Evaluating Export Promotion Agencies: Does one size fit all?[☆]

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Abstract

Governments generally evaluate the performance of export promotion agencies on the basis of specific criteria such as total exports or customer satisfaction. In this paper we argue that the performance evaluation criteria that apply to EPAs will affect their behavior, including the selection of clients (firms) and the services that are supplied. We analyze the two most prevalent performance evaluation criteria (total exports and customer satisfaction) in the framework of a simple multitasking principal-agent model with heterogeneous firms. A key feature of the model is that working with small firms is highly scalable for EPAs, whereas support provided to large firms is idosyncratic. We use the theoretical framework to evaluate the incentive effects of the most commonly observed performance evaluation criteria that are applied to EPAs and show that the use of different criteria has implications for activities of EPAs and the realization of their export promotion objectives.

Keywords: Export promotion agency, trade promotion organization, principal-agent, heterogeneous firms, SMEs.

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1. Introduction

Export Promotion Agencies (EPAs) are a mechanism used by governments to enhance nation export performance by helping firms to overcome market failures associated with coordination costs and asymmetric information.[1] In the ideal scenario, EPAs help firms get discovered and promote the role of learning by exporting. Typically, activities of EPAs are carried out through a line ministry or a publicly funded agency. Because taxpayer money is involved, EPAs are subject to scrutiny and assessment. Although most if not all EPAs are tasked with expanding exports, different indicators are used by governments to assess how well EPAs perform. Little is known about how different evaluation mechanisms and specific performance indicators affect the behaviour of EPAs and the realization of their export promotion mandates.

In this paper we use a principal agent model to study the potential role of evaluation mechanisms (performance criteria) in shaping the tension between EPAs (the agent) and their Governments (the principal). EPAs choose how to distribute effort across domestic firms that are heterogeneous in their productivity and confront an exogenous evaluation mechanism that is imposed by the government. Evaluation mechanisms comprise performance indicators that are either output-based, such as the change in the value of exports of participating (assisted) firms, or input-based, where the assessment centers on the quality of services provided as measured by client satisfaction. The Government observes the value of the performance indicator (the signal) and evaluates the EPA accordingly. Government decisions on EPA remuneration (i.e., their resource allocation) depends on EPA performance, as well as, indirectly, the political benefits that governments obtain through the impact of the efforts by EPAs on domestic firms. These benefits are allowed to vary across firms. Because of the EPA's cost structure, there is a trade-off between customized tasks (which are provided to large firms with specific demands) and scalable tasks, such as basic technical assistance, that are provided to assist small firms. The model provides a framework to characterize the incentive structure confronting many EPAs and is used to assess the effects of different performance evaluation mechanisms on the achievement of the economic policy goals that EPAs are tasked with pursuing.

[1] EPAs are also referred as Trade Promotion Organizations in the economic literature.

The analysis generates three main findings. First, in very volatile environments, none of the performance indicators (evaluation criteria) will help EPAs increase their effort. Second, the allocation of effort between large and small firms differs across evaluation mechanisms. The model predicts that how EPA effort is distributed depends on the indirect political benefit that the government obtains from EPA assistance to firms, the scalability of support provided to small firms and the export premium of large firms. We show that in an environment with low-productivity large firms that have significant political power, the output based evaluation mechanism works better in generating EPA effort for small firms than an input-based performance indicator (measures of customer satisfaction). In the latter case, complementarity works against small firms, resulting in low incentives for the EPA to focus on small firms. Our last finding concerns the implications for the size of EPA budgets. We show that if significant political benefits accrue to governments (which may arise from either small or large firms), EPAs are expected to be allocated more resources (larger budgets) under a customer satisfaction criterion. This prediction is consistent with what is observed in the data on EPAs.

Better understanding of the effects of different performance evaluation criteria is important for several reasons. First, 78% of EPAs surveyed by Lederman et al. (2016) are subject to evaluation mechanisms. For some 50% of EPAs, the value of exports is the principal performance indicator. For 30% of the EPAs, customer satisfaction is the primary evaluation criterion. How the existence of different evaluation mechanisms affect the behavior of EPAs has not been studied. Insofar as different mechanisms affect performance, this is information that is relevant for the design of EPAs. Second, as noted by Lederman et al. (2010), the returns to investment in EPAs (budget allocations) in terms of export growth impacts are diminishing. Our model can shed light on inefficiencies in the allocation of resources. They suggest that the diminishing returns observed in the data might stem from a mis-allocation of resources (effort) by EPAs across different types of firms. Third, given that EPAs are supposed to be a tool to address market failures that negatively affect exporters, fulfilling their mandates requires that ex-post evaluation mechanisms not distort client selection incentives in ways that impede the realization of EPA mandates. Fourth, there has been little analytical work on the distributional effects (by firm size) of EPA interventions, in spite of considerable empirical

evidence that EPA activities are skewed towards small firms Volpe Martincus & Carballo (2010). Given that almost 80% of EPAs are subject to impact evaluation mechanisms, it is important to understand how these influence EPA behavior. Extant research in this area has centered on the impact of EPA activities (do they work? who benefits? what is the return on investment?) as opposed to the assessing the role that performance assessment mechanisms play in determining the allocation of EPA resources and their effectiveness. Better understanding of how evaluation criteria may affect behavior and outcomes can help inform the design of EPA programs.

The remainder of the paper is structured as follows. Section 2 briefly reviews the literature on EPAs. Section 3 presents stylized facts on EPAs. Section 4 introduces the model and highlights the key trade-offs in the decision making process. Section 5 concludes.

2. Related literature

The basic goal of EPAs is to help firms overcome fixed and variable costs of exporting by reducing search costs and information asymmetry. This is a role that is particularly salient in a development context. International trade comprises a network of buyers and sellers that are matched to each other (Rauch, 1999). Matching sellers to buyers has always been a primary focus of EPAs. The services provided by EPAs are built around provision of information about foreign markets, complemented by actions to help firms overcome information asymmetries or other market failures. Doing so can help incumbent firms to export more, new exporters to increase the probability of survival and purely domestic firms to start exporting. Cagé & Rouzet (2015) is a recent illustration of the basic motivation underpinning the activities of EPA. They focus on situations when buyers cannot observe the quality of a product before purchase. In their model, exports have an inherent reputation based on the average quality exported by the country of origin. In this case, a variety of high quality producing firms may not be discovered because of the reputation of their country of origin. Government intervention can help the high-quality firms get discovered by providing assistance that replicates the perfect information outcome.

Early economic analyses of EPAs were largely critical and skeptical that they did

much to increase exports (Hogan et al., 1991). Subsequent empirical assessments have been more positive. Several papers have attempted to quantify the impact of EPAs along the different margins of trade using firm-level insights. Lederman et al. (2016) show, using data for firms in selected Latin-American countries, that export promotion helps non-exporter firms enter foreign markets and increases their survival chances, with little effect on the intensive margin of exporters. The result is similar to the that obtained in the Volpe Martincus & Carballo (2008) analysis of Peruvian firms. In that context, most gains of export promotion were found along the extensive margin of trade. Broocks & Van Biesebroeck (2017) find that export promotion helped Belgian firms to start exporting outside the European Union.

It is an open question whether there are long-run effects of export promotion policies. Cadot et al. (2015) show that the gains of the interventions are large in the short-run but do not last. Using a World Bank survey on 103 EPAs' budgets, Lederman et al. (2010) find that there is an impact of export promotion at the aggregate level of a country's exports, but show there are decreasing returns to investments in EPA activities. They argue the efficacy of export promotion policies is limited to small interventions. The literature has also shown that the distributional effects of export promotion depend on firm size. Small and medium-sized firms appear to benefit more from EPA programs (Volpe Martincus & Carballo, 2010).

3. EPA goals and performance indicators

Information on the design and operations of Export Promotion Agencies is limited. To date, the only database that allows for cross-country comparisons of EPAs is the one compiled by Lederman et al. (2010) and subsequently expanded by Olarreaga et al. (2017). The database was built from the results of three surveys that used the same questionnaire and were undertaken in 2005, 2010, and 2014.[2] The first two surveys were carried out by the World Bank and span the same set of EPAs. The third was done by ITC and covers only 13 European EPAs. Lederman et al. (2010) present summary statistics for five key areas addressed in their questionnaire: (i) country image building; (ii) export

[2]Boffa and Melo (2018) are currently working on expanding the database to Sub-Saharan Africa.

support services; (iii) marketing; (iv) market research; and (v) policy advocacy. The most common strategic objective mentioned by EPAs in 2010 was to increase exports across all sectors and destinations (69% ranked this as the most important objective, see Table 1). This, together with attracting investment from multinationals (29%) and promoting SMEs (32%) were ranked most frequently as primary goals by EPAs, followed closely by diversification-related objectives. In the survey, EPAs are also asked if they are subject to an impact evaluation mechanism to assess their performance. A total of 74 out of 95 respondents indicated they were assessed on the basis of specific performance indicators in 2010. Not surprisingly, the value of exports is mentioned most frequently as a key performance indicator (Table 1), followed by client satisfaction.

Table 1: Key Performance Indicators

	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 most common ranking given to the key performance indicators. The survey asked to rank the objectives from 1st to 5th but allowing for ties.

The performance indicators used to assess EPAs are often related. When queried about the most important indicators for their own performance, value of exports is often placed at a level similar to the number of exporters but unrelated with the rank of the number of clients and the number of exporters. Customer satisfaction is in turn positively linked with the number of clients with a weaker relationship with the number of exporters (Table 3).

Table 2: Relationship between Performance Indicators

	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 Export Promotion Agencies in the questionnaire. A positive number indicates that the two objectives tend to be associated at similar levels of importance. A negative number indicates that the objectives are at the antipodes.

Thus, two factors dominate: export growth, an outcome indicator and client satisfaction, an input measure. The following section analyzes the properties of these two types of evaluation mechanisms in the context of a simple theoretical framework.

4. A Multitasking Agency Model

4.1. Assumptions and setup

The relationship between the Government and the EPA is that of a principal and its agent. The principal-agent model is a suitable tool for exploring the interaction between these two parties (Laffont & Martimort, 2009; Bolton & Dewatripont, 2005; Mas-Colell et al., 1995). The model used below belongs to the hidden-action category of principal-agent models (Grossman & Hart, 1983; Holmstrom, 1979). As the tasks of EPAs are multidimensional, we use the workhorse model of the multitasking agency problem developed by Holmstrom & Milgrom (1991). The key contribution of this version of the principal agent model lies in the complementarity between multiple tasks. The EPA will respond to incentives, but because of complementarities in dealing with similar tasks, there will be an incentive to put more effort on highly scalable tasks.

The model consists of two players, the Government (the principal) and the EPA (the agent) acting in an open economy with N firms. The agent is risk averse, with CARA

utility function, while the principal is risk neutral.[3] The EPA chooses a one time vector of efforts $\boldsymbol{t}^t = \Big[t_1 \dots t_N\Big]$, at private cost $C(\boldsymbol{t})$. Each element of the vector represents the effort allocated to one of the N firms in the economy. We follow Holmstrom & Milgrom (1991) by assuming that $C(\boldsymbol{t})$ is convex in its arguments. The benefit function $B(\boldsymbol{t})$ pursued by the Government is assumed to be concave with continuous partial derivatives $\nabla B(\boldsymbol{t}) = \Big[B_1 \dots B_N\Big]$. $B(\boldsymbol{t})$ embodies the political benefits of having the EPA work for domestic firms, with the value a function of the distribution of EPA activities across firms. We are agnostic as the nature of these political benefits. They may reflect delivering on electoral commitments or be associated with lobbying activities by the firms.

The vector of efforts, $\boldsymbol{t}$, is not directly observable by the Government. Instead, the Government observes a column vector of signals, $\boldsymbol{x} = \boldsymbol{\mu}(\boldsymbol{t}) + \boldsymbol{\epsilon}$, where $\boldsymbol{\mu}$ is a vector function of $\boldsymbol{t}$ and $\boldsymbol{\epsilon}$ a column vector of random shocks. The signal function represents the evaluation mechanism used by the Government and the associated key performance indicators. The dimensionality of vector $\boldsymbol{x}$ depends on the nature of the evaluation mechanism in place: if the performance indicator observed by the government is, for instance, the total value of exports in the economy, $\boldsymbol{x}$ and $\boldsymbol{\epsilon}$ will be scalars and $\boldsymbol{\mu}$ will be a function from $\Re_+^N$ (the space of the values of effort toward each firm in the economy) to $\Re_+$ (the space of the value of total export).

The Government wishes to elicit effort by the EPA in a way to maximize its objective. To find the solution of the game, we use a linear budgetary scheme which provides the agent with compensation based on the value of performance indicators that are observed (the signal). These assumptions are used to build a workhorse model. The twist in our approach is that we evaluate the impact of different performance indicators (signals) on the allocation of effort by the EPA across domestic firms.

As noted in Section 3, the two most frequently observed evaluation mechanisms are value of exports and customer satisfaction. The value of exports is an output based measure, while customer satisfaction is an input-based indicator. By asking firms about their experience in working with EPAs, the government obtains information on the effort provided by the EPA. To allow for easy comparison of the implication of each indicator,

[3] An alternative modeling strategy is to use a limited liability model with a risk-neutral model. Because of the limited liability constraint the model would still yield an interesting tradeoff.

we focus on the case where there are only three firms, two small and one large.

4.2. Output-based evaluation mechanism, 3 firms

As the first case, in order to illustrate the model, we employ a simple setup with two small firms (with identifiers 1 and 2) and one large firm only (firm number 3). The special case is useful, because it shows similar features as in the general model, without most of its mathematical complications. We start by defining the private cost of the agent. The agent allocates a vector of effort $\boldsymbol{t}$ to helping the three firms and faces the cost function:

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

The two small firms 1 and 2 enter symmetrically the cost function. We assume that the activities performed for small firms are highly scalable. They might for example concern the access to certificate of origin and standard information about customs abroad. The coefficient $\rho \in (0, 1)$ captures the degree of complementarity between the tasks demanded by the small firms. It is straightforward to calculate the cost function gradient and Hessian matrices which take the form:

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

which is a block diagonal matrix, with the upper-block being equi-correlation matrix and the lower block just the identity matrix. The effort of the agent provides some benefit to the principal, $B(\boldsymbol{t})$. The principal only observes the key performance indicator which is the total value of exports and serves as a noisy signal of the vector of efforts. For simplicity, we assume that firm-specific exports are given by a random component plus the EPA's effort scaled by a coefficient that reflects the export premium/capacity of each individual firm. We normalize the export premium of small firms to unity and assume that the premium of the large firm (denoted by η) to be larger than one. We further assume the random component of exports to be distributed according to a Normal distribution with mean zero and firm-specific variance σ_i^2 for $i = 1, 2, 3$. We equalize the variance of small firm exports to σ_s^2 and denote the variance of the large firm's exports

as σ_l^2. The value of total exports (the signal) is thus given by:

$$x = \mu(\boldsymbol{t}) + \epsilon = t_1 + t_2 + \eta t_3 + \epsilon, \quad \epsilon \sim N\left(0, 2\sigma_s^2 + \sigma_l^2\right), \tag{3}$$

Thus, the signal is composed by the sum of all firm specific efforts, weighted by the return of working with large firms $\eta > 1$. The principal remunerates the agent according to a linear compensation schedule. The operational budget is thus composed of a constant and variable part. The latter is the incentive budget of the EPA.[4]

$$w = \beta + \alpha\mu(\boldsymbol{t}), \tag{4}$$

The agent CARA utility function is given by

$$u(w) = -e^{-rw}, \tag{5}$$

with $r > 0$ the risk aversion coefficient. The joint surplus is given by the sum of the agent's certain equivalent $CE = \alpha\mu(\boldsymbol{t}) + \beta - C(\boldsymbol{t}) - \frac{1}{2}\alpha^2 rVar(\epsilon)$ and the principal expected profit given by $B(\boldsymbol{t}) - E\{w[\mu(\boldsymbol{t}) + \epsilon]\} = B(\boldsymbol{t}) - \alpha\mu(\boldsymbol{t}) - \beta$. As discussed in Holmstrom & Milgrom (1991), the β parameter determines the distribution of the joint surplus between the principal and the agent but does not appear in the joint surplus. Given that, the incentive efficient linear contract $(\boldsymbol{t}, \alpha, \beta)$ is such that $(\boldsymbol{t}, \alpha)$ maximizes the joint surplus subject to the incentive compatible constraints of the agent. In other words, the principal chooses $(\boldsymbol{t}, \alpha)$ to be the solution of the following constrained maximization problem:

$$\max_{\boldsymbol{t},\alpha} \quad \Pi(\boldsymbol{t}) = B(\boldsymbol{t}) - C(\boldsymbol{t}) - \frac{1}{2}\alpha^2 rVar(\epsilon) \quad s.t. \quad \boldsymbol{t} \in \arg\max_{\boldsymbol{z}} \alpha\mu(\boldsymbol{z}) - C(\boldsymbol{z}) \tag{6}$$

To solve the problem, we first need to find the effort of the agent for a given α. The agent solves the problem:

$$\max_{\boldsymbol{t}} \quad \alpha(t_1 + t_2 + \eta t_3) - \frac{1}{2}\left(t_1^2 + t_2^2 + t_3^2\right) + \rho t_1 t_2, \tag{7}$$

[4]The extent to which such incentive budget allocations are used across countries is not known, but the survey data reveal that budgets of EPAs vary across time and managers report that better performance on KPIs is, on average, associated with increases in resources, and vice versa.

which yields the following incentive compatibility constraints:

$$t_1 - \rho t_2 = \alpha \Leftrightarrow t_1 = \frac{\alpha}{1-\rho}, \tag{8}$$

$$t_2 - \rho t_1 = \alpha \Leftrightarrow t_2 = \frac{\alpha}{1-\rho}, \tag{9}$$

$$t_3 = \alpha\eta \tag{10}$$

The equality between the two tasks, comes from the complementarity in the cost function. The problem of the principal can be written as:

$$\begin{aligned} &\max_{\alpha, \boldsymbol{t}} \quad \Pi(\boldsymbol{t}) = B(\boldsymbol{t}) - C(\boldsymbol{t}) - \frac{1}{2}\alpha^2 r Var(\epsilon) \\ &s.t. \\ &t_1 = \frac{\alpha}{1-\rho}, \\ &t_2 = \frac{\alpha}{1-\rho}, \\ &t_3 = \alpha\eta \end{aligned} \tag{11}$$

Totally differentiating with respect to α, we get the the solution in terms of the structural parameters.

$$\frac{d\Pi(\boldsymbol{t})}{d\alpha} = 0 \Leftrightarrow \frac{dB(\boldsymbol{t})}{d\alpha} - \frac{dC(\boldsymbol{t})}{d\alpha} - \alpha r Var(\epsilon) \tag{12}$$

$$\frac{B_1}{1-\rho} + \frac{B_2}{1-\rho} + \eta B_3 - \frac{2\alpha}{1-\rho} - \alpha\eta^2 = \alpha r Var(\epsilon) \tag{13}$$

The solution is

$$\alpha^* = \frac{B_1 + B_2 + (1-\rho)\eta B_3}{2 + (1-\rho)(\eta^2 + r Var(\epsilon))} \tag{14}$$

The efficient and incentive compatible levels of effort are given by

$$t_1^* = \frac{\alpha^*}{1-\rho}, \tag{15}$$

$$t_2^* = \frac{\alpha^*}{1-\rho}, \tag{16}$$

$$t_3^* = \alpha^*\eta \tag{17}$$

The first observation here is straightforward: the incentive part of the EPA's budget ($\alpha^*\mu(\boldsymbol{t}^*)$), is increasing in the the way the Government's political benefit responds to effort across firms: B_1, B_2, B_3. The more sensitive the political benefit of the Government

is to the effort exerted by the EPA across firms, the more the compensation of the EPA will depend on the actual vector of efforts.

Secondly, the complementarity of the tasks required by small firms (ρ) and the export premium of the large firm (η) determine whether effort allocation would tend to favor small firms against the large one. If tasks required by small firms are very scalable (high complementarity between t_1 and t_2; ρ close to 1), the EPA will have incentives to concentrate effort on them. If instead the export premium of the large firm is high (high value of η), the effort of the EPA will go more to the large firm. Formally $t_1^* + t_2^* > t_3^* \iff \eta < 2/(1-\rho) \iff \rho > (\eta - 2)/\eta$. This condition is verified for any level of complementarity if the export capacity of the large firm (η) is smaller or equal to the sum of the export capacity of the small firms (which is equal to 2 in this stylized environment). On the contrary, if the export capacity of the large firm is very high the EPA will allocate more effort to the large firm unless the complementarity parameter is close to its maximum value.

Third, the EPA's effort toward all firms as well as the size of the budget is monotonically decreasing in the variance of exports. Notice that with a very high variance of the exports, the incentive budget will decrease less if there is a high enough complementarity between the tasks. Therefore, having a budget that evaluates firms on total exports gives the result that EPAs might exert high effort even when exports themselves are a very noisy signal. In that case effort is likely to go more to the small firms.

4.3. Input-based evaluation mechanism, three firms

To model the customer satisfaction of the firm, we assume that instead of observing the aggregate effort, the Government asks the firms to report on the effort (services) provided by the EPA, e.g., through a survey that allows firms to be identified. Thus, the Government will be able to observe, up to a random effect, the effort made by the EPA for each firm. We assume that the random disturbance in the responses of firms is equal to the random component of each individual export function. In such a scenario, under the assumption of no correlation between the signals, the vector of signals can be

modeled as follows:

$$\boldsymbol{x} = \begin{bmatrix} t_1 \\ t_2 \\ t_3 \end{bmatrix} + \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \epsilon_3 \end{bmatrix}, \quad \boldsymbol{\epsilon} \sim N\left(\mathbf{0}, \begin{bmatrix} \sigma_s^2 I_2 & 0 \\ 0 & \sigma_l^2 \end{bmatrix}\right) \tag{18}$$

In contrast to the previous case, the government can target individual tasks. Thus the optimal contract will be to set the remuneration on a task-by-task basis. In this case, therefore, $\boldsymbol{\alpha}^t = \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 \end{bmatrix}$. The maximization program of the principal changes to:

$$\begin{aligned} &\max_{\boldsymbol{\alpha},\boldsymbol{t}} \quad \Pi(\boldsymbol{t}) = B(\boldsymbol{t}) - C(\boldsymbol{t}) - \frac{1}{2} r \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 \end{bmatrix} \begin{bmatrix} \sigma_s^2 I_2 & 0 \\ 0 & \sigma_l^2 \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} \\ &s.t. \\ &\boldsymbol{t} \in \arg\max_{\boldsymbol{z}} \ \alpha_1 z_1 + \alpha_2 z_2 + \alpha_3 z_3 - C(\boldsymbol{z}) \end{aligned} \tag{19}$$

To simplify even further the results, we assume that the political marginal benefit for the Government of EPA effort targeting the two small firms is the same, i.e., $B_1 = B_2$. This implies $t_1 = t_2$ and $\alpha_1 = \alpha_2$. As usual, the problem of the agent yields the incentive compatibility constraints which are given by:

$$t_1 = t_2 = \frac{\alpha_1}{1-\rho} \Leftrightarrow \alpha_1 = \alpha_2 \tag{20}$$

$$t_3 = \alpha_3 \tag{21}$$

Substituting the incentive compatibility constraints back into the problem of the principal we get

$$\begin{aligned} &\max_{\boldsymbol{\alpha},\boldsymbol{t}} \quad B(\boldsymbol{t}) - C(\boldsymbol{t}) - \frac{1}{2} r (2\alpha_1^2 \sigma_s^2 + \alpha_l^2 \sigma_l^2) \\ &s.t. \\ &t_1 = \frac{\alpha_1}{1-\rho} \\ &t_2 = \frac{\alpha_2}{1-\rho} \\ &t_3 = \alpha_3 \end{aligned} \tag{22}$$

The solution of the problem is given by the following set of parameters:[5]

$$\tilde{\alpha}_1 = \frac{B_1 + B_2}{2(1 + (1-\rho)r\sigma_s^2)} = \frac{B_1}{1 + (1-\rho)r\sigma_s^2} \tag{23}$$

$$\tilde{\alpha}_2 = \frac{B_1 + B_2}{2(1 + (1-\rho)r\sigma_s^2)} = \frac{B_2}{1 + (1-\rho)r\sigma_s^2} \tag{24}$$

$$\tilde{\alpha}_3 = \frac{B_3}{r\sigma_l^2 + 1} \tag{25}$$

The efficient and incentive compatible levels of effort will then be

$$\tilde{t}_1 = \frac{\tilde{\alpha}_1}{1-\rho}, \tag{26}$$

$$\tilde{t}_2 = \frac{\tilde{\alpha}_2}{1-\rho}, \tag{27}$$

$$\tilde{t}_3 = \tilde{\alpha}_3 \tag{28}$$

The task-specific compensation for the EPA's effort to support small firms is equal. The compensation is highly dependent on the complementarity between the tasks. If complementarity is high, (ρ close to 1), $\tilde{t}_1$ and $\tilde{t}_2$ are compensated at the highest rate (the highest possible α), virtually independent of the variability of the signal. A key feature of the use of a customer satisfaction performance indicator is that it does not take into account the higher productivity of large firms, which cannot be accounted for in a simple input-based evaluation approach. Thus, the Government will tend to reward more tasks performed for small firms unless the political benefit of support to large firms is great enough. Formally, the total effort allocated to small firms will be higher than the effort directed towards the large firm if $B_3 < \hat{B}_3 = \frac{2B_1(1+r\sigma_l^2)}{(1-\rho)+r\sigma_s^2(1-2\rho+\rho^2)}$.

As in the previous case where performance was evaluated on the basis of aggregate exports, extreme economic conditions reflected in a high volatility environment will shrink the size of the incentive.

4.4. Comparing evaluation mechanisms

The simple framework presented above highlights some key features of the role played by the evaluation mechanism in shaping the activities of an EPAs as well as the structure

[5] In the case where the political marginal benefit from EPA effort targeting small firms differs across the firms, there will be no full symmetry, although a similar result can be derived by focusing on the expression $\alpha_1 + \alpha_2$.

of its budget. This is important because international organizations such as the World Bank and the International Trade Centre, often audit EPAs and offer advice in ways to better supply services to small and medium enterprises. Two main questions arise: which evaluation mechanism elicits more effort on small firms? How do the two compare in terms of budget distribution? We answer these questions with the following three observations.

Observation 1. *The EPA's effort toward small firms is higher under the 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* $\partial \bar{B}_3/\partial \eta > (<) 0 \iff \eta > (<)\sqrt{r\sigma_l^2}$.

Observation 1 shows the existence of a threshold value for which the total export evaluation mechanism provides more effort for small firms than the customer satisfaction mechanism. The result reverts the expectation that a mechanism favored on economic impact (such as total exports) will necessarily disfavor small firms. In fact, because the evaluation mechanism is based on the aggregate value, it is always optimal for the EPA to increase effort in small firms because of the cost minimizing structure. The larger the complementarity between the firms, the more stringent the constraint will become, because the customer satisfaction mechanism is more sensitive to changes in complementarity than that based on total exports. In an environment with large unproductive firms that have substantial political influence, the only way to increase the effort provided to small firms is to evaluate EPAs with respect to their aggregate result (total exports). In the case of the customer satisfaction-based indicator, the government will reward the EPA for exerting effort toward the large firm. In the case where total exports are used as the performance measure such targeted incentives are not a viable option, and more efforts is exerted toward small firms.

Observation 2. *The EPA's effort toward the large firm is higher under the evaluation mechanisms based on total exports if either* B_3 *is small enough or* B_1 *is large enough.*

observation 2 is just the corollary of observation 1. If the political benefit is larger on the small firms, then the customer satisfaction mechanism will offer them a higher budget. This is the case because in the total exports mechanism, the weight of political

benefits are averaged out and mitigated. Therefore, the mechanism is less sensitive to large changes in political benefits.

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 the evaluation mechanisms based on total exports if* $B_3 > \widehat{B}_3 = \frac{B_1\eta(1+r\sigma_l^2)}{1+r\sigma_s^2(1-\rho)} > \bar{B}_3$.

The last observation, coupled with the results or observation 1 and 2, tells us that in an environment with lobbying and unproductive large firms, the relative effort concentration ratio will only benefit small firms in presence of the total export mechanism.

Finally, the model allows us to compare the size of the EPA's budget under the two different mechanisms.

Observation 4. *For any given* β*, if at least one marginal political benefit* (B_3 *or* B_1) *is high enough, the size of the EPA's budget is higher under the customer satisfaction evaluation mechanism.*

Observation 4 suggests that given a sufficiently high level of political benefits, independent of whether these reflect effort targeting large or small firms, the size of the EPA's budget will be higher under an evaluation mechanism based on customer satisfaction. This performance measure allows the Government to target EPA incentives across firms and therefore to better align the EPA's allocation of effort across tasks to its own political benefit function which in turn results in the Government allocating more resources to the EPA.

According to the predictions of the model, if we assume there are political benefits to the Government of EPA activities we should observe that EPAs that are assessed on the basis of the value of exports should, on average, have less resources than those who are assessed using measures of customer satisfaction. While testing this prediction is not possible given available data, we can compare the averages for budgets and the number of employees of EPAs based on their performance indicators. As can be seen from Table 3, the relationship predicted by the model seems to hold. EPAs that are evaluated in terms of the value of exports tend to have both lower budgets and fewer employees than those that are assessed on the basis of customer satisfaction.

Table 3: Average budgets and key performance indicator

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

Source: Olarreaga et al. (2017).

Note: Some countries ranked 1st two or more objectives. In such cases we include them in both categories, so the averages are not biased by their presence.

5. Conclusion

[[To be added]]

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