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

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ELSNIT Conference
Paris October, 2019

This project has received funding from the European Union's Horizon 2020, grant agreement No 770680

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  - typically line ministry or publicly funded agency
  - subject to scrutiny and assessment
- EPAs' evaluation criteria differ across countries
- Little knowledge of how different evaluation mechanisms affect the behaviour and resources of EPAs

Research questions

- Accounting for relevant features of firms' landscape and for political economy forces,

1. How do evaluation mechanisms shape the activities of EPAs?

2. What role do they play as a determinant of national EPA budgets?

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:
  - heterogeneous firms (export capacity)
  - scalability of tasks required by firms
  - 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 (allocation of resources) and characteristics (budget) of EPAs under alternative evaluation mechanisms, accounting for economic and political economy parameters

What we find

- Two primary performance indicators apply to EPAs: value of exports (output-based) and customer satisfaction (input-based)
- Allocation of resources across heterogeneous firms
  - Value of exports: only firms' economic parameters matter
  - Customer satisfaction: political economy forces also play a role
  - Effort to small relatively to big firms is higher under value of export if large firms have a **strong** political influence relatively to small ones
- Size of budget
  - If political economy forces are strong enough, customer satisfaction mechanism will result in a larger incentive budget

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

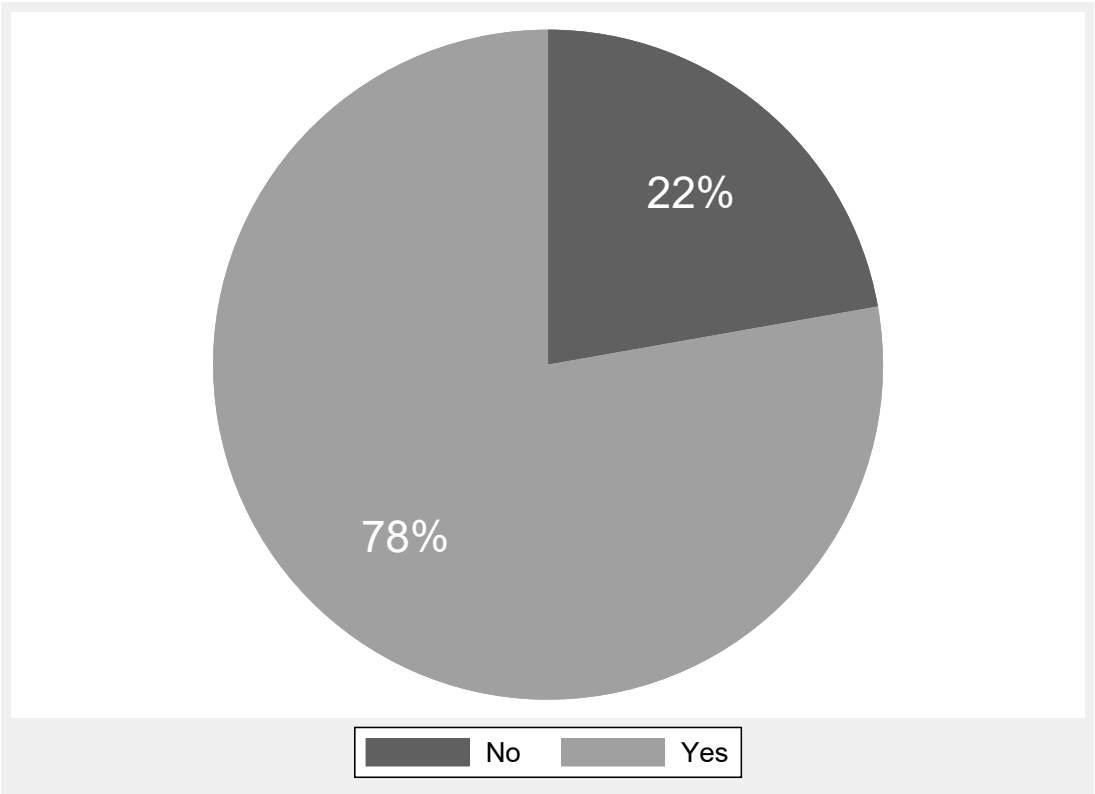
Effect of EPA activities

- Munch & Schaur (2018): data on Danish firms ⇒ export promotion increases sales, value added, employment and productivity
- Lederman et al. (2016): data for LA countries ⇒ 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 ⇒ show that export promotion helped firms start to export outside the EU
- Lederman et al. (2010): survey of EPAs in 106 countries ⇒ 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 ⇒ 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

	Mode value	Frequency
Value of Exports	1st	53%
Number of Exporters	2nd	28%
Number of Clients	2nd	25%
Client Satisfaction	1st	30%
Other	Not important	37%

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

	Value of Exports	Number of Exporters	Number of Clients	Clients' satisfaction
Value of Exports	1			
Number of Exporters	0.28	1		
Number of Clients	not significant	0.32	1	
Clients' satisfaction	-0.05	0.23	0.45	1

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.

From data to theory

- Two alternative evaluation mechanisms:
  1. Value of exports
  2. Custumer satisfaction

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) $\boldsymbol{t} = \left[t_1 \dots t_N\right]$
- EPA convex private cost $C(\boldsymbol{t})$
- Government concave political benefit $B(\boldsymbol{t})$ with $\nabla B(\boldsymbol{t}) = \left[B_1 \dots B_N\right]$
  - use $B(\boldsymbol{t})$ to introduce political economy forces
  - deliberately agnostic about welfare

Multitasking Principal-Agent: ingredients III

- Effort $\boldsymbol{t}$ not observable by the Government
- Signal: $\boldsymbol{x} = \boldsymbol{\mu}(\boldsymbol{t}) + \boldsymbol{\epsilon}$
- $\boldsymbol{\mu}(\cdot) : \mathbb{R}^N \rightarrow \mathbb{R}^K$

Multitasking Principal-Agent: ingredients VI

- Linear compensation scheme for the EPA $w = \boldsymbol{\alpha}^t \boldsymbol{\mu}(\boldsymbol{t}) + \beta$
- The principal will maximize its objective subject to the incentive compatibility constraints
- Solution: $(\boldsymbol{\alpha}, \boldsymbol{t})$
- We solve this model for two evaluation mechanisms $\boldsymbol{\mu}(\boldsymbol{t})$

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 $\rho < 1$
- ASS: negative correlation between size and tasks scalability

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

$$\nabla C(\boldsymbol{t}) = \begin{bmatrix} t_1 - \rho t_2 & t_2 - \rho t_1 & t_3 \end{bmatrix}, \quad H(\boldsymbol{t}) = \begin{bmatrix} 1 & -\rho & 0 \\ -\rho & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \tag{2}$$

Solution of the model: value of exports I

- Effort maps stochastically to total exports in a linear fashion:

$$x = \mu(\boldsymbol{t}) + \epsilon = t_1 + t_2 + \underbrace{\eta}_{\text{premium}} t_3 + \epsilon, \quad \epsilon \sim N\left(0, 2\sigma_s^2 + \sigma_l^2\right),$$

- ASS: positive correlation between size and export premium

- Principal maximizes joint surplus under incentive compatibility constraints

$$\max_{(\boldsymbol{t},\alpha)} \Pi(\boldsymbol{t}) = B(\boldsymbol{t}) - C(\boldsymbol{t}) - \frac{1}{2}\alpha^2 rVar(\epsilon)$$
$$\text{s.t. } \boldsymbol{t} \in \arg\max_{\boldsymbol{z}} \left(\alpha\mu(\boldsymbol{z}) - C(\boldsymbol{z})\right)$$

Solution of the model under value of exports II

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

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

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

$$t_3^* = \alpha^* \eta$$

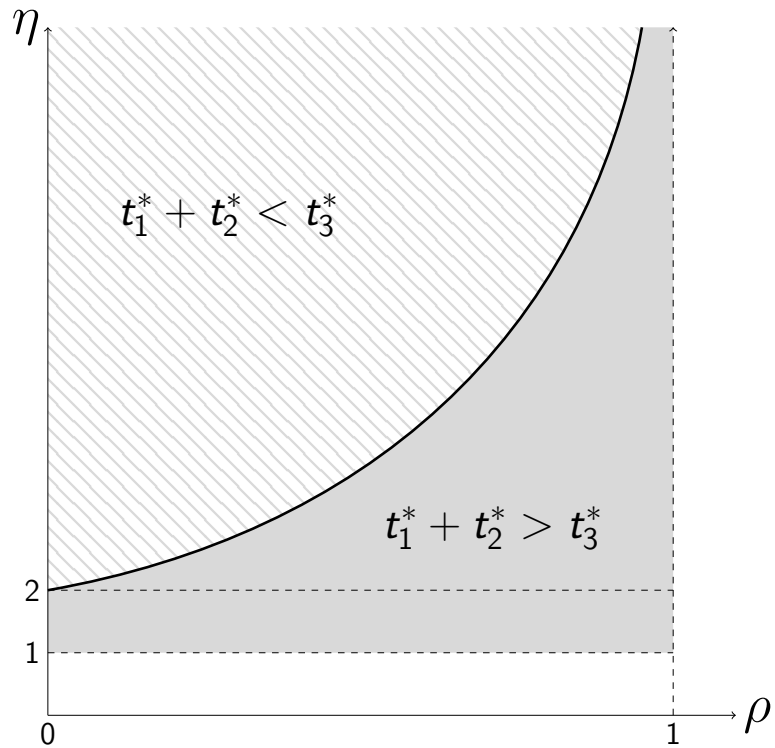
Comparative statics

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

- increasing in the the way the Government's political benefit responds to effort across firms: B_1, B_2, B_3
- decreasing in the variance of exports

Effort allocation as a function of ρ and η

The EPA's effort toward small firms $t_1^* + t_2^*$ is larger than the effort to the large firm $t_3^* \iff \eta < 2/(1-\rho)$



Solution of the model: customer satisfaction I

- The GVT asks firms about EPA services

$$\boldsymbol{x} = \begin{bmatrix} t_1 \\ t_2 \\ t_3 \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \epsilon_3 \end{bmatrix}, \quad \boldsymbol{\epsilon} \sim N\left(\mathbf{0}, \begin{bmatrix} \sigma_s^2 I_2 & 0 \\ 0 & \sigma_I^2 \end{bmatrix}\right)$$

- Principal maximizes joint surplus under incentive compatibility constraints

$$\max_{(\boldsymbol{\alpha}, \boldsymbol{t})} \quad \Pi(\boldsymbol{t}) = B(\boldsymbol{t}) - C(\boldsymbol{t}) - \frac{1}{2} r \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 \end{bmatrix} \begin{bmatrix} \sigma_s^2 I_2 & 0 \\ 0 & \sigma_I^2 \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix}$$

$s.t.$

$$\boldsymbol{t} \in \arg\max_{(\boldsymbol{z})} \ \alpha_1 z_1 + \alpha_2 z_2 + \alpha_3 z_3 - C(\boldsymbol{z})$$

Solution of the model: customer satisfaction II

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

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

$$\tilde{\alpha}_3 = \frac{B_3}{r \sigma_I^2 + 1}$$

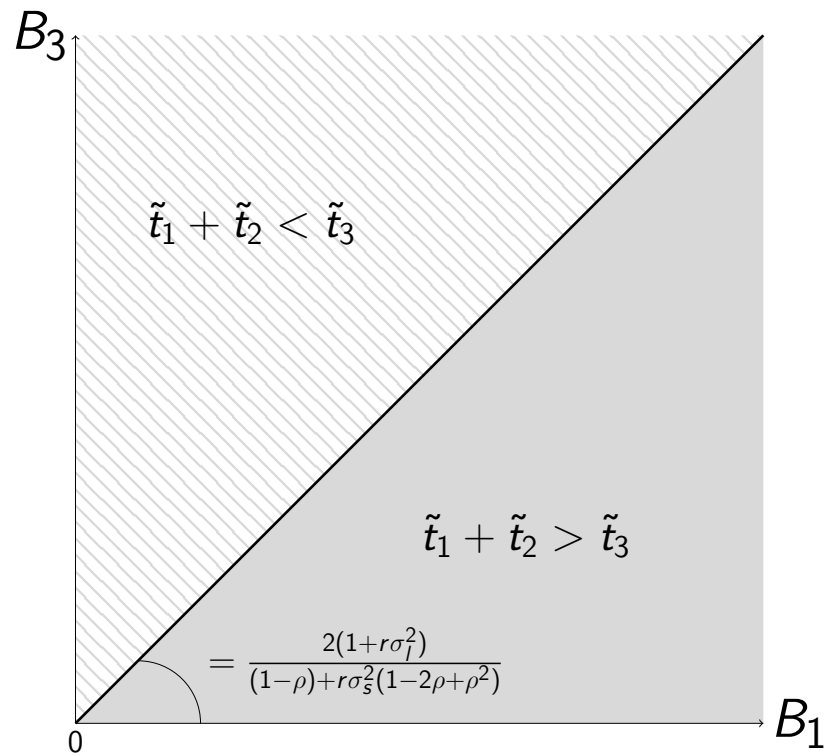
$$\tilde{t}_1 = \frac{\tilde{\alpha}_1}{1-\rho}$$

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

$$\tilde{t}_3 = \tilde{\alpha}_3$$

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 ρ

The model at work

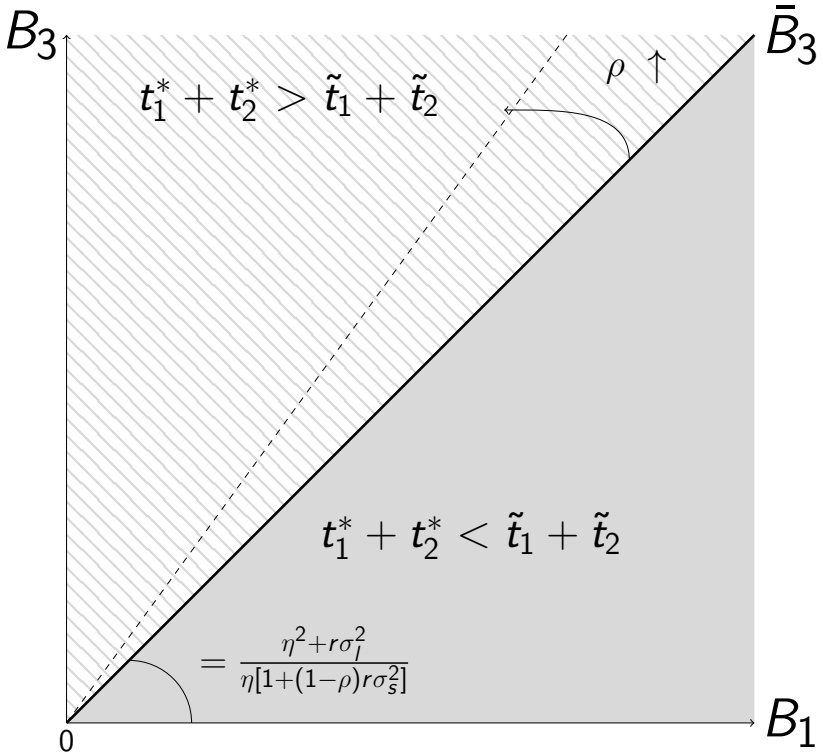
Given the relevant parameters how the two evaluation mechanisms compare in terms of

- EPA's allocation of effort
- EPA's resources

Effort towards small firms

Observation 1

The EPA's effort toward small firms is higher under evaluation mechanisms based on total exports if $B_3 > \bar{B}_3 = \frac{B_1(\eta^2+r\sigma_l^2)}{\eta[1+(1-\rho)r\sigma_s^2]}$.
Moreover $\partial\bar{B}_3/\partial\rho > 0$ *and* $\partial\bar{B}_3/\partial\eta > (<)0 \iff \eta > (<)\sqrt{r\sigma_l^2}$.



Effort towards large firms

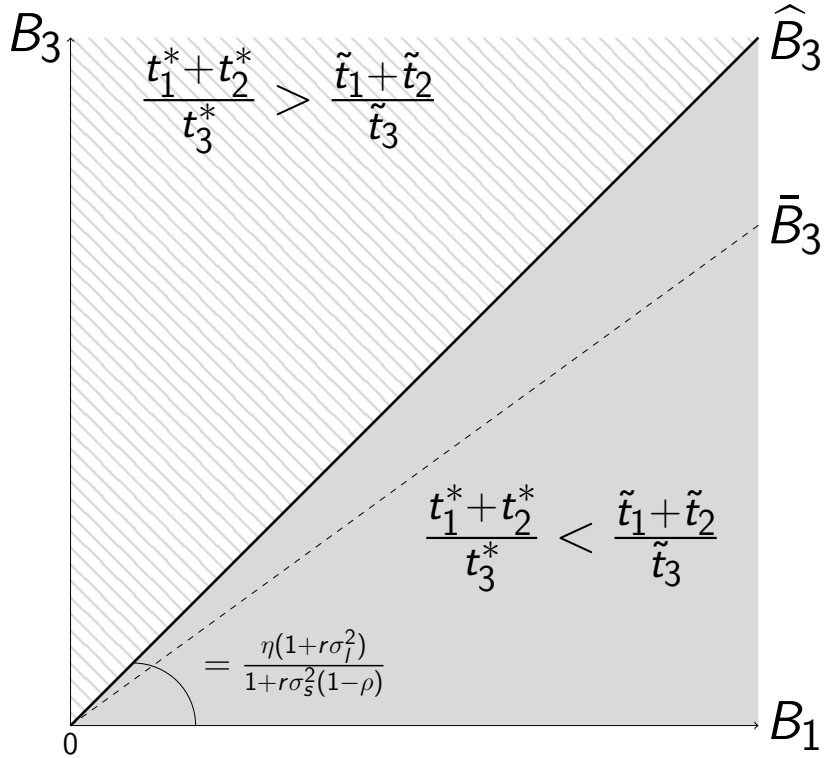
Observation 2

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.

Small/big relative effort

Observation 3

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



Size of the budget

Observation 4

For any given β, 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

KPI ranked 1st	Number of countries	Av. budget (in USD)	Av. number of employees
Value of exports	42	32 millions	210
Clients' satisfaction	23	47 millions	302

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.

Conclusions and final ruminations

- We built a model that, given relevant parameters (including scalability, export premium, political influence of firms), tells how different evaluation mechanisms affect activities and resources of EPAs
- Decision to be taken against a welfare objective (help small firms/push the big guys/have larger EPAs...)
- Potential policy application: in environments where our assumptions make some sense, given welfare objective and values for parameters, we can suggest optimal evaluation mechanism

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