# Multinational firms and Export Dynamics

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# Motivation

What are the main features of MNE dynamics as opposed to exporter dynamics?

Numerous recent papers on export dynamics, but little evidence on dynamics of FDI
Reason: strong data requirements

**This paper**

- novel facts on multinational firm dynamics contrasted with export dynamics
- using detailed firm-level data on exports and FDI from Norway, France and Germany
- simple extension of Helpman, Melitz, Yeaple (2004) suffices to explain many features of the data

# Literature

- Nascent literature on FDI dynamics

  Conconi, Sapir, Zanardi (forthcoming); Cravino & Levchenko (2015); Egger, Fahn, Merlo & Wamser (2014); Fillat & Garetto (2014); Fillat, Garetto & Oldenski (2015); Kotseva & Vettas (2005); Ramondo, Rappaport & Ruhl (2013); Rob & Vettas (2003)

- Comparatively large literature on export dynamics

  *Fact finding*: e.g. Albornoz, Pardo, Corcos & Ornelas (2012), Schmeiser (2012);
  *Heterogeneous firm models*: Alessandria & Choi (2007, forthcoming), Aw, Roberts & Xu (2011), Burstein & Melitz (2012), Costantini & Melitz (2007), Das, Roberts & Tybout (2007), Impullitti, Irarrazabal & Opromolla (2013), Liu (2014), Roberts & Tybout (1997), Ruhl & Willis (2013);
  *Learning models*: Akhmetova (2010), Akhmetova & Mitaritonna (2010), Eaton, Eslava, Jinkins, Krizan & Tybout (2014), Morales, Sheu & Zahler (2015), Timoshenko (2015, 2015)

# Data

1. **Norway, 1996-2006. Main data source.**
   Sample: 8,044-8,838 firms per year.
   - Balance sheet, customs, foreign affiliate data for manufacturing sector
   - Every year: destination of exports; location of foreign affiliates; domestic, export and foreign affiliate sales

2. **France, 1999-2011.**
   - Balance sheet, customs, foreign affiliate data for manufacturing sector
   - Every year: destination of exports; location of foreign affiliates; domestic and (monthly) export sales; foreign affiliates: no sales, some employment

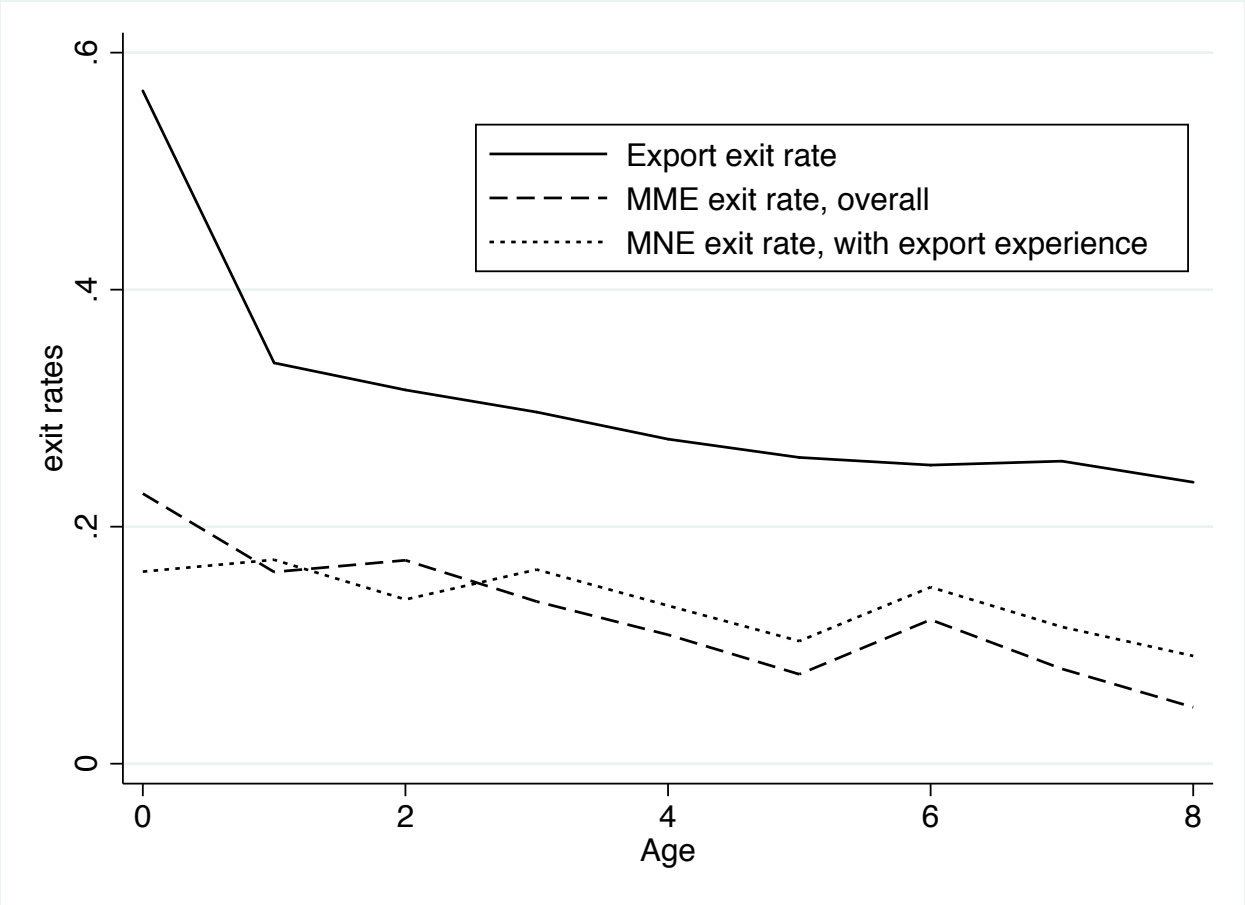
3. **Germany, 1999-2011.**
   - Foreign affiliate data for manufacturing sector
   - Every year: location of foreign affiliates; domestic and foreign affiliate sales and employment; no exporters or domestic firms

Summary Statistics

# Fact I: Exit rates (I)

**Exit rates are lower for new MNEs than for new exporters.**

Firm-destination level. Norway.

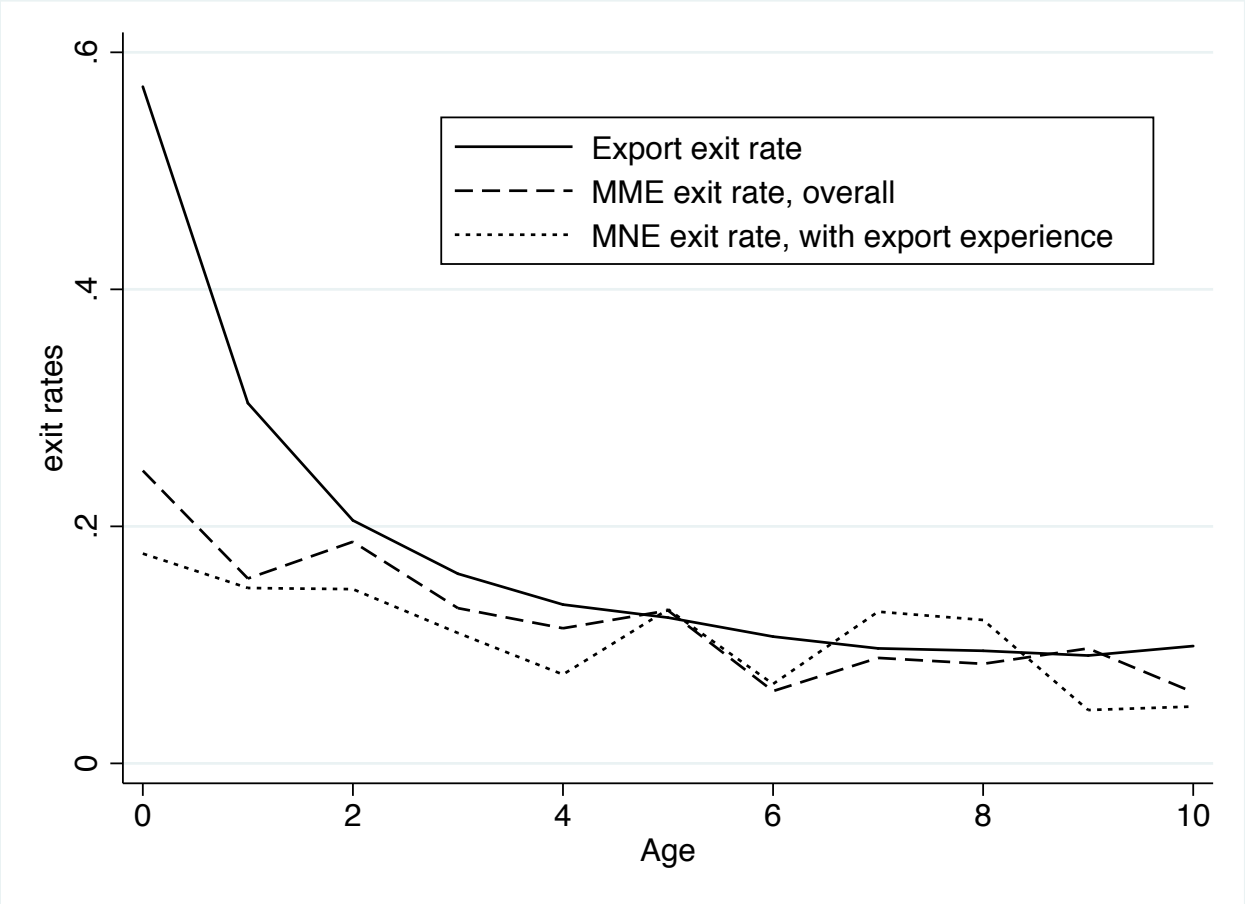



Firm level

# Fact I: Exit rates (II)

**Exit rates are lower for new MNEs than for new exporters.**

Firm-destination level. France.

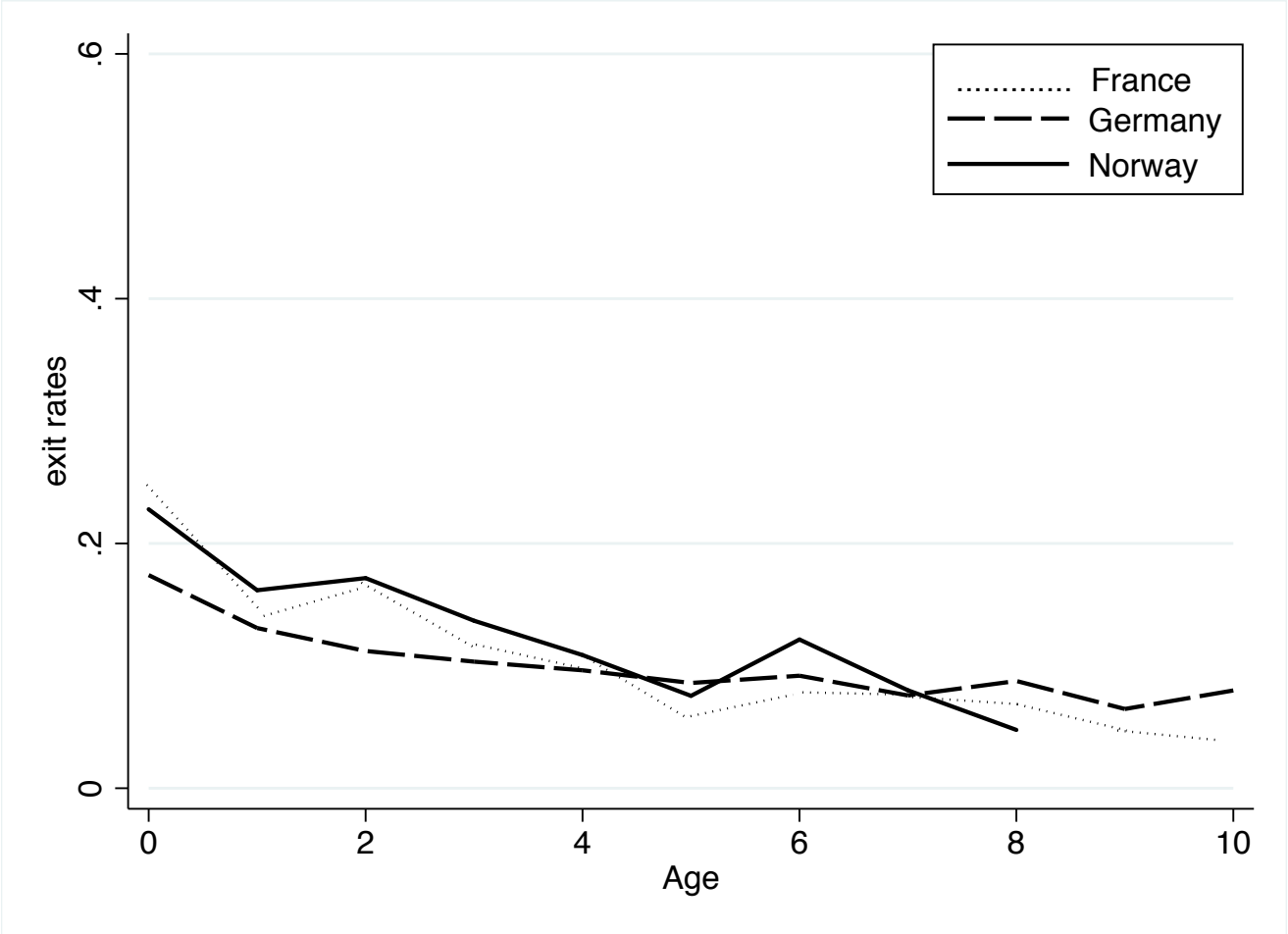



Firm level

# Fact I: Exit rates (III)

**Exit rates are lower for new MNEs than for new exporters.**

Multinational firms. All countries.




Firm level

# Fact I: Exit rate regressions

$$Exit_{inmt} = \beta_0\, mne_{int} + \beta_1\, age_{inmt} + \beta_2\, mne_{int} \times age_{inmt}$$
$$+\beta_3\, exp_{inmt} + \beta_4\, mne_{int} \times exp_{inmt} + \alpha_n + \alpha_s + \alpha_t + \epsilon_{inmt}$$

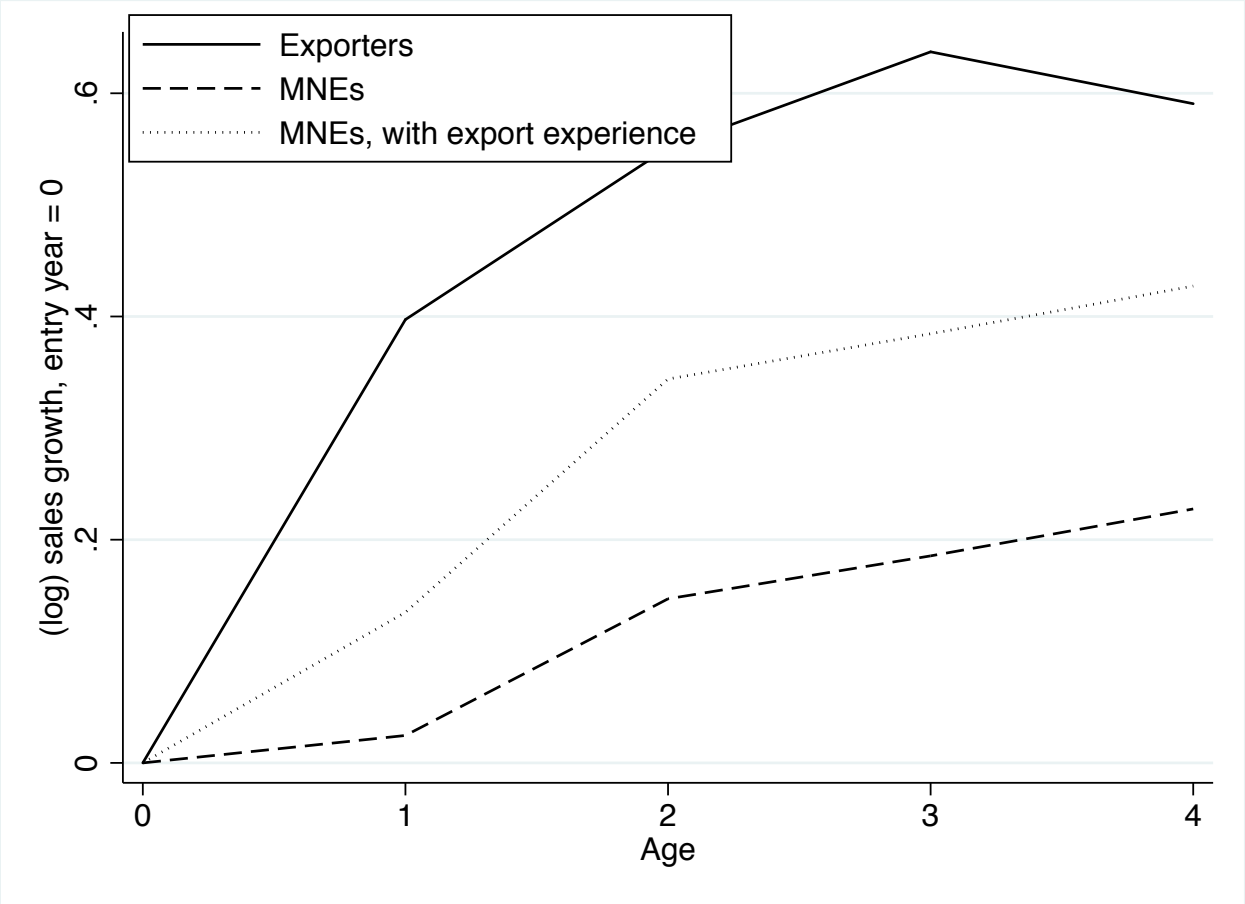
with $i$: firm, $n$: destination, $m$: mode, $t$: time, $s$: sector; $\alpha$: fixed effect

| | — Norway — | | | — France — | | |
|---|---|---|---|---|---|---|
| $mne_{in}$ | -0.22*** | -0.23*** | -0.21*** | -0.29*** | -0.28*** | -0.22*** |
| | (0.027) | (0.032) | (0.034) | (0.022) | (0.022) | (0.022) |
| $age_{inmt}$ | -0.044*** | -0.044*** | -0.042*** | -0.072*** | -0.072*** | -0.055*** |
| | (0.002) | (0.002) | (0.002) | (0.004) | (0.004) | (0.003) |
| $mne_{in} \times age_{inmt}$ | 0.026*** | 0.026*** | 0.028*** | 0.048*** | 0.048*** | 0.039*** |
| | (0.006) | (0.006) | (0.006) | (0.005) | (0.005) | (0.003) |
| $exp_{inm}$ | | -0.063 | -0.019 | | -0.135*** | -0.116*** |
| | | (0.054) | (0.055) | | (0.011) | (0.011) |
| $exp_{inm} \times mne_{in}$ | | 0.073 | 0.057 | | 0.109*** | 0.183*** |
| | | (0.064) | (0.065) | | (0.014) | (0.018) |
| log $sales_{it,dom}$ | | | -0.03*** | | | -0.04*** |
| | | | (0.004) | | | (0.001) |
| Observations | 114,426 | 114,426 | 109,092 | 2,158,576 | 2,158,576 | 925,990 |
| R-squared | 0.066 | 0.066 | 0.077 | 0.135 | 0.120 | 0.126 |

# Fact II: Sales growth rates (I)

**Growth profiles are flatter for new MNEs than for new exporters.**

Foreign sales growth. Norway.

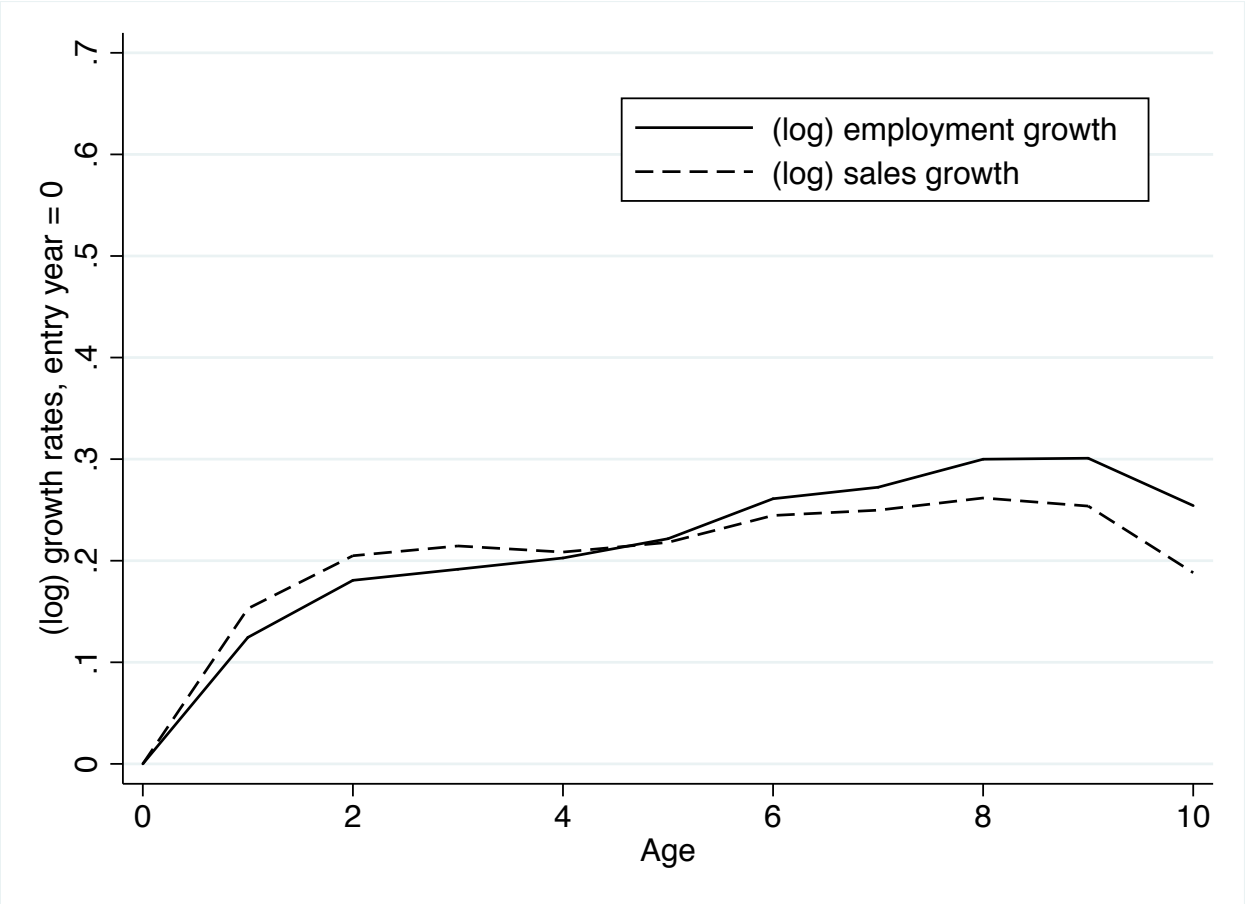



Regressions N vs. G vs. F

# Fact II: Sales growth rates (II)

**Growth profiles are flatter for new MNEs than for new exporters.**

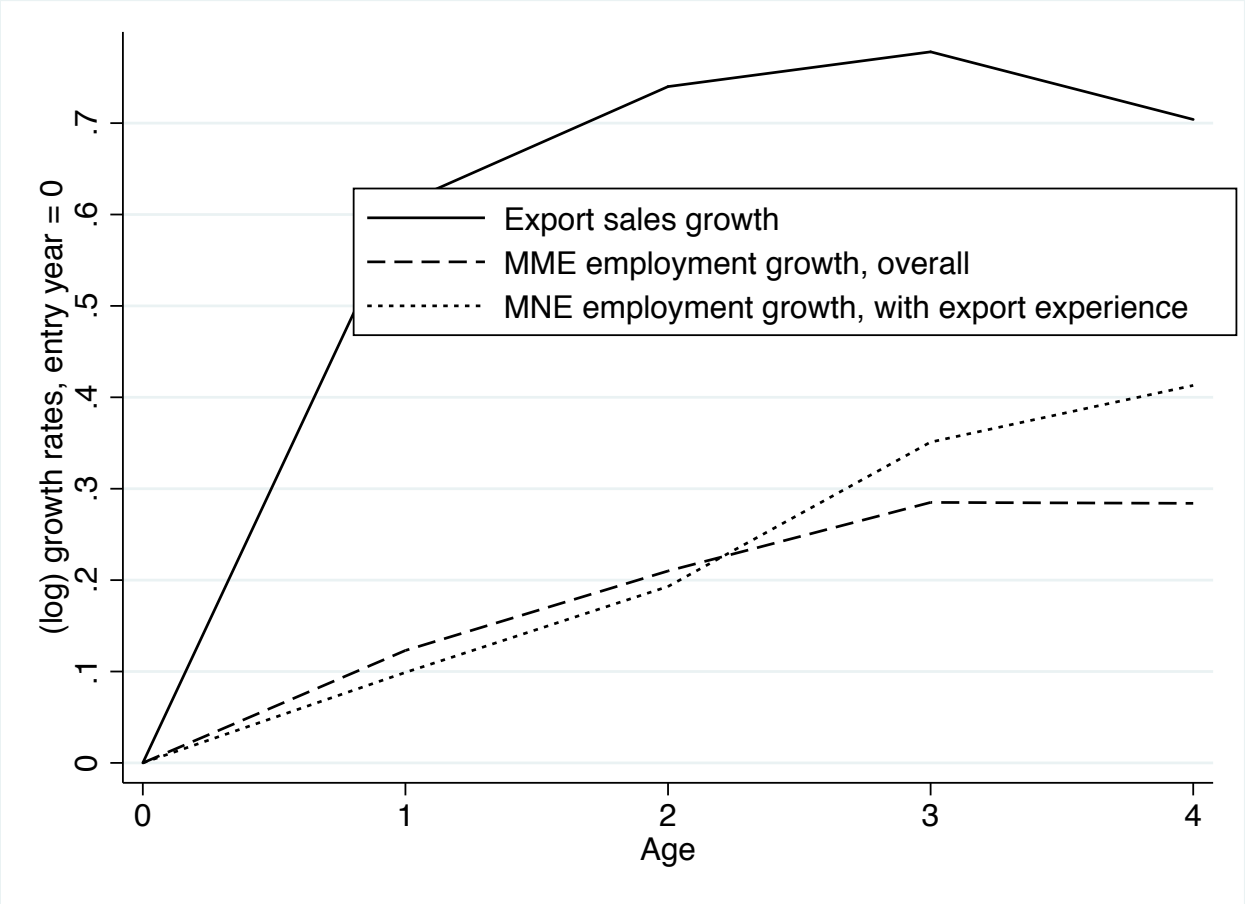
Foreign affiliate sales vs. employment growth. Germany.



# Fact II: Sales growth rates (III)

**Growth profiles are flatter for new MNEs than for new exporters.**

Foreign sales and employment growth. France.




Exports PYE

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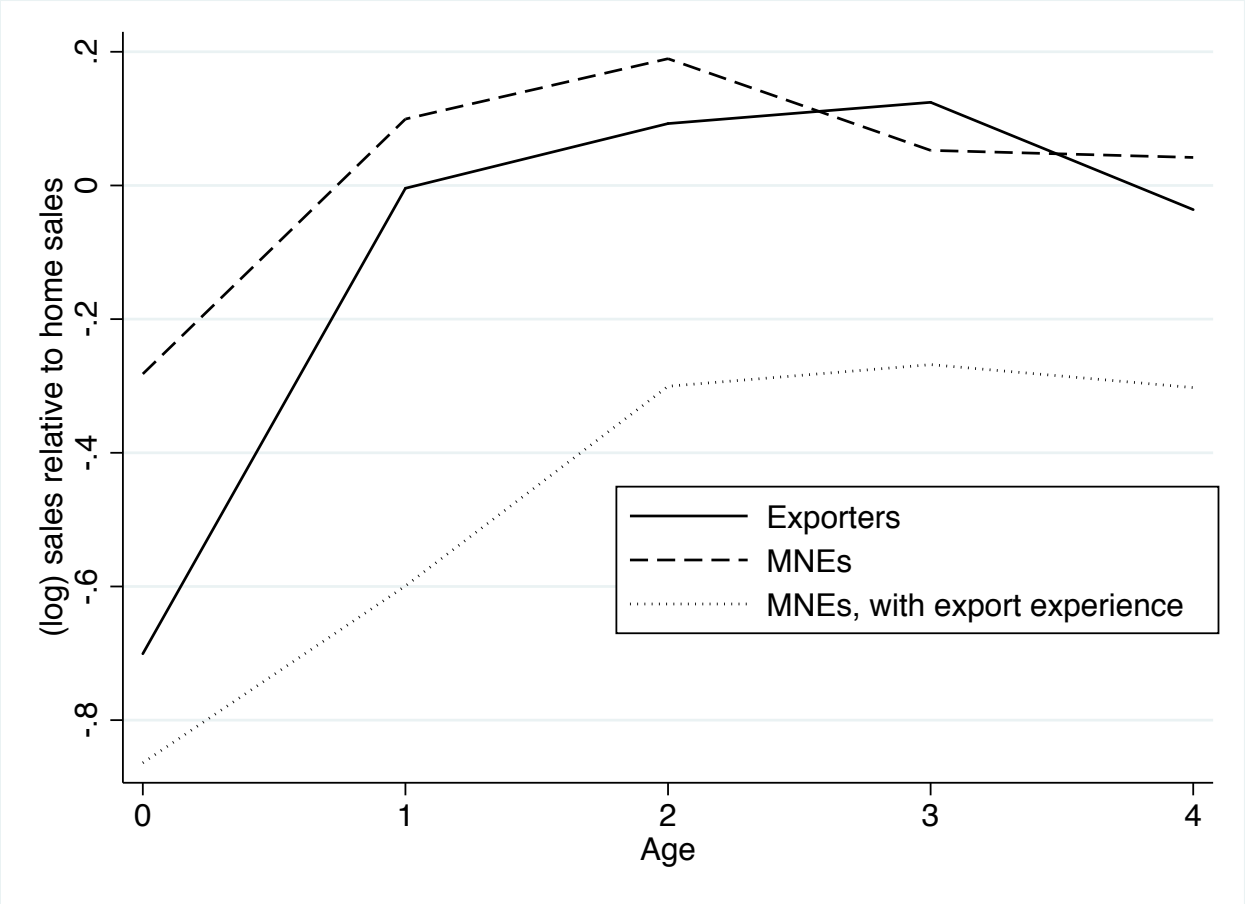



Regressions

# Fact III: Transition patterns

**Experienced MNEs are larger than incumbent MNEs.**

Firm level. Mean log sales.

| $t-1 \setminus t$ | Domestic | Exporter | MNE | Total |
|---|---|---|---|---|
| Domestic | -1.47 | -0.92 | -0.42 | -1.43 |
| Exporter | -1.17 | -0.35 | 0.96 | -0.39 |
| MNE | -2.29 | 0.38 | 0.67 | 0.63 |
| Total | -1.45 | -0.38 | 0.68 | -0.86 |

Countries

# Theory: Assumptions

Point of departure: **Helpman, Melitz & Yeaple (2004)**

- One factor of production: labor
- Two countries
- Three options: domestic activity $D$, exporting $X$, FDI $M$
- Fixed costs of exporting $f^X$ and FDI $f^M$ with $f^M > \tau^{\sigma-1} f^X$
- Iceberg-type transport costs $\tau \geq 1$
- Continuum of firms, monopolistic competition, CES preferences

Plus

- Several time periods $t = 0, 1, 2, ...$, infinite time horizon
- **Sunk costs of FDI** $f_e^M > 0$
- **Markov productivity process**: productivity $\phi_{\mathbf{t}} = \mathbf{exp}(\mathbf{z_t})$ with

$$z_t = \rho z_{t-1} + \sigma_\epsilon \epsilon_t \qquad 0 < \rho < 1,\ \epsilon_t \sim N(0,1)$$

# Results

1. **MNEs more productive than exporters,**
   **MNE entrants more productive than MNE exiters.**

$$\bar{\phi}^X < \bar{\phi}^M < \bar{\phi}_e^M$$

→ Band of inaction $\phi \in [\bar{\phi}^M, \bar{\phi}_e^M]$

2. **Exit rate of experienced MNEs lower than of inexperienced MNEs.**
   Intuition:

   Exporters more productive than domestic firms

   MNE entry upon positive productivity shock

   MNE exit cut-off independent of experience

⇒ As experienced MNEs larger at time of entry, less likely to exit.

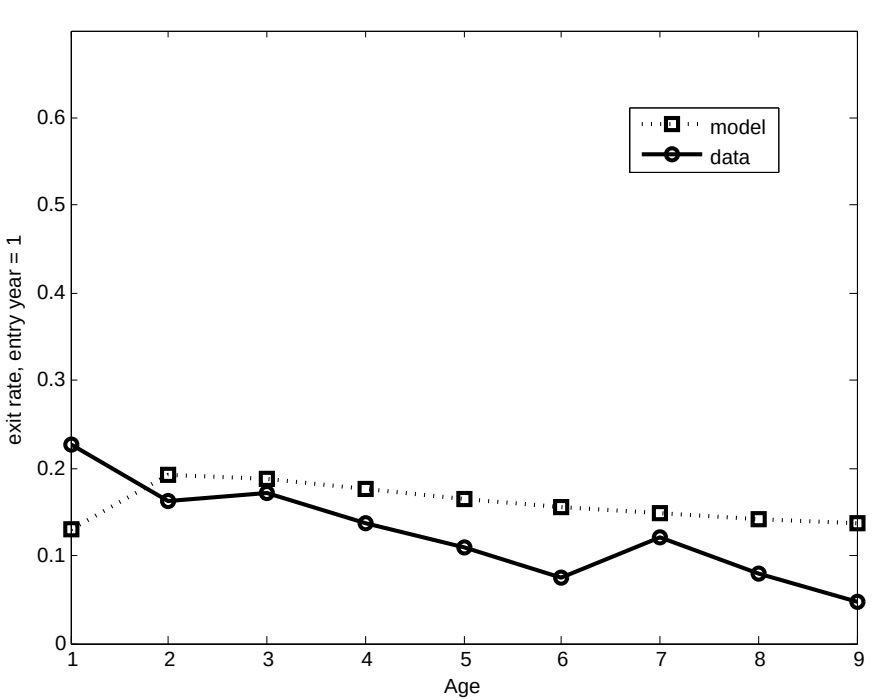
# Calibration: Moments (Norway)

| Parameter | Description | Value | Moment | Data | Model |
|---|---|---|---|---|---|
| *Fixed* | | | | | |
| $\sigma$ | Elasticity of substitution | 5 | | | |
| $\beta$ | Discount factor | 0.95 | | | |
| *Calibrated* | | | | | |
| $\tau$ | trade iceberg cost | 1.6 | $\frac{\text{export sales}}{\text{domestic sales}}$ | 0.15 | 0.15 |
| $\rho$ | persistence of productivity shock | 0.966 | AR(1), domestic sales | 0.966 | 0.966 |
| $\sigma_\epsilon$ | SD of productivity shock | 0.095 | | 0.095 | 0.095 |
| $f^x$ | export fixed cost | 0.040 | fraction of exporters, | 39.6 | 40.8 |
| $f^m$ | FDI fixed cost | 3.930 | fraction of MNEs, | 1.5 | 1.41 |
| $f_e^m$ | FDI entry cost | 2.472 | prob. 1st y. MNE exit | 21 | 13 |

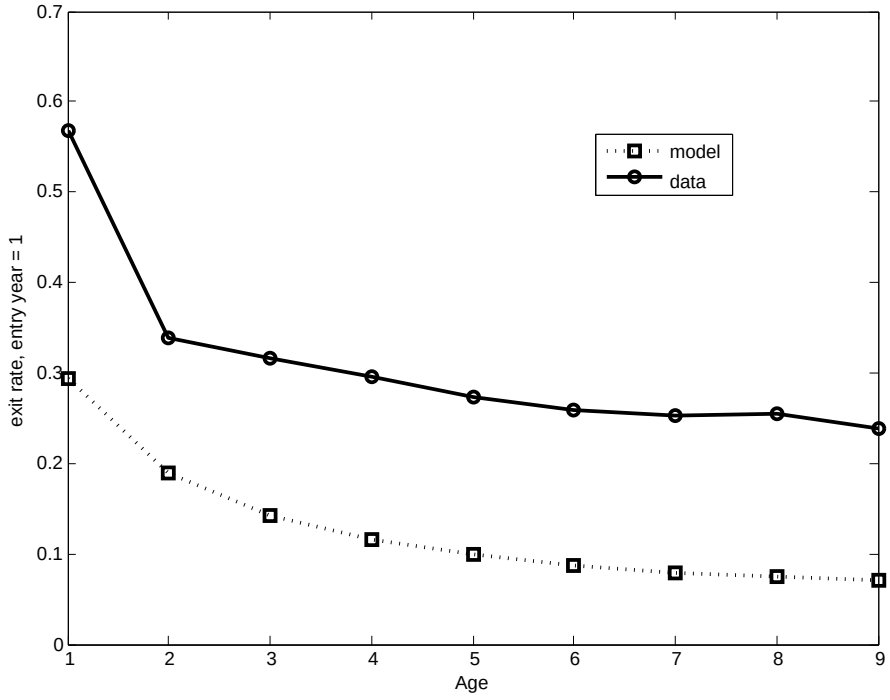
# Calibration: Non-targeted moments

| Non-targeted moments | data | model |
|---|---|---|
| probability of export exit in the 1st yr after entry | 58% | 31% |
| fraction of experienced MNEs (in all MNEs) | 39% | 15% |
| prob. of becoming experienced MNE | 0.17% | 0.52% |
| prob. of becoming non-experienced MNE | 0.09% | 0% |
| prob. of experienced MNE exit in the 1st yr after entry | 16% | 13% |
| prob. of non-experienced MNE exit in the 1st yr after entry | 27% | 22% |

# Calibration: Exit rates

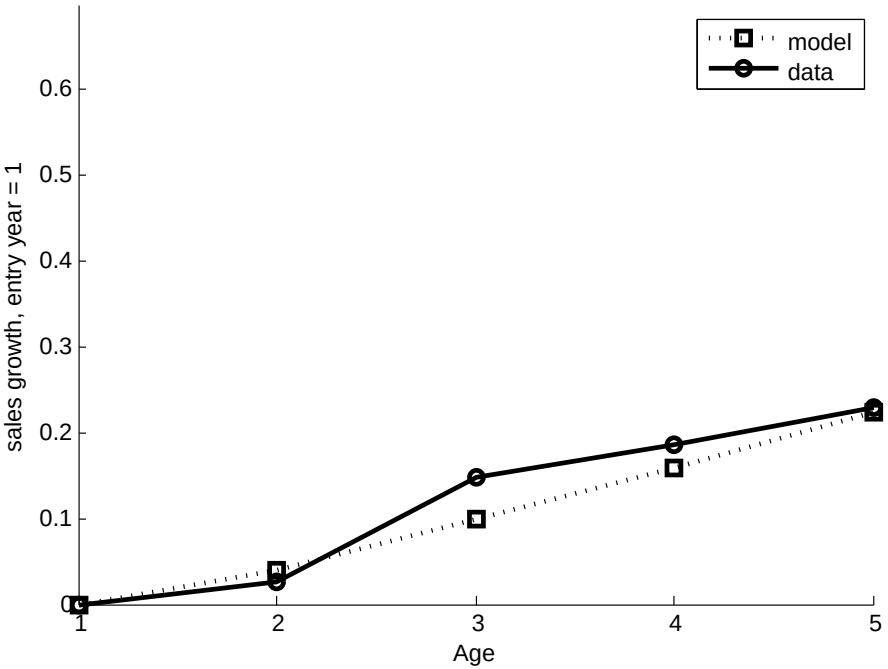



(a) MNEs

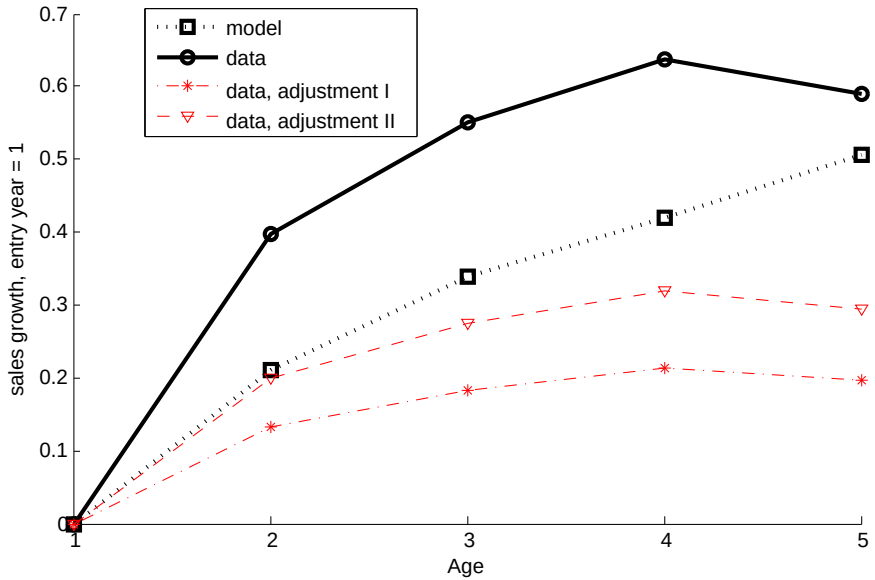



(b) Exports

# Calibration: Growth pattern




(c) Affiliate sales — growth rel. to entry year




(d) Exports — growth rel. to entry year

# Final remarks

**Take away**

- New facts on MNE vs. exporter dynamics
- In particular: lower exit rates of new MNEs than of new exporters, even after controlling for size and age
- Findings pro sunk costs of FDI, but not sunk costs of exporting
- Simple model captures salient facts, but not all

**Next steps**

- Further explore life cycle of firms
- Include hiring and lay-off patterns