Eco-Labelling, Trade Integration, and Productivity

Vera DANILINA

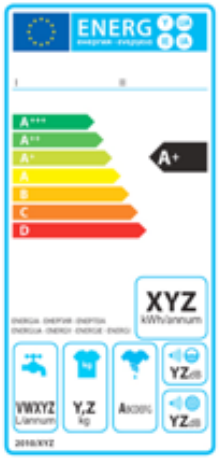
Aix-Marseille School of Economics (Aix-Marseille University), France

8th FIW Research Conference
International Economics
December 3-4, 2015

Voluntary Environmetal Programmes

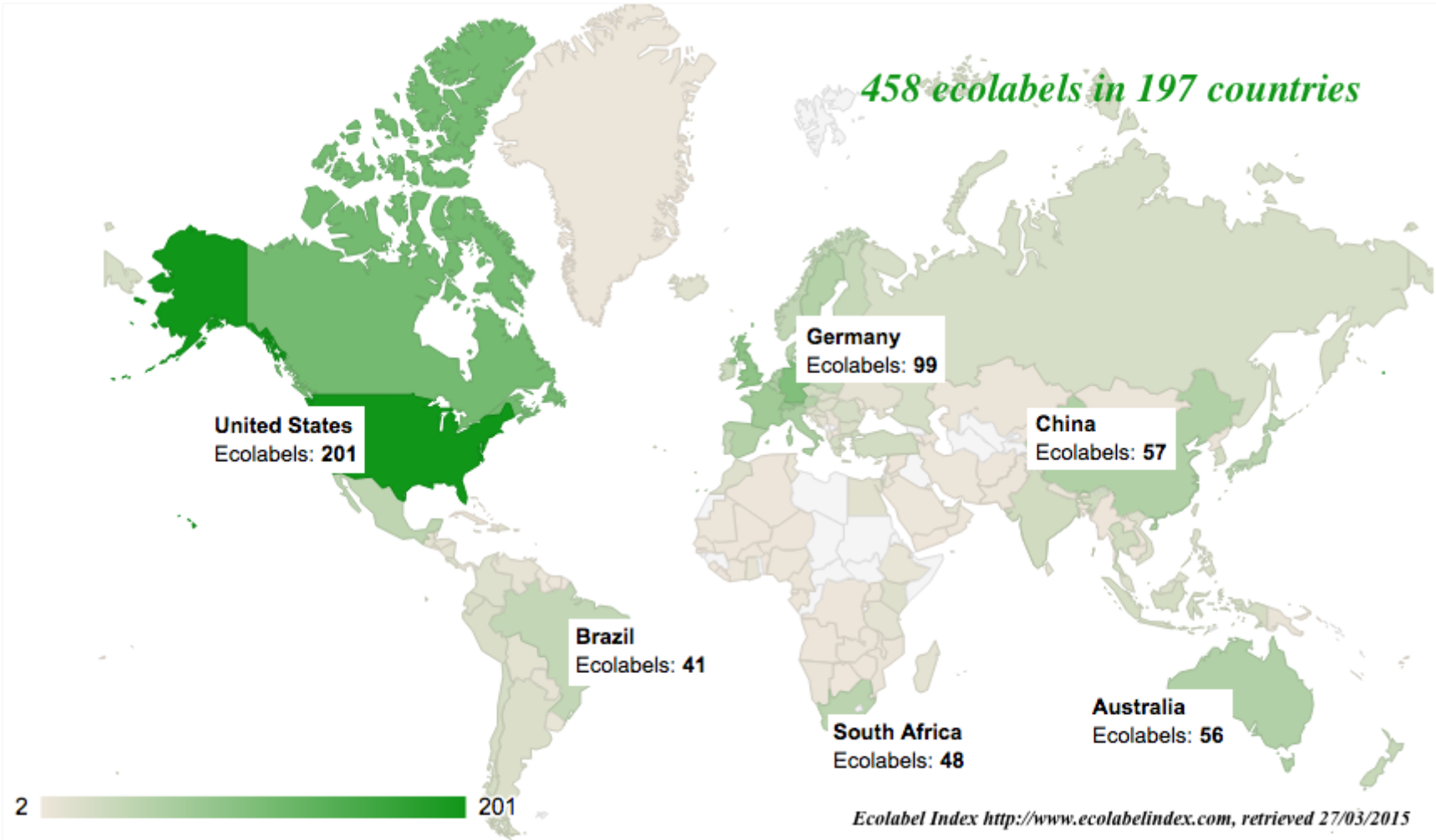
- eco-standards,
- stewardship certificates,
- ranking and rating,
- green mutual funds,
- environmental management systems,
- environmental declarations,
- codes of conduct,
- reporting standards,
- green trademarks,
- **eco-labels**.

(1) Why Eco-Labels?

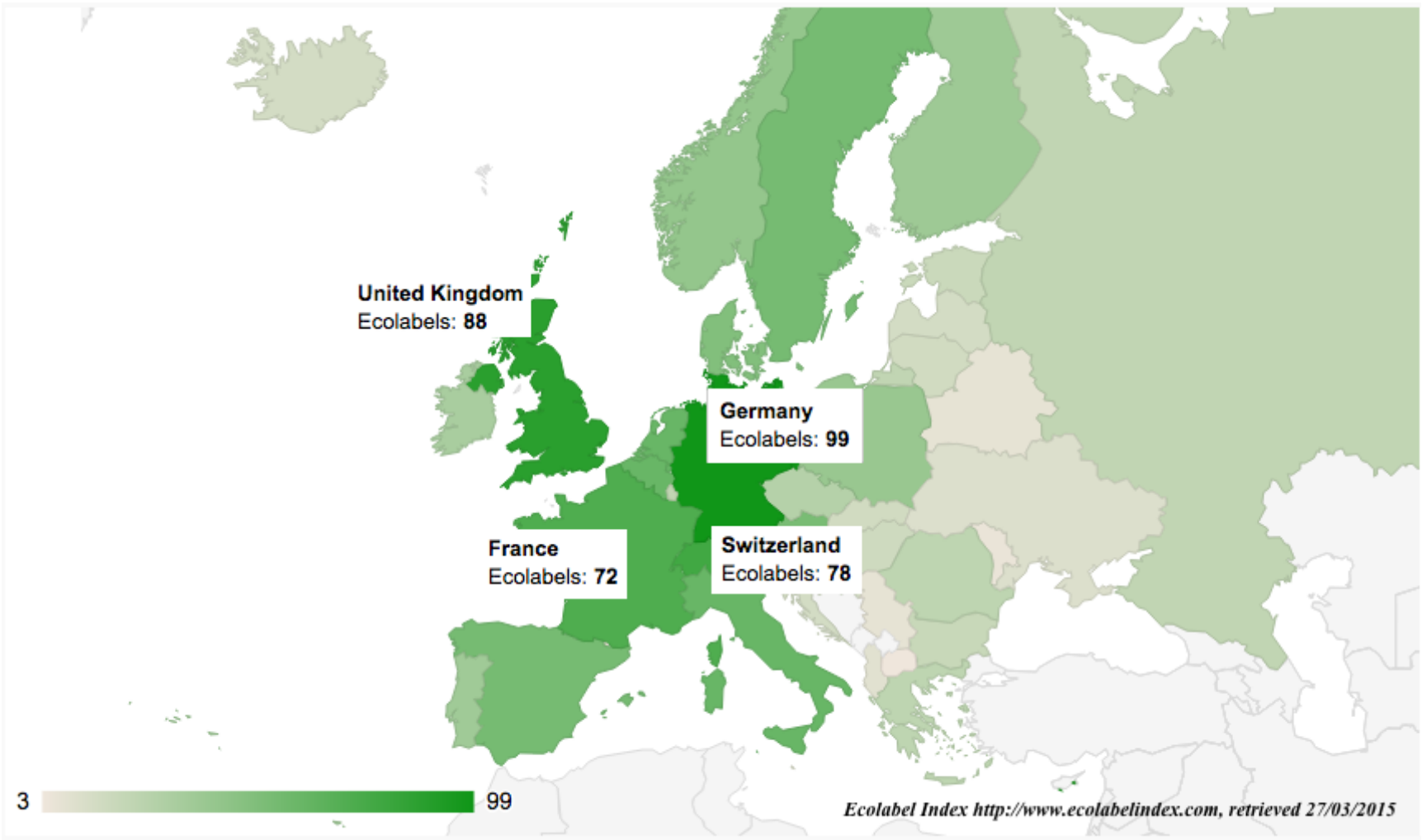


C.A.F.E. Practices

Distribution of Eco-Labels: World



Distribution of Eco-Labels: Europe



(2) Why Eco-Labels?

Eco-labels

- meet green-biased preferences.
  - *stated preferences*: Imkamp (2000), Johnston et al. (2001), Moon et al. (2002), Gadema and Oglethorpe (2011), Echeverría et al. (2014).
  - *revealed preferences*:
    - Teisl et al. (2002) - USA, tuna market;
    - Bjørner et al. (2004) - Denmark, Nordic Swan, toilet paper, paper towels, detergents;
    - Vanclay et al. (2001) - Australia, grocery.
- disclose the *credence* characteristics of products (Darby and Karni, 1973).
- overcome the information overload and fill the *attitude-behaviour gap* (Young et al., 2010).

(2) Why Eco-Labels?

Eco-labels

- meet green-biased preferences.
  - *stated preferences*: Imkamp (2000), Johnston et al. (2001), Moon et al. (2002), Gadema and Oglethorpe (2011), Echeverría et al. (2014).
  - *revealed preferences*:
    - Teisl et al. (2002) - USA, tuna market;
    - Bjørner et al. (2004) - Denmark, Nordic Swan, toilet paper, paper towels, detergents;
    - Vanclay et al. (2001) - Australia, grocery.
- disclose the *credence* characteristics of products (Darby and Karni, 1973).
- overcome the information overload and fill the *attitude-behaviour gap* (Young et al., 2010).

(3) Why Eco-Labels?

Eco-labels

- serve up to 20% of the market (Amacher et al. 2004).
- complement mandatory regulation.
- play a role of additional market barriers.
- establish "*a new industry of selling stickers*" (IMD report - Comas Martí and Seifert, 2012).
- lack transparent and clear criteria due to lower availability for regulation (Prakash and Potoski, 2012).
- refer to *greenwashing*.
- *invite multidisciplinary approach.*

(3) Why Eco-Labels?

Eco-labels

- serve up to 20% of the market (Amacher et al. 2004).
- complement mandatory regulation.
- play a role of additional market barriers.
- establish "*a new industry of selling stickers*" (IMD report - Comas Martí and Seifert, 2012).
- lack transparent and clear criteria due to lower availability for regulation (Prakash and Potoski, 2012).
- refer to *greenwashing*.
- *invite multidisciplinary approach.*

(3) Why Eco-Labels?

Eco-labels

- serve up to 20% of the market (Amacher et al. 2004).
- complement mandatory regulation.
- play a role of additional market barriers.
- establish "*a new industry of selling stickers*" (IMD report - Comas Martí and Seifert, 2012).
- lack transparent and clear criteria due to lower availability for regulation (Prakash and Potoski, 2012).
- refer to *greenwashing*.
- *invite multidisciplinary approach.*

Environmental Concerns / Eco-appreciation

Franzen and Vogl (2013):

individuals react in three distinct ways to environmental problems: having rational insight into the problem, being willing to act, and being emotionally affected by environmental degradation.

1. Ingelharts post-materialism hypothesis (Inglehart 1995).
2. Dunlap and Van Lieres "New Environmental Paradigm" hypothesis (Dunlap and Van Liere 1978).
3. Affluence hypothesis (Kuznets curve).

Van-Liere and Dunlap 1980, Franzen and Meyer 2010, Meyer 2015

Distribution of wealth, quality of environment, population density, age and gender, educational level, and other sociodemographic characteristics also matter.

Environmental Concerns / Eco-appreciation

Franzen and Vogl (2013):

individuals react in three distinct ways to environmental problems: having rational insight into the problem, being willing to act, and being emotionally affected by environmental degradation.

1. Ingelharts post-materialism hypothesis (Inglehart 1995).
2. Dunlap and Van Lieres "New Environmental Paradigm" hypothesis (Dunlap and Van Liere 1978).
3. Affluence hypothesis (Kuznets curve).

Van-Liere and Dunlap 1980, Franzen and Meyer 2010, Meyer 2015

Distribution of wealth, quality of environment, population density, age and gender, educational level, and other sociodemographic characteristics also matter.

Environmental Concerns / Eco-appreciation

Franzen and Vogl (2013):

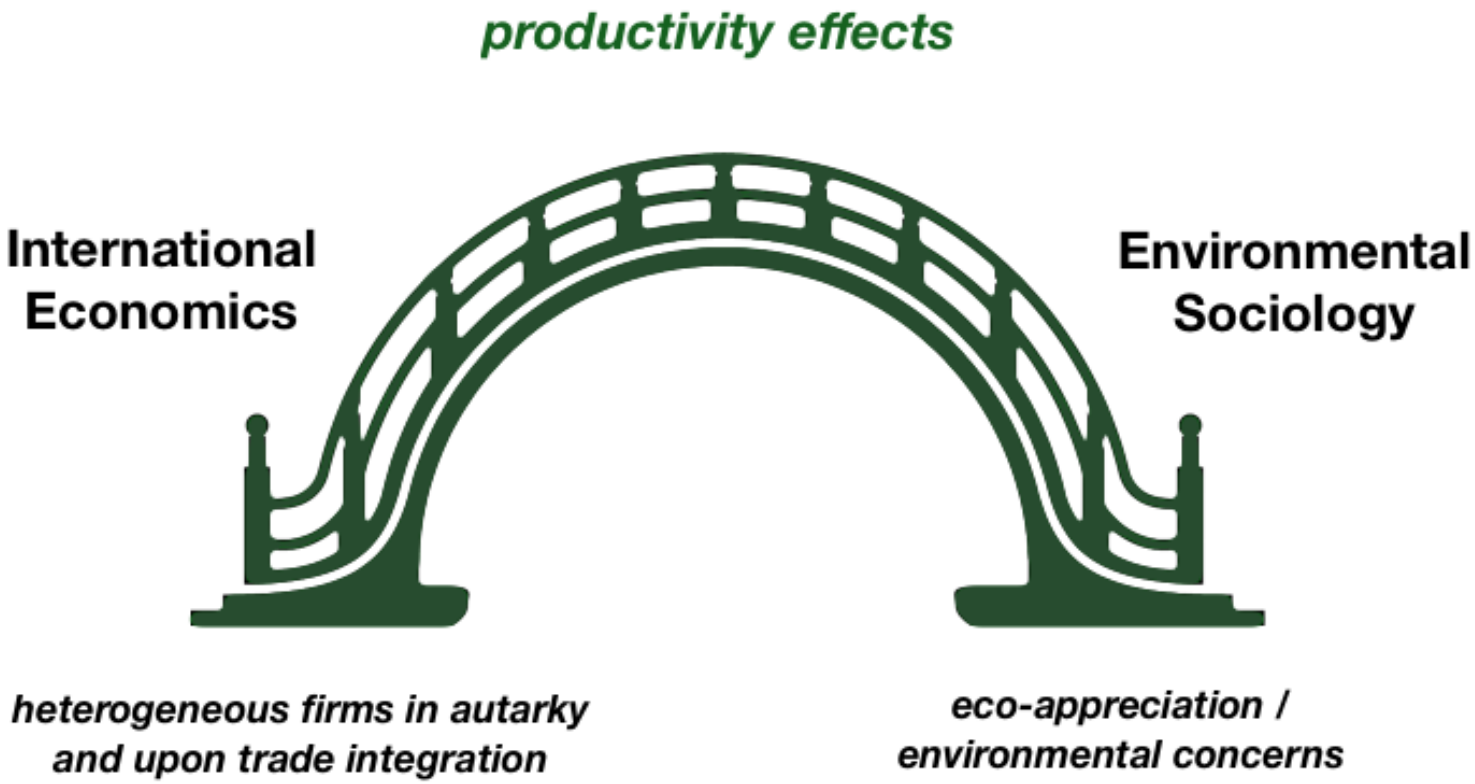
individuals react in three distinct ways to environmental problems: having rational insight into the problem, being willing to act, and being emotionally affected by environmental degradation.

1. Ingelharts post-materialism hypothesis (Inglehart 1995).
2. Dunlap and Van Lieres "New Environmental Paradigm" hypothesis (Dunlap and Van Liere 1978).
3. Affluence hypothesis (Kuznets curve).

Van-Liere and Dunlap 1980, Franzen and Meyer 2010, Meyer 2015

Distribution of wealth, quality of environment, population density, age and gender, educational level, and other sociodemographic characteristics also matter.

Interdisciplinary Approach



Outline and General Result

Studying productivity effects in the equilibrium with different types of eco-labelling upon:

1. introducing eco-labels to the market in autarky;
2. opening to trade;
3. eco-appreciation heterogeneity growth within trade integration.

General Result Related to Productivity

- Eco-labelling matters.
- Type of eco-labelling matters.
- Relative degree of environmental awareness across countries matters.

Outline and General Result

Studying productivity effects in the equilibrium with different types of eco-labelling upon:

1. introducing eco-labels to the market in autarky;
2. opening to trade;
3. eco-appreciation heterogeneity growth within trade integration.

General Result Related to Productivity

- Eco-labelling matters.
- Type of eco-labelling matters.
- Relative degree of environmental awareness across countries matters.

Eco-Quality

Eco-quality function and Preferences

$$\chi = \chi(pr, \varepsilon)$$

$$X = \left[\int_{\varphi^*}^{\infty} \chi_i^{\frac{1}{\sigma}} x_i^{\frac{\sigma-1}{\sigma}} dG \right]^{\frac{\sigma}{\sigma-1}}, \sigma > 1$$

Assumptions:

- $\chi \geq 1$; $\chi(1, \varepsilon) = \chi(pr, 0) = 1$, $pr \geq 1$ - promotion activity, $\varepsilon \geq 0$ - eco-appreciation.
- a twice differentiable strictly concave increasing supermodular function.
- independent of the size of technological efforts.

Types of VEPs

	technology	application and licence fees	promotion/ advertisement	eco-quality
External ISO 14024 (Type I)	$\mathcal{T} > 0$[1]	$\mathcal{F} > 1$ $0 < \mathcal{F}_\ell < 1$	$\mathcal{A} > 1$	$\chi(\mathcal{A}, \varepsilon)$
Internal ISO 14021 (Type II)[2]	$t_i \geq 1$	-	$a_i > 1$	$\chi_i(a_i, \varepsilon)$

1. By assuming $0 < \mathcal{T} < 1$ the model follows the "win-win" Porter hypothesis (Porter and van der Linde, 1995).
2. To prevent greenwashing with self-declarations firms are subject to external public control with the probability of being

Types of VEPs

	technology	application and licence fees	promotion/ advertisement	eco-quality
External ISO 14024 (Type I)	$\mathcal{T} > 0$[1]	$\mathcal{F} > 1$ $0 < \mathcal{F}_\ell < 1$	$\mathcal{A} > 1$	$\chi(\mathcal{A}, \varepsilon)$
Internal ISO 14021 (Type II)[2]	$t_i \geq 1$	-	$a_i > 1$	$\chi_i(a_i, \varepsilon)$

1. By assuming $0 < \mathcal{T} < 1$ the model follows the "win-win" Porter hypothesis (Porter and van der Linde, 1995).
2. To prevent greenwashing with self-declarations firms are subject to external public control with the probability of being

Types of VEPs

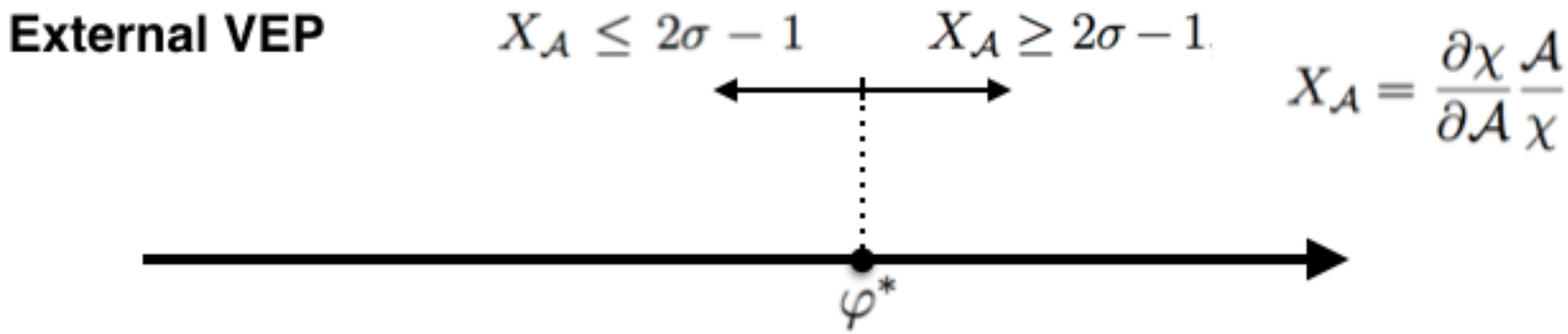
	technology	application and licence fees	promotion/ advertisement	eco-quality
External ISO 14024 (Type I)	$\mathcal{T} > 0$[1]	$\mathcal{F} > 1$ $0 < \mathcal{F}_\ell < 1$	$\mathcal{A} > 1$	$\chi(\mathcal{A}, \varepsilon)$
Internal ISO 14021 (Type II)[2]	$t_i \geq 1$	-	$a_i > 1$	$\chi_i(a_i, \varepsilon)$

1. By assuming $0 < \mathcal{T} < 1$ the model follows the "win-win" Porter hypothesis (Porter and van der Linde, 1995).
2. To prevent greenwashing with self-declarations firms are subject to external public control with the probability of being

General Assumptions

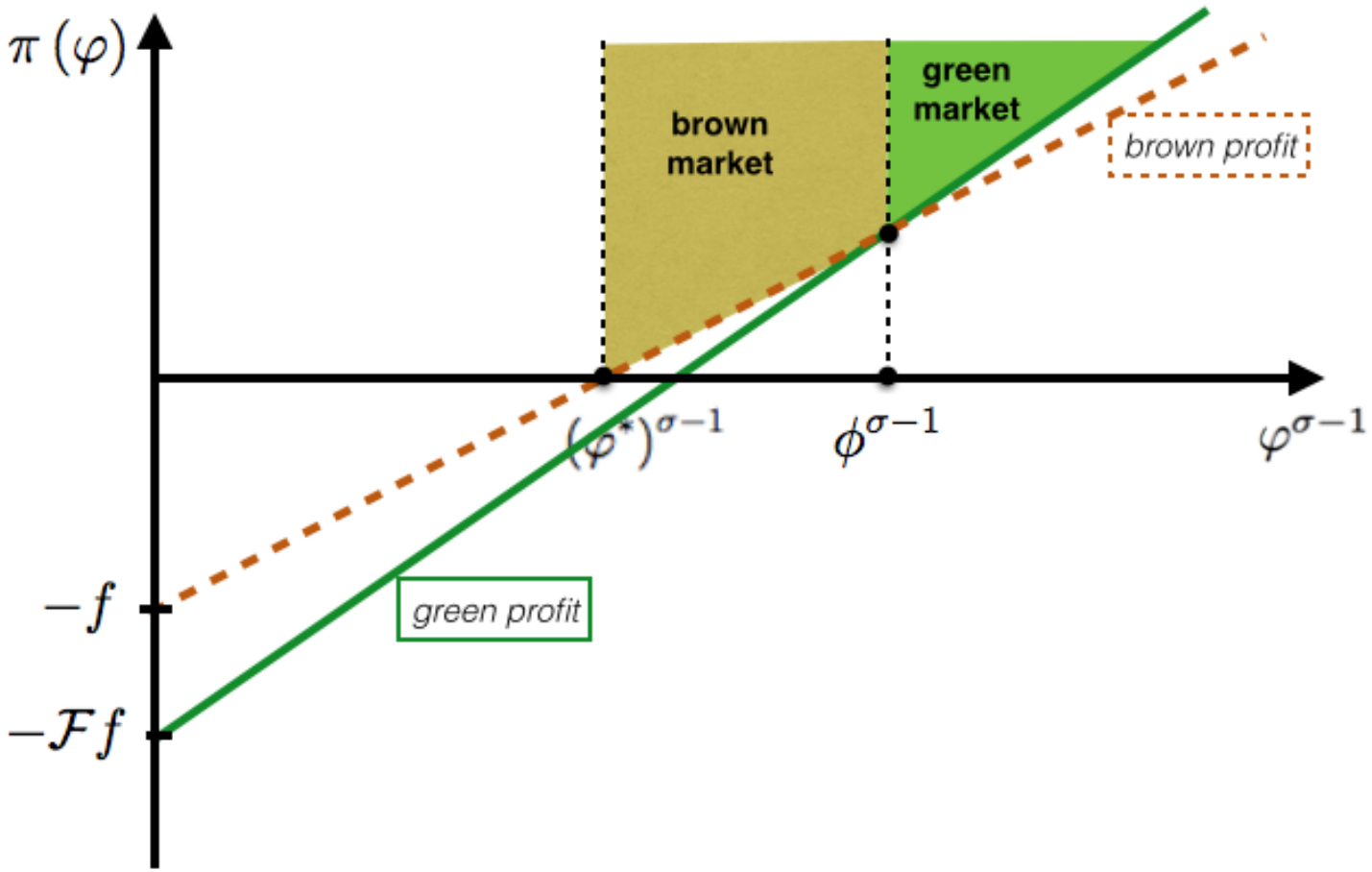
- 2x1 model: two industries, one factor within the model with heterogeneous firms, a nested Cobb-Douglas-CES utility function (Melitz, 2003).
- *Industry X*: eco-unfriendly, heterogeneous good, monopolistic competition, increasing returns to scale. It is divided into two sectors, green and brown.
- *Industry Y*: eco-indifferent, homogeneous good, perfect competition, constant returns to scale, used as a numéraire.
- **Trade integration**: two countries, symmetric iceberg trade costs, zero fixed exporting costs.

Introducing External Eco-Labelling

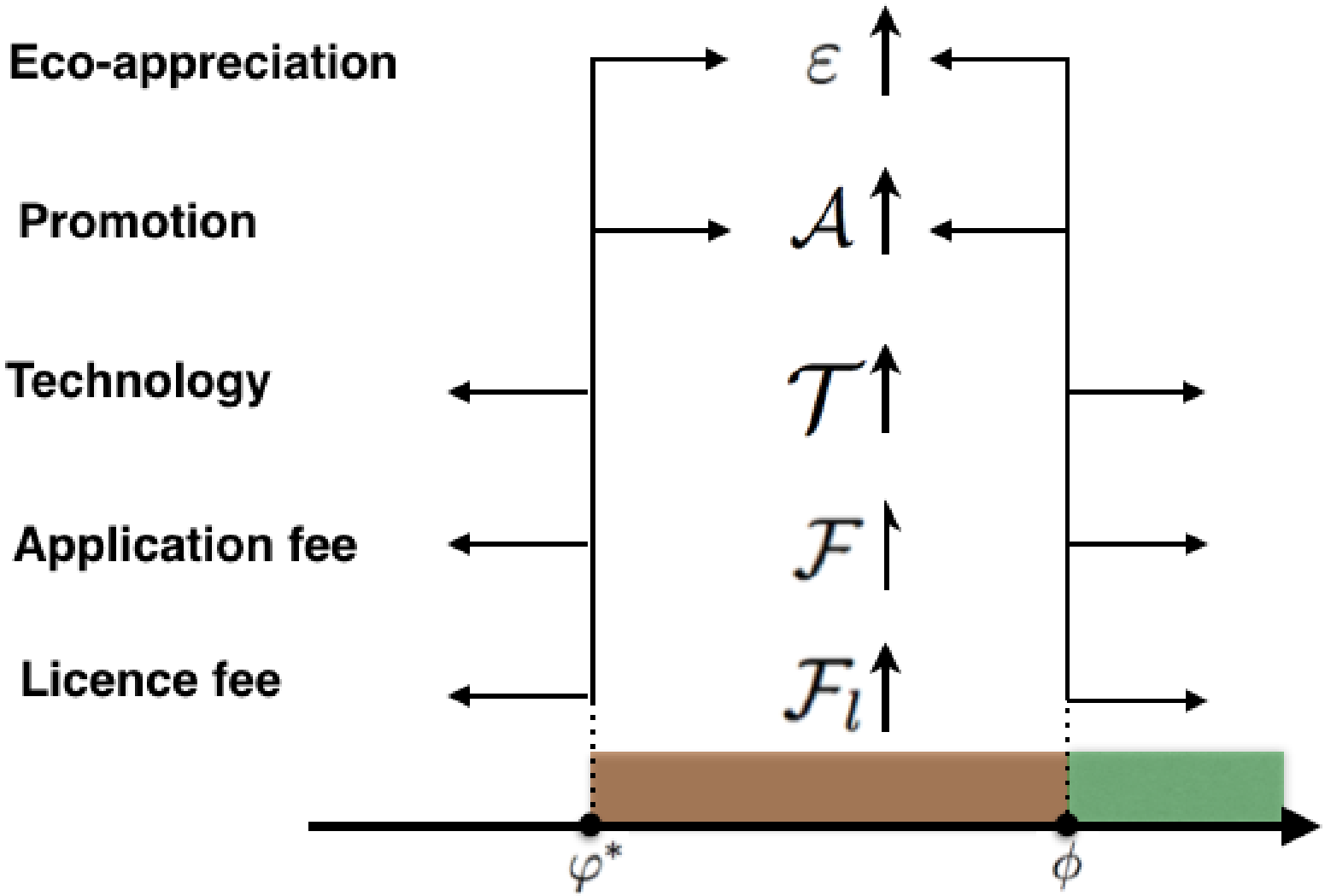


$X_{\mathcal{A}}$ represents the elasticity of eco-quality w.r.t. promotion activity;
σ represents the elasticity of substitution between varieties.

Market with External Eco-Labelling in Autarky



Productivity effects of External VEP changes in autarky



Market with Internal Eco-Labelling in Autarky

1. In the absence of public control all firms tend to greenwash.
2. Higher elasticity of substitution between varieties requires more stringent external control to prevent firms from greenwashing.
3. More stringent public control diminishes the share of greenwashing firms.
4. Profits are supermodular in (a,φ): more efficient firms choose to spend more on promotion.

Market with Internal Eco-Labelling in Autarky

1. In the absence of public control all firms tend to greenwash.
2. Higher elasticity of substitution between varieties requires more stringent external control to prevent firms from greenwashing.
3. More stringent public control diminishes the share of greenwashing firms.
4. Profits are supermodular in (a,φ): more efficient firms choose to spend more on promotion.

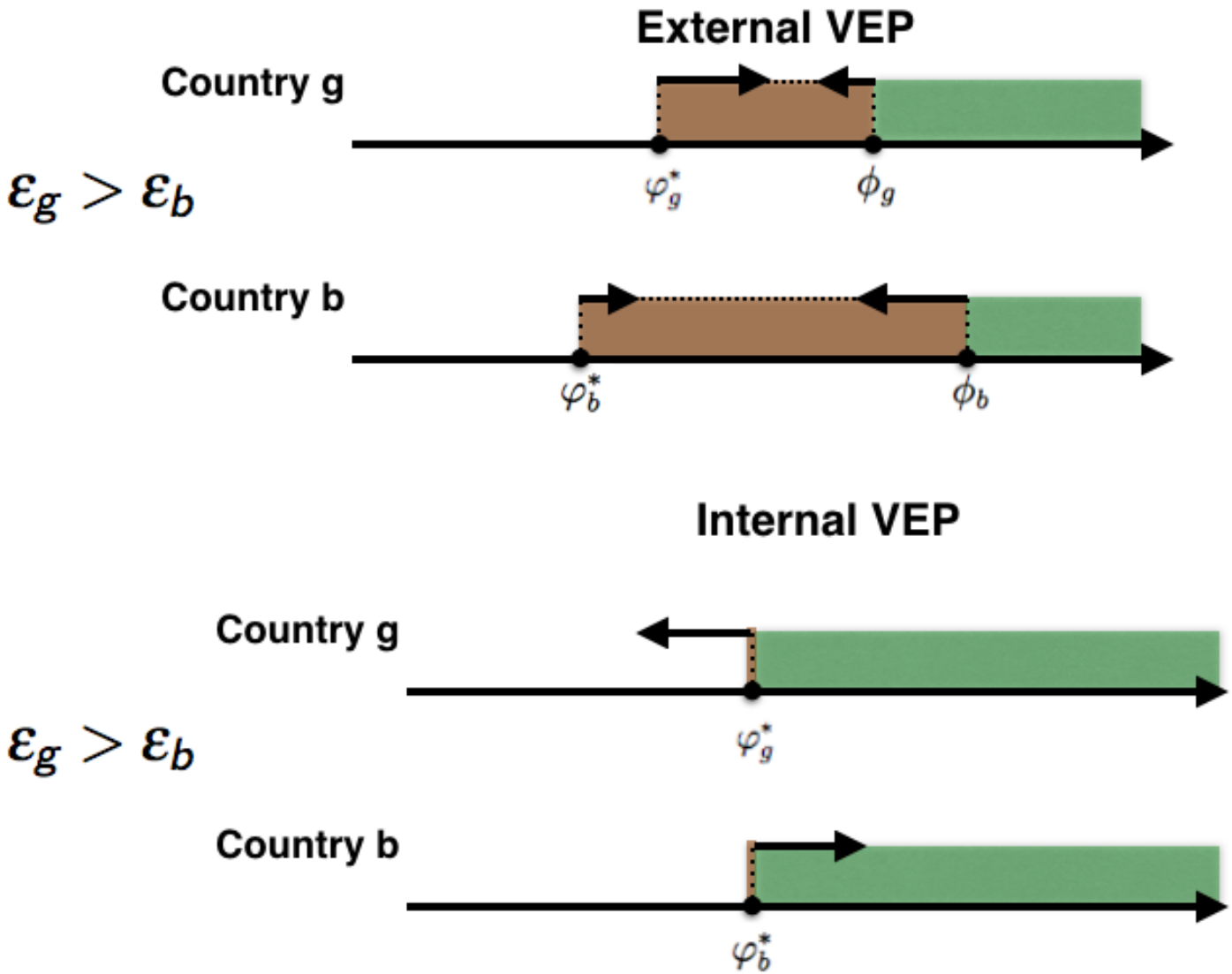
Market with Internal Eco-Labelling in Autarky

1. In the absence of public control all firms tend to greenwash.
2. Higher elasticity of substitution between varieties requires more stringent external control to prevent firms from greenwashing.
3. More stringent public control diminishes the share of greenwashing firms.
4. Profits are supermodular in (a,φ): more efficient firms choose to spend more on promotion.

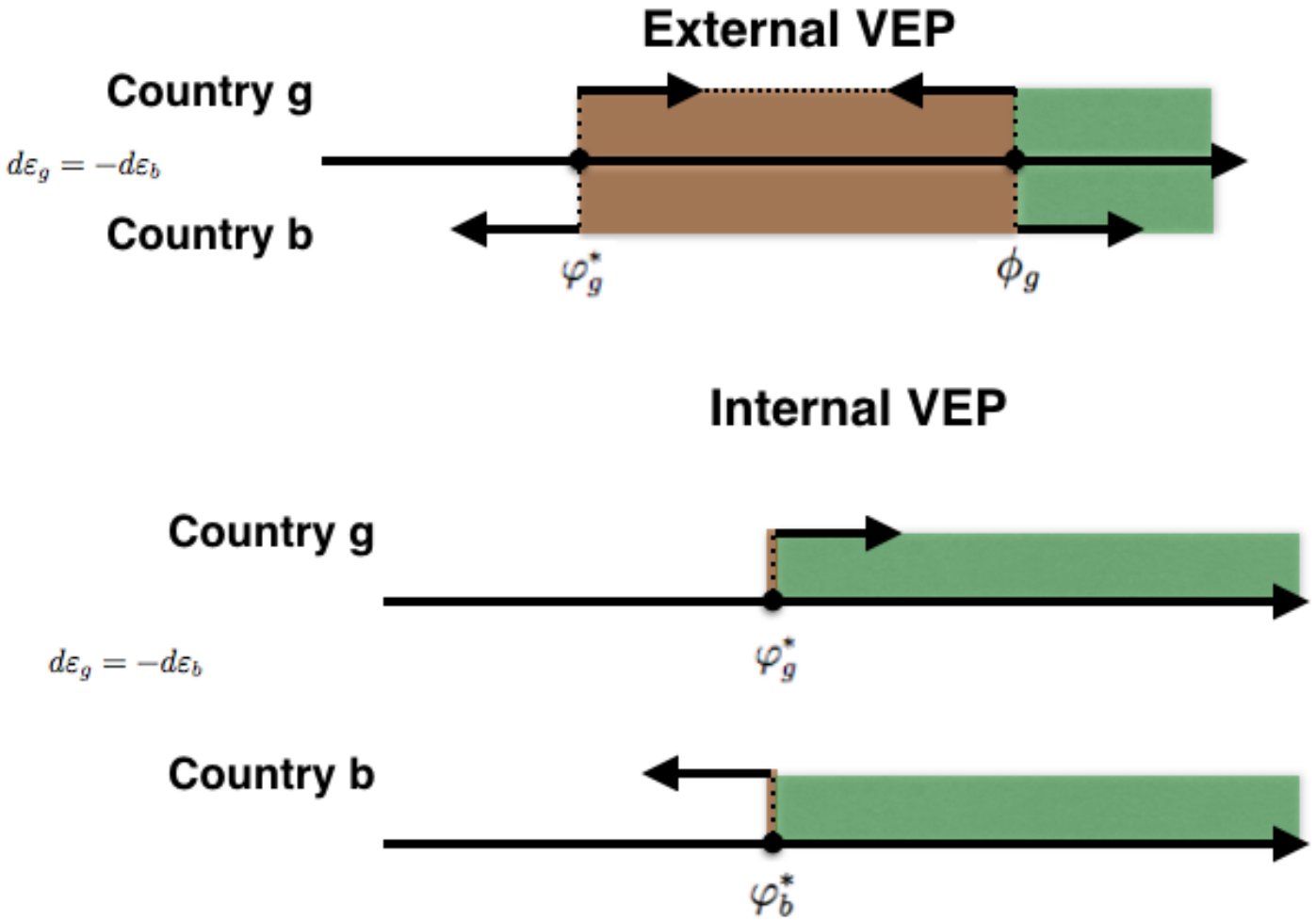
Market with Internal Eco-Labelling in Autarky

1. In the absence of public control all firms tend to greenwash.
2. Higher elasticity of substitution between varieties requires more stringent external control to prevent firms from greenwashing.
3. More stringent public control diminishes the share of greenwashing firms.
4. Profits are supermodular in (a,φ): more efficient firms choose to spend more on promotion.

Opening to Trade



Growing Environmental Heterogeneity in Open Economy



Concluding Remarks

- The model introduces a concept of eco-appreciation to the heterogenous firms framework.
- Eco-quality based on eco-appreciation allows to model green-biased preferences to discover one more relationship between demand and supply.
- More efficient firms are more likely to implement green programs than less efficient.
- Trade integration might lead to controversial results in productivity effect due to eco-concerns heterogeneity and the type of VEP.

Selected Shortcomings to Overcome

- zero fixed exporting costs: *How significant is the impact of eco-labelling to productivity?*
- no mandatory regulation: *What is the relationship between mandatory and voluntary regulation?*
- eco-preferences homogeneity: *What is the relative trustworthiness of different types of VEPs?*
- no social welfare estimation: *What are the welfare effects of eco-labelling?*
- eco-appreciation is an external country-specific parameter: *Should we take into account the affluence hypothesis?*
- theoretical model: *What does the empirics say?*

Thank you for your attention!

vera.danilina@univ-amu.fr
https://veradanilina.wordpress.com/