Performance Evaluation and Export Promotion Agencies: Does one size fit all?

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Background

- Horizon 2020 project on EU external policy coherence

- How does trade policy affect realization of foreign policy objectives (labor standards, etc.)

- How does EU commercial policy interact with Member State policies? Complements? Substitutes?

- Policy recommendations to enhance coherence of EU external policies
Export promotion agencies (EPAs) are a common instrument of national economic diplomacy.

- Need to understand the goals set for EPAs, what they do and how effective they are.
- Will be influenced by the evaluation criteria used by governments.
- And by political economy factors.
- Evaluation criteria differ across countries.
Research questions

- How do evaluation mechanisms shape the activities of EPAs?
- What role do they play as a determinant of national EPA budgets?
- (down the road...) A case for greater monitoring or coordination at EU level?
What we do

- Characterize the evaluation mechanisms that are observed

- Propose a multi-tasking principal agent problem to study distribution of EPA effort across firms and EPA characteristics (size of the budget)

- Main ingredients of the model:
  - scalability of tasks required by small firms
  - heterogeneous firms (export capacity)
  - heterogeneous political benefits to the GVT from different firms

- GVT evaluates the EPA based on a noisy signal of effort: we use the signal function to model different evaluation mechanisms

- Compare the activities and characteristics of EPAs under alternative performance indicators
What we find

- Two primary performance indicators apply to EPAs: value of exports (output-based) and customer satisfaction (input-based).

- In cases where exports are very volatile, performance evaluation mechanisms will not incentivize EPAs to increase their effort.

- More generally, EPA efforts are influenced by evaluation mechanisms and depend on political benefits to the GVT, the scalability of EPA tasks and the export premium of large firms.

- In an environment with low-productivity, politically influential large firms, the output based mechanism works better in incentivizing effort to assist large firms.

- The size of EPA budgets depends on the evaluation mechanism. In presence of large political benefits of EPA support activities, the customer satisfaction mechanism will result in a larger incentive budget. Data are consistent with this result.
Related literature

- Theoretical papers focused on justification for (existence of) EPAs

- Empirical analysis of the impact of EPA activities on exports and which firms benefit
Rationale for EPAs

- Provide information and allow for better matching between buyers and sellers (given international trade as a network, Rauch, 1999)

- From a development perspective, EPAs may help firms discover what they are good at (Hausmann & Rodrik, 2003)

- Cagé & Rouzet (2015): if buyers cannot observe the quality of the product before purchase, GVT intervention can help high-quality firms get discovered
Effect of EPA activities

- Munch & Schaur (2018): data on Danish firms $\Rightarrow$ export promotion increases sales, value added, employment and productivity
- Lederman et al. (2016): data for LA countries $\Rightarrow$ export promotion helps non-exporter firms to enter foreign markets, increases survival rates, little effect on the intensive margin of exporters (similar results by Volpe Martincus & Carballo (2010) for Peruvian firms)
- Broocks & Van Biesebroeck (2017): data for Belgian firms $\Rightarrow$ show that export promotion helped firms start to export outside the EU
- Lederman et al. (2010): survey of EPAs in 106 countries $\Rightarrow$ find decreasing export returns to EPA budgets
- Small and medium sized firms appear to experience higher returns from EPA activities Volpe Martincus & Carballo (2010)
- Olarreaga et al. (2017): survey of EPAs $\Rightarrow$ heterogeneous returns across countries depending on EPAs institutional design (evaluation mechanisms not included)
Data on EPAs

- ITC/World Bank surveys, last round in 2010. Olarreaga et al. (2017) extend the survey for 13 European countries

- 19 questions concerning expenditures, activities, strategic objectives and impact evaluation

- In total 108 EPAs participated
EPAs with an evaluation mechanism in place

Source: Olarreaga et al. (2017).
Note: The figure plots the answer to the question on impact evaluation mechanisms in 2010. 95 countries responded either yes or no to the question.
### Performance indicators applied to EPAs

<table>
<thead>
<tr>
<th></th>
<th>Mode value</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Exports</td>
<td>1st</td>
<td>53%</td>
</tr>
<tr>
<td>Number of Exporters</td>
<td>2nd</td>
<td>28%</td>
</tr>
<tr>
<td>Number of Clients</td>
<td>2nd</td>
<td>25%</td>
</tr>
<tr>
<td>Client Satisfaction</td>
<td>1st</td>
<td>30%</td>
</tr>
<tr>
<td>Other</td>
<td>Not important</td>
<td>37%</td>
</tr>
</tbody>
</table>

**Source:** Olarreaga et al. (2017).

**Note:** The table calculates the ranking most frequently given to the key performance indicators. The survey asked to rank the objectives from 1st to 5th, allowing for ties.
### Relationship between evaluation mechanisms

<table>
<thead>
<tr>
<th></th>
<th>Value of Exports</th>
<th>Number of Exporters</th>
<th>Number of Clients</th>
<th>Clients’ satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Exports</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Exporters</td>
<td>0.28</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Clients</td>
<td>not significant</td>
<td>0.32</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clients’ satisfaction</td>
<td>-0.05</td>
<td>0.23</td>
<td>0.45</td>
<td>1</td>
</tr>
</tbody>
</table>

**Source:** Olarreaga et al. (2017).

**Note:** The table calculates the Spearman rank correlation between the rank of the objectives given by EPAs in the questionnaire.
Multitasking Principal-Agent: ingredients I

We follow Holmstrom & Milgrom (1991)

- Government (the principal) and the EPA (the agent)
- Principal risk neutral
- Agent risk averse, with CARA utility $u(w) = -e^{-rw}$
- Reduced form economy with $N$ heterogeneous firms
Multitasking Principal-Agent: ingredients II

- EPA chooses to exert efforts on firms (tasks) $t = [t_1 \ldots t_N]$

- EPA convex private cost $C(t)$

- Government concave political benefit $B(t)$ with $\nabla B(t) = [B_1 \ldots B_N]$
Multitasking Principal-Agent: ingredients III

- Effort $t$ not observable by the Government

- Signal: $x = \mu(t) + \epsilon$

- $\mu(\cdot) : \mathbb{R}^N \rightarrow \mathbb{R}^K$
Multitasking Principal-Agent: ingredients VI

- Linear compensation scheme for the EPA \( w = \alpha^t \mu(t) + \beta \)

- The principal will maximize its objective subject to the incentive compatibility constraints

- Solution: \((\alpha, t)\)

- We solve this model for two evaluation mechanisms \(\mu(t)\)
A simple case: 3 firms, cost of the agent

- Firms 1 and 2 are small, firm 3 is large

- Small firms enter the cost function symmetrically. Convexity is guaranteed for $\rho < 1$

\[
C(t) = \frac{1}{2} \left( t_1^2 + t_2^2 + t_3^2 \right) - \rho t_1 t_2, \tag{1}
\]

\[
\nabla C(t) = \begin{bmatrix} t_1 - \rho t_2 & t_2 - \rho t_1 & t_3 \end{bmatrix}, \quad H(t) = \begin{bmatrix} 1 & -\rho & 0 \\ -\rho & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \tag{2}
\]
Solution of the model: value of exports I

- Effort maps stochastically to total exports in a linear fashion:
  \[ x = \mu(t) + \epsilon = t_1 + t_2 + \eta t_3 + \epsilon, \quad \epsilon \sim N(0, 2\sigma_s^2 + \sigma_l^2), \]

- Principal maximizes joint surplus under incentive compatibility constraints

  \[
  \max_{(t, \alpha)} \Pi(t) = B(t) - C(t) - \frac{1}{2} \alpha^2 r\text{Var}(\epsilon)
  \]

  \[
  \text{s.t. } t \in \arg\max_z (\alpha \mu(z) - C(z))
  \]

Boffa, Fiorini and Hoekman
Solution of the model under value of exports II

\[ \alpha^* = \frac{B_1 + B_2 + (1 - \rho)\eta B_3}{2 + (1 - \rho)(\eta^2 + rVar(\epsilon))} \]

\[ t_1^* = \frac{\alpha^*}{1 - \rho} \]

\[ t_2^* = \frac{\alpha^*}{1 - \rho} \]

\[ t_3^* = \alpha^* \eta \]
Comparative statics

The EPA’s effort toward all firms \((t_1^*, t_2^*, t_3^*)\) and the incentive part of the EPA’s budget \((\alpha^* \mu(t^*))\) are

- increasing in the way the Government’s political benefit responds to effort across firms: \(B_1, B_2, B_3\)
- decreasing in the variance of exports
The EPA’s effort toward small firms $t_1^* + t_2^*$ is larger than the effort to the large firm $t_3^*$ $\iff \eta < \frac{2}{1 - \rho}$
The GVT asks firms about EPA services

\[ x = \begin{bmatrix} t_1 \\ t_2 \\ t_3 \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \epsilon_3 \end{bmatrix}, \quad \epsilon \sim N \left( 0, \begin{bmatrix} \sigma_s^2 & l_2 & 0 \\ l_2 & 0 & \sigma_l^2 \\ 0 & \sigma_l^2 & 0 \end{bmatrix} \right) \]

Principal maximizes joint surplus under incentive compatibility constraints

\[
\max_{(\alpha, t)} \Pi(t) = B(t) - C(t) - \frac{1}{2} r \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 \end{bmatrix} \begin{bmatrix} \sigma_s^2 & l_2 & 0 \\ l_2 & 0 & \sigma_l^2 \\ 0 & \sigma_l^2 & 0 \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} \\
\text{s.t.} \quad t \in \arg \max_{(z)} \alpha_1 z_1 + \alpha_2 z_2 + \alpha_3 z_3 - C(z)
\]
Solution of the model: customer satisfaction II

\[ \tilde{\alpha}_1 = \frac{B_1}{1 + (1 - \rho)r\sigma_s^2} \]

\[ \tilde{\alpha}_2 = \frac{B_2}{1 + (1 - \rho)r\sigma_s^2} \]

\[ \tilde{\alpha}_3 = \frac{B_3}{r\sigma_l^2 + 1} \]

\[ \tilde{t}_1 = \frac{\tilde{\alpha}_1}{1 - \rho} \]

\[ \tilde{t}_2 = \frac{\tilde{\alpha}_2}{1 - \rho} \]

\[ \tilde{t}_3 = \tilde{\alpha}_3 \]
Trade-off between political benefits

\[ \tilde{t}_1 + \tilde{t}_2 > \tilde{t}_3 \iff B_3 < \hat{B}_3 = \frac{2B_1(1 + r \sigma_i^2)}{(1 - \rho) + r \sigma_s^2(1 - 2\rho + \rho^2)} \]

Slope increases with \( \rho \)
Observation 1

The EPA’s effort toward small firms is higher under evaluation mechanisms based on total exports if \( B_3 > \bar{B}_3 = \frac{B_1(\eta^2 + r \sigma_i^2)}{\eta[1+(1-\rho)r\sigma_s^2]} \).

Moreover \( \partial \bar{B}_3 / \partial \rho > 0 \) and \( \partial \bar{B}_3 / \partial \eta > (\leq)0 \) \( \iff \eta > (\leq)\sqrt{r\sigma_i^2} \).
Observation 2

The EPA’s effort toward the large firm is higher under evaluation mechanisms based on total exports if either $B_3$ is small enough or $B_1$ is large enough.
Observation 3

The ratio between total EPA’s effort toward small firms and effort toward the big firm \( \left( \frac{t_1 + t_2}{t_3} \right) \) is higher under evaluation mechanisms based on total exports if \( B_3 > \hat{B}_3 = \frac{B_1 \eta (1 + r \sigma_i^2)}{1 + r \sigma_s^2 (1 - \rho)} > \bar{B}_3 \).
Observation 4

For any given $\beta$, if at least one marginal political benefit ($B_3$ or $B_1$) is high enough, the EPA's budget is greater under the customer satisfaction evaluation mechanism.
Budgets and evaluation mechanisms

<table>
<thead>
<tr>
<th>KPI ranked 1st</th>
<th>Number of countries</th>
<th>Av. budget (in USD)</th>
<th>Av. number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of exports</td>
<td>42</td>
<td>32 millions</td>
<td>210</td>
</tr>
<tr>
<td>Clients’ satisfaction</td>
<td>23</td>
<td>47 millions</td>
<td>302</td>
</tr>
</tbody>
</table>

**Source:** Olarreaga et al. (2017).

**Note:** Some countries may rank two or more objectives 1st, in this case we include them in both categories, so the averages are not biased.
To do

- Descriptives on relevant parameters \((\eta, \rho, B, \sigma^2_s, \sigma^2_l)\) across EU countries
  - productivity of firms
  - geographic diversification / homogeneity of products
  - GVT preferences (political benefit function)
  - volatility of export performance

- Implications for EPAs of alternative evaluation mechanisms \(\mu(\cdot)\)
A role for the EU?

- Endogeneity of $\mu(\cdot)$ (GVT changes evaluation to maximize political benefit)

- Potential for coordination at EU level (welfare enhancing commitment device?)

- Discussion of EU-evaluation mechanism in the context of the EU TPO network

- Implications for design of EU-level economic diplomacy


References II


References III

