How R&D tax credit and cluster policies interact: the case of the French « Pôles de Compétitivité » for SMEs and mid-sized firms

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(joint work with Vincent Dortet Bernadet)

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Impact of the French cluster policy on the R&D investment decision and business activity of recipient firms

“Pôles de compétitivité” program : impact over the period 2005-2009 :

融合发展策略：两种机制在行动，地理集中和专业化以利用协同效应和合作

Impact of public support on firm R&D investment

Goal : estimate the effect of the “Pôles de compétitivité” policy on business activity of recipient firms

Difficulties : the firms participating to this policy are not random +
many heterogeneous public R&D policies have changed at the same time
→ Hard to disentangle the causal effect of each policy instrument
Impact of the French cluster policy on the R&D investment decision and business activity of recipient firms

“Pôles de compétitivité” program : impact over the period 2005-2009 :

➢ **Impact of a cluster policy** : two mechanisms in action, geographic concentration and specialization to build on synergies and cooperation

➢ **Impact of public support** on firm R&D investment

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The context

- **Cluster policies and R&D tax credit interact**: member firms of clusters can combine direct and indirect innovation schemes

- **R&D tax credit** (“Crédit d’Impôt Recherche”, CIR): classic indirect instrument with a high incentive in France since 2008
  - In 2005, R&D tax credit equals the sum of 5% of the R&D total amount and to 45% of the R&D growth
  - Extended in 2006 with 10% for the amount and 40% for the growth of R&D expenditures
  - Extended in 2008 with 30% for the amount of R&D expenditures

- **The French cluster policy**
  - Initiated in 2006
  - Firms member of Pôles can benefit from many direct instruments (competitive grants, credit loans and guarantees, repayable advances, ...) and indirect ones (R&D tax credit)
  - Only one instrument is dedicated to the French cluster policy: competitive grants for R&D cooperative projects (between large and small firms, research lab and educational estab.)
  - Focusing on a cluster policy in Japan, Nishimura and Okamuro (2011) find a weak effect of direct R&D support compared to the networking/coordination support
The French cluster policy “Pôles de compétitivité”

- Initiated in 2006
  ➔ certification of 71 innovation clusters

- Every cluster is defined by:
  - a theme
  - a region
  - a governance

- FUI : 2 calls for proposals of R&D cooperative projects each year since 2006
  ➔ 100 projects/year
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MerBretagne: cross-industry cluster associated with linked-to-the-sea applications such as business R&D for defence industry or for renewable energy sector

Xylofutur: cluster dedicated to the timber industry

The impact of a French cluster policy on small and mid-sized firms
Public support on firm R&D investment in France

- Indirect financing instruments: (CIR, CII, JEI) : ≈ €5 billions (2012)
- Direct financing instruments (ANR, BPI France, FUI) : ≈ €2.5 billions (2012)
- Pôles de compétitivité (FUI) accounts for 6% of direct support for firm R&D

Sources: MENESR, GECIR, enquête R&D; Acoss, base JEI; Insee, Lifi, Ficus/Fare, DADS | Calcul: Insee (à paraître)

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2008: reform of the R&D tax credit

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The impact of a French cluster policy on small and mid-sized firms
Problem 1: many public schemes related to Pôles de compétitivité

Public funding of R&D expenditures for SMEs and Mid-sized firms that invest less than €16M in R&D (field of application of the evaluation)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intramural R&amp;D expenditures</td>
<td>4 145</td>
<td>5 106</td>
<td>4 727</td>
<td>5 286</td>
<td>4 623</td>
</tr>
<tr>
<td>Direct public support</td>
<td>233</td>
<td>364</td>
<td>371</td>
<td>457</td>
<td>353</td>
</tr>
<tr>
<td>European support</td>
<td>34</td>
<td>52</td>
<td>41</td>
<td>87</td>
<td>44</td>
</tr>
<tr>
<td>R&amp;D tax credit</td>
<td>251</td>
<td>448</td>
<td>477</td>
<td>929</td>
<td>887</td>
</tr>
</tbody>
</table>

Sources: Dgcis, Insee, MESR

→ Firms member of French clusters use both direct and indirect instruments
**Problem 2: participation the cluster policy is not random**

R&D effort of (futur) participants was already higher than for non participants, before the creation of clusters:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Firms in the control group</th>
<th>Firms member of a French cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total R&amp;D (k euros)</td>
<td>640</td>
<td>1454</td>
</tr>
<tr>
<td>Employment</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Public funding of R&amp;D (k euros)</td>
<td>25</td>
<td>142</td>
</tr>
</tbody>
</table>

Means in 2005, before the creation of the French cluster policy | Sources: Dgcis, Insee, MESR

Field of application: SMEs and Mid-sized firms that invest less than €16M in R&D
Data: as much as possible!

- **Annual R&D survey** (conducted by the Ministry of Higher Education and Research)
  - R&D expenditures
  - R&D funding:
    - Direct public supports (almost complete)
    - Data on local public support is less reliable
    - No data on indirect public support!

- **CIR (tax credit) database management** (exhaustive)

- **JEI database** (exhaustive)

- **Additional administrative data** (fiscal data, financial links, employment…)

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The impact of a French cluster policy on small and mid-sized firms
Evaluation: method + field of application

- Method: Matching + Diff-in-Diff
  - Kernel-based Propensity Score Matching to account for the selection issue
  - Diff-in-Diff to control for strong heterogeneity and to obtain a causal impact

- Field of application
  - 2005-2009 period
  - SME and Mid-sized firms (empl.<5000) that invest less than €16M in R&D
  - Large firms are excluded

- Account for the policy mix
  - Control for indirect financing instruments (R&D tax credits) in the propensity score
  - Evaluate the impact of participating in the French cluster policy on R&D tax credit
    (participation + amount of tax credit)
  - accurate estimation of the effect on private R&D expenditures

The impact of a French cluster policy on small and mid-sized firms
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  - accurate estimation of the effect on private R&D expenditures
What determine the participation to French clusters?

<table>
<thead>
<tr>
<th>Participation to a cluster is associated with:</th>
<th>Characteristics (2005)</th>
<th>Estimated coef.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Ability to develop and benefit from innovation</td>
<td>Employment (log)</td>
<td>0.09***</td>
</tr>
<tr>
<td></td>
<td>% of engineer and technical executives</td>
<td>0.64***</td>
</tr>
<tr>
<td></td>
<td>Investment (log)</td>
<td>0.08***</td>
</tr>
<tr>
<td>- Previous experience in application to R&amp;D subsidies + subsidies level</td>
<td>JEI</td>
<td>0.47***</td>
</tr>
<tr>
<td></td>
<td>CIR (log)</td>
<td>0.03**</td>
</tr>
<tr>
<td>- Geographical distance to other potential partners</td>
<td>Distribution density (x10^5) of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- total R&amp;D</td>
<td>2.8**</td>
</tr>
<tr>
<td></td>
<td>- R&amp;D of the firm’s sector</td>
<td>1.1**</td>
</tr>
<tr>
<td></td>
<td>Median of sector’s R&amp;D densities</td>
<td>-7.5***</td>
</tr>
<tr>
<td></td>
<td>French nationality</td>
<td>0.4***</td>
</tr>
</tbody>
</table>

The impact of a French cluster policy on small and mid-sized firms
“Misleading” results (without accounting for the overlapping of direct and indirect public supports)

- Average treatment effect
- Decomposed between direct public support and private investment (private = no direct public support)

**Multiplier effect!**

The impact of a French cluster policy on small and mid-sized firms

20/10/2014
Results (accounting for the overlapping of direct and indirect public supports)

- Average treatment effect

- Decomposed between direct & indirect public support, and private investment (private = no direct & indirect public support)

\[ \text{No multiplier effect!} \]
Results: Alternative outcomes

Average yearly effect from being a member of a cluster over 2006-2009(1):
- Total R&D expenditures (k€): +76
- R&D direct public funding (k€): +30
- CIR (tax credit, in k€): +33
- CIR use (%): +11
- Empl. devoted to R&D: +0.7
- Revenue: +0
- Patent: +0

(1) Relative effect compared to similar non participants

No crowding-out effect but, for now, no virtuous effect on private R&D expenditures
Results: Alternative outcomes

Member firms of the Pôles de compétitivité

Firms partners of projects granted by the FUI

Field of the evaluation: SMEs and Midmarket firms independant from large groups

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\(^{(1)}\) Relative effect compared to similar non participants

⇒ No crowding-out effect but, for now, no virtuous effect on private R&D expenditures
Conclusion

**Results:**

• Subsidies to small and mid R&D investors add to their private investment: no crowding-out effect, no virtuous effect

• Effect due to the raise in direct and indirect public supports: firms benefit from different public supports

**Limitation:**

• Impossible to disentangle the effect of the cluster policy from the effect of the R&D tax credit reform

**Extensions:**

• Dortet Bernadet & Sicic (2014) study the population of small firms more specifically and obtain that, pooled together, the various innovation subsidy programs might lead to crowding-out effects
The impact of a French cluster policy

Thanks for your attention!

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