The table reports hazard ratios with standard errors clustered at the firm/destination level in brackets. A coefficient above (below) 1 implies that the variable has a positive (negative) effect on the likelihood of FDI. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

# Future work

- Strategies to identify **horizontal FDI**:
  - Use detailed information from NBB trade dataset to rule out FDI entries that do not lead to a fall in the firm's **exports of "core products"**.
  - Use spotty information from NBB FDI Survey to rule out FDI entries that lead to "substantial" **intra-firm trade**.
- Apply analysis to **regions** or **trade blocs**, to account for export-platform FDI.