The Dynamic Interaction between Entrepreneurship and the Public Sector Efficiency

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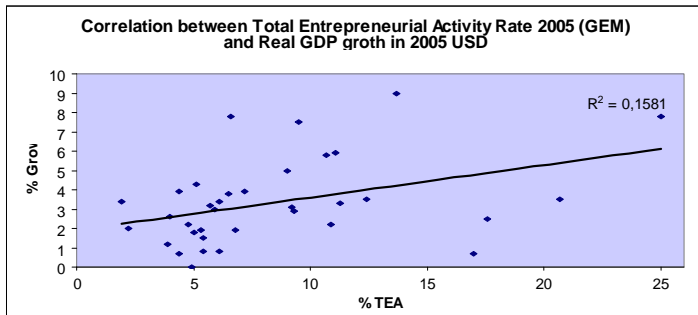
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Motivation
Entrepreneurship & Growth Rate

- Entrepreneurship is very important for economic growth, productivity, innovation and employment. It is widely viewed as a key aspect of economic dynamism. Data show that there exists a direct correlation between entrepreneurship and the real growth rate (0,39).Correlation is higher when we consider the OECD countries (0,44).

Correlation between Total Entrepreneurial Activity Rate 2005 (GEM) and Real GDP groth in 2005 USD

$R^2 = 0,1581$

% Grow — % TEA

Source: GEM and World Economics Outlook Database (2005), IMF

Motivation.
Entrepreneurship: Determinants

- In this paper we focus in two of the main determinants of the level of entrepreneurship:
  - **Regulatory framework** (related with the public sector performance) and
  - **Culture** (related with the distribution of preferences in the society and their intergenerational transmission).
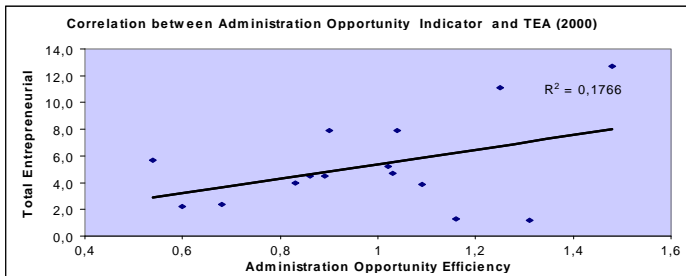
Motivation.
Determinants.Public Sector Performance

- Entrepreneurship requires a good, clear and enforceable regulatory framework, e.g. property rights, institutions for resolving disputes, protection of contractual partners, etc.

- Afonso, Schuknecht and Tanzy (2005) made an **Administration opportunity indicator** that takes into account corruption, red tape (concerning regulatory environment), quality of the judiciary (concerning the confidence in the administration of justice) and the size of the shadow economy (which is undermining the level playing field by being untaxed and unregulated).

Motivation.
Determinants. Public Sector Performance

- Correlation between TEA and Administration Opportunity Indicator for those countries that appear in both sources of data in 2000 offers a positive and significant value and 0,42 . **The higher is the efficiency of the public sector, the more dynamic is the economy.**

Correlation between Administration Opportunity Indicator and TEA (2000)

$R^2 = 0,1766$

Source: Afonso, Schuknecht and Tanzy (2005) and Global Entrepreneurship Monitor (GEM) 2000
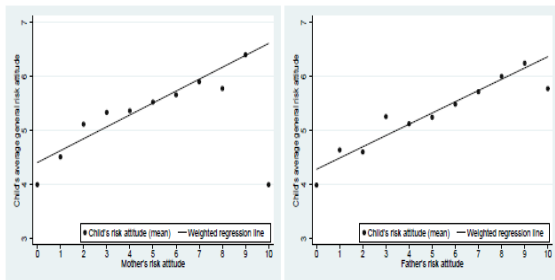
Motivation.
Entrepreneurship: Determinants

- An important determinant on the decision of becoming an entrepreneur are the individual risk attitudes or PREFERENCES. Individuals with risk taking preferences are more likely to become entrepreneurs than risk averse individuals.

- There are differences by country in this characteristic related to entrepreneurship: risk taking atitudes.

Motivation:
Intergenerational Transmission of Preferences

- These preferences are partly transmitted through generations and acquired by learning and other forms of social interaction.
- Domen, Falk, Fuman (2006) reports evidence that a crucial determinant of entrepreneurship, willingness to take risks, is transmitted from parents to children.

Figure 2: Attitudes towards Risk and Trust: Children and Parents

Motivation.
Determinants: Culture/Preferences/Intergenerational Transmission of Attitudes

Intergenerational Transmission of Attitudes

- Empirical work has shown that self-employment is correlated across generations, so that the children of the self-employed are themselves more likely to be self-employed (Colombier and Masclet 2008;Hundley 2006; Niitykangas and Tervo 2005, Hout and Rosen 2000, among others).

- Hundley (2006) results provide support for the effects of entrepreneurial inheritance (skills and values that are specifically acquired from exposure to a self-employed parent) on the self-employment choice.

Intergenerational Transmission of Attitudes

- Therefore, not only preferences but also behavior shows a high intergenerational correlation.
- In this context, the efficiency of the public sector will influence not only the decision of risk takers to become entrepreneurs but also the incentives of parents to transmit risk-taking preferences. Therefore, there is a two-way feedback between changes in the preference population distribution and changes in the distribution of behavior in the population.

Introduction

- We present an overlapping generations model with intentioned and costly cultural transmission of preferences in order to analyze the interaction between entrepreneurship and the efficiency of the public sector.

- If an individual decides to become an entrepreneur and start a risky project, the results will depend crucially on the level of effort of the civil servants. If they work hard, the profits for the entrepreneur are the highest. Conversely, if they exert low effort, the project may likely fail.

- We want to analyze in a dynamic setting this interaction when risk preferences are heterogeneous and decision on taxes (that affect the profits of entrepreneurs and the wage of officials) are made by majority voting.

Introduction

- We characterize the long run behavior of this society, that is, the stable steady states of the cultural dynamics.
- The model has three potential long run outcomes (cultures):
  - A first one with a large share of entrepreneurs, and a level of taxes just enough to implement high effort of officials (Efficient Public Sector).
  - A second one in which there are not entrepreneurs and there exists confiscatory taxes on entrepreneurs's profits.
  - An a last equilibrium with a high share of officials and routine producers, with a confiscatory taxes (and official's wage), and the resulting net profits are very low.

The model

- We consider an overlapping generations model. The population is a continuum [0,1] and each individual lives for two periods.
- There exists two types of individuals, $i \in \{a, b\}$; type a are risk-takers and b are risk-averse. The proportion of each type in the population is q and $(1-q)$ respectively.
- During the first period, as a child, the individual is socialized to one of these two preferences and in the second period, as an adult, he chooses an activity.
- Individuals decide to become entrepreneurs (E) or no entrepreneurs (NE).
- If they choose NE, with probability α they become officials and with probability $1 - \alpha$, they work on routine production activities.

The model
Payoffs

- Routine Producers receive a fixed payoff, w^r, which is normalized to zero $w^r = 0$.
- Entrepreneurship is a risky activity (exogenous and strategic risk). The final profits depend on the behavior of the officials. The effort of the officials can be high or low $(e^h; e^l)$.
- Specifically, we assume that the probability of success is the effort of the officials, $e^h \in [0, 1]$ and $e^l \in [0, 1]$ and $e^h > e^l > 0$.
- The expected profits are: $\pi^h > \pi^l \geq 0$

$$\pi^h = e^h H + (1 - e^h)L \qquad (1)$$
$$\pi^l = e^l H + (1 - e^l)L \qquad (2)$$

where $H > 0$ and $L < 0$ are the profits in case of success or not, respectively.

- The cost of high effort is $c > 0$ and for simplicity the cost of low effort is zero.
- Assumption: $\Delta \pi = \pi^h - \pi^l > c$.

The model
Payoffs

- Only entrepreneurs pay taxes, τ, that are used to pay the officials´ wages, w^o.
- There is a balanced public budget:

$$\tau\pi\mu = w^o(1-\mu)\alpha \qquad (3)$$

where $\pi = \{\pi^h, \pi^l\}$ and μ is the proportion of entrepreneurs.

- The wage of the officials is given by

$$w^o = \frac{\tau\pi\mu}{(1-\mu)\alpha} \rightarrow w^o = \begin{cases} \frac{\tau\pi^h\mu}{(1-\mu)\alpha} & \text{if } e^h \\ \frac{\tau\pi^l\mu}{(1-\mu)\alpha} & \text{if } e^l \end{cases}$$

The model
Preferences

- We use a very simple form of risk preferences to characterize the types $i \in \{a, b\}$.
- Recall that E is a risky activity whereas NE is not.
- The utility functions are:

$$
\begin{aligned}
U_a(y^j, j) &= y^a + \gamma\delta, \text{ where } \left\{ \begin{array}{ll} \delta = 1 & \text{if } j = E \\ \delta = 0 & \text{if } j = NE \end{array} \right. \qquad (4) \\
U_b(y^j, j) &= y^a - \theta\delta, \text{ where } \left\{ \begin{array}{ll} \delta = 1 & \text{if } j = E \\ \delta = 0 & \text{if } j = NE \end{array} \right.
\end{aligned}
$$

where j denotes the two activities $j \in \{E, NE\}, \gamma > 0, \theta > 0$ and y^j is expected income

- Notice that

$$
U_a(y^{NE}, NE) = U_b(y^{NE}, NE)
$$

The model
Timing of the society game

- First stage: individuals make a decision between to become an entrepreneur or not.
- Second stage: individuals vote on Taxes by majority. We assume that entrepreneurs and officials can quit and find a job in a routine production activity.
- Third stage: officials choose to make high or low effort, e^l or e^h.

Socialization Process

- We consider overlapping generations of agents who only live two periods (as a young and as an adult).
- Preferences among agents are influenced by a purposeful and costly socialization process.
- We will draw from the models of cultural transmission of Cavalli-Sforza and Feldman (1981) and Bisin and Verdier (2001).

Socialization Process

- Let $d^i \in [0, 1]$ be the educational effort made by a parent of type i where $i \in \{a, b\}$.
- The socialization mechanism:

- A child is first directly exposed to the parent's preferences and is socialized to this preferences with probability d^i chosen by the parent (vertical transmission).
- If this direct socialization is not successful, with probability $1 - d^i$, he is socialized to the preferences of a role model picked at random in the population (oblique transmission).

Socialization Process

- Direct transmission is costly and it is justified because parents are altruistic towards their children.
- But their socialization decisions are not based on the purely material payoff expected for their children but on the payoff as perceived by their parents according to their own preferences: imperfect empathy.
- According to the imperfect empathy notion, parents obtain a higher utility if their children share their preferences.
- The degree or level of cultural intolerance of parents is the net utility loss suffered when your child is socialized to different preferences.
- The optimal education effort functions of parents depend (positively) on their level of cultural intolerance and (negatively) on the proportion of their own type in the current preferences distribution in the population

$$d^i = kq^j \Delta V^i,$$

where ΔV^i is the level of cultural intolerance of a parent of type i.

Socialization Process

- Considering the optimal education efforts, the differences equation that characterizes the dynamic behavior of q_t is:

$$
\begin{aligned}
q_{t+1} &= q_t + q_t(1 - q_t)\left(d^a - d^b\right), \\
q_{t+1} &= q_t + q_t(1 - q_t)k[\Delta V^a(1 - q_t) - \Delta V^b q_t].
\end{aligned}
$$

- This is the Bisin-Verdier cultural dynamics.
- Instead of material payoffs, levels of cultural intolerance are the main determinants that govern the dynamic evolution of the preferences distribution.

Cultures in the long run

- We characterize the stable steady states of the differences equation.
- A CULTURE is any stable steady state of the dynamics where the same Perfect Bayesian Equilibrium (PBE) of the society game is played.
- We work with a two-speed dynamics. Gradual changes in preferences are accompanied by immediate behavioral adjustments that maintain equilibrium play.

Solution of the society game

- We solve the model by backward induction
- Third stage: Officials choose effort
- Given μ and τ, officials choose e^h or e^l. High effort, e^h is preferred to e^l if:

$$\frac{\tau \pi^h \mu}{(1-\mu)\alpha} - c \geq \frac{\tau \pi^l \mu}{(1-\mu)\alpha}$$

$$\tau \geq \tau^* = \frac{c}{\Delta \pi} \frac{\alpha(1-\mu)}{\mu}$$

- But if $\mu \to 0$, this condition can not be fulfilled. There exists a threshold: if the proportion of entrepreneurs μ is very low, then the taxes -that makes officials choose high effort- tends to ∞, which is not possible. Taxes can not be higher than 1.
- Therefore, for $\mu < \bar{\mu}$, with $\bar{\mu} = \frac{\alpha c}{\alpha c + \Delta \pi} < \frac{1}{2}$, it is not possible to implement e^h.

Solution of the society game
Third stage

Solution of the society game
Second stage
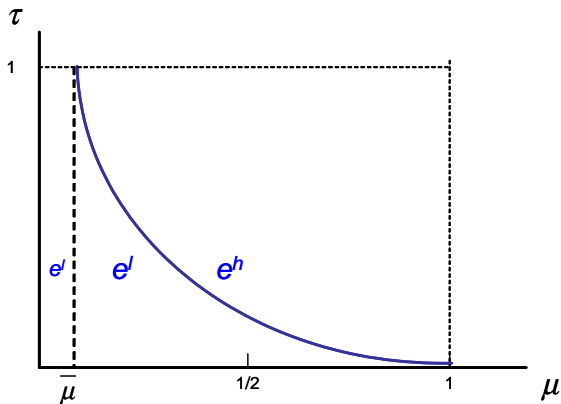
Second Stage: Voting by majority on taxes

- If entrepreneurs are majority, $\mu > \frac{1}{2}$, they choose between:
  - The tax $\tau^* = \frac{c}{\Delta\pi} \frac{\alpha(1-\mu)}{\mu}$, or
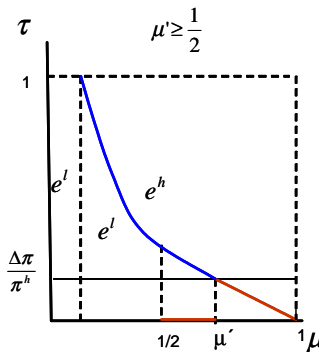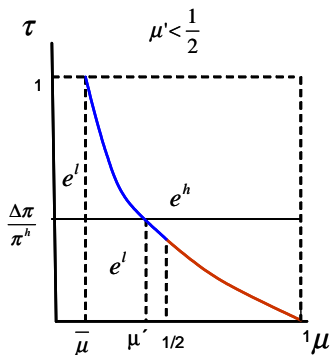 - No taxes at all, $\tau = 0$.

- Entrepreneurs prefer τ^* if

$$(1 - \frac{c}{\frac{\Delta\pi\mu}{\alpha(1-\mu)}})\pi^h > \pi^l \rightarrow \mu > \frac{\alpha c\pi^h}{\alpha c\pi^h + (\Delta\pi)^2} = \mu'$$

- Therefore,
  - If $\mu' < \frac{1}{2}$, the tax will be the efficient tax τ^*, $\forall\mu \in [\frac{1}{2}, 1]$
  - If $\mu' > \frac{1}{2}$, the tax will be $\begin{cases} \tau = 0, \forall\mu \in [\frac{1}{2}, \mu'] \\ \tau^*, \forall\mu \in [\mu', 1] \end{cases}$
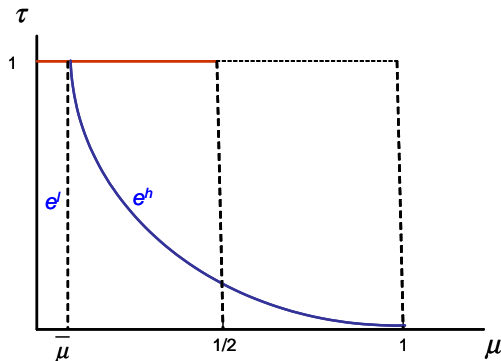
Solution of the society game
Second stage

Second stage: Voting by majority on taxes.

Solution of the society game

Second stage

- If non entrepreneurs are majority, $\mu < \frac{1}{2}$, they choose the "confiscatory tax" $\tau = 1$.
- Additionally, if $\mu > \bar{\mu}$ officials exert high effort and if $\mu < \bar{\mu}$, officials exert low effort.

Solution of the society game
First stage

First Stage: Choosing activity

- Assumption: For type b is a dominant strategy to choose NE. (Pooling equilibrium (E, E) does not exist.) It requires

$$\theta \geq \max\{\pi^l, \pi^h - \frac{\alpha c \pi^l}{\Delta \pi}\}$$

- We are interested in a model where there exists a type that is so risk averse that never wants to become an entrepreneur.

- Intuition:

$$\begin{cases} \text{If } \tau = 0, \text{ it requires that } U_b(NE) > U_b(E) \rightarrow 0 > \pi^l - \theta \rightarrow \theta \geq \pi^l \\ \text{If } \tau = \tau^*, \text{ it requires that } U_b(NE) > U_b(E) \rightarrow \frac{\alpha c \pi^l}{\Delta \pi} > \pi^h - \theta \rightarrow \theta \geq \pi^h \end{cases}$$

- Remark: For type a is not dominant strategy to choose E. It requires that

$$\gamma < \pi^h - \alpha c$$

Intuition: If $\tau = 1$, it requires that
$U_a(E) < U_a(NE) \rightarrow \gamma < \pi^h - \alpha c = w^o$, where $\pi^h - \alpha c$ is the maximum wage for an official when there exists a confiscatory tax policy and $q = \frac{1}{2}$

Solution of the society game
First stage

- Two situations:
  - Type a are the majority, $q > \frac{1}{2}$
    - $\left\{ \begin{array}{l} \text{Type } a \text{ chooses } E \\ \text{Type } b \text{ chooses } NE \end{array} \right\}$ $\mu = q > \frac{1}{2}$
    - $\left\{ \begin{array}{l} \text{Type } a \text{ chooses } NE \\ \text{Type } b \text{ chooses } NE \end{array} \right\}$ $\mu = 0$
  - Type b are the majority, $q < \frac{1}{2}$
    - $\left\{ \begin{array}{l} \text{Type } a \text{ chooses } E \\ \text{Type } b \text{ chooses } NE \end{array} \right\}$ $\mu = q < \frac{1}{2}$
    - $\left\{ \begin{array}{l} \text{Type } a \text{ chooses } NE \\ \text{Type } b \text{ chooses } NE \end{array} \right\}$ $\mu = 0$

Equilibrium of the society game.

- Case $\pi_l = 0$. There are four Perfect Bayesian Equilibria:
- Majority of type a, $q > \frac{1}{2}$
    - Proposition: There exists an efficient separating equilibrium with low taxes $\forall q \in [\frac{1}{2}, 1]$ in which type a chooses E and type b chooses NE. The level of taxes is τ^*, and officials exert high effort, e^h.

Equilibrium of the society game.

- Majority of type b, $q < \frac{1}{2}$

  - Proposition: If $\gamma < \pi^h - \alpha c$,

(ii) there exists a non entrepreneurship pooling equilibrium $\forall q \in [\hat{q}, \frac{1}{2})$ in which both types, choose NE. The proportion $\hat{q}$ solves
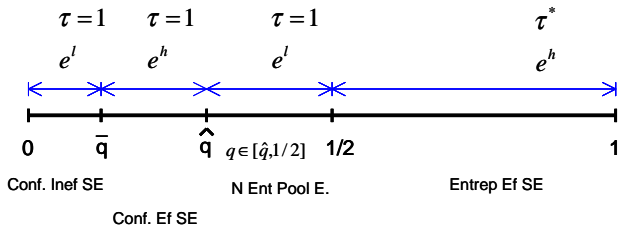$$\begin{cases} \gamma = \frac{\hat{q}}{1-\hat{q}} \pi^h - \alpha c \text{ if } \gamma > \frac{\alpha c \pi^h}{\Delta \pi} \\ \gamma = \frac{\hat{q}}{1-\hat{q}} \pi^l \text{ if } \gamma < \frac{\alpha c \pi^h}{\Delta \pi} \end{cases}$$

(iii) there exists a confiscatory efficient separating equilibrium $\forall q \in [\bar{q}, \hat{q})$ in which type a chooses E and type b chooses NE, there are confiscatory taxes, $\tau = 1$, and officials exert high effort, e^h.
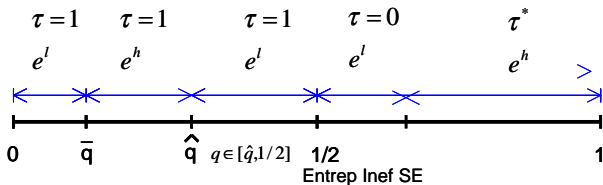
(iv) there exists a confiscatory inefficient separating equilibrium $\forall q \in [0, \bar{q})$ in which type a chooses E and b chooses NE, there are confiscatory taxes, $\tau = 1$, and officials exert low effort, e^l.

Solution of the society game

Case $\pi_l = 0$

$\tau = 1$	$\tau = 1$	$\tau = 1$	τ^*
e^l	e^h	e^l	e^h

0   $\bar{q}$ $\hat{q}$ $q \in [\hat{q}, 1/2]$ 1/2   1

Conf. Inef SE   N Ent Pool E.   Entrep Ef SE

Conf. Ef SE

General case

$\tau = 1$	$\tau = 1$	$\tau = 1$	$\tau = 0$	τ^*
e^l	e^h	e^l	e^l	e^h

0   $\bar{q}$ $\hat{q}$ $q \in [\hat{q}, 1/2]$ 1/2   1

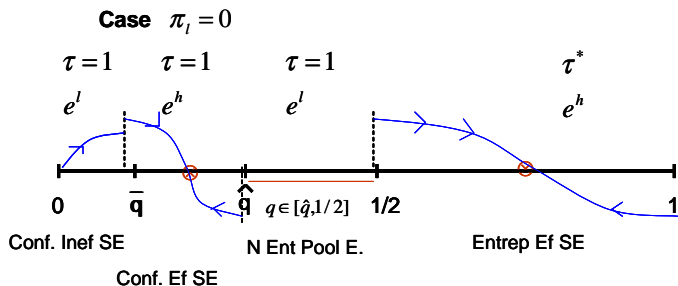Entrep Inef SE

Cultures in the long run

- We characterize the stable steady states of the differences equation.
- A CULTURE is any stable steady state of the dynamics where the same Perfect Bayesian Equilibrium (PBE) of the society game is played.
- Our model yields different long run outcomes, cultures, depending on the initial conditions; the particular values of π^h, π^l, and α; and the risk preference parameters, γ and θ.

Cultures in the long run

- Three types of cultures

  - **Entrepreneurial culture**
    - Most individuals are entrepreneurs. This is a society where risk-takers individuals are majority in the population
    - Taxes are high enough to implement an efficient Public Sector, but taxes are lower than in the traditional society
    - Net profits of entrepreneurs are higher than in the other types of cultures. These profits increase with the proportion of entrepreneurs.
    - Official wages are lower than in the other cultures

  - **Non entrepreneurial culture**
    - There are not Entrepreneurs
    - Individuals work on the traditional (and less risky) sector
    - Risk-aversion attitudes are more extended among the population.
    - Individuals would vote for a confiscatory tax policy on entrepreneurs's profits.

Case: $\pi^l = 0, \theta > \pi^h, \gamma < \pi^h - \alpha c$

Case $\pi_l = 0$

| $\tau = 1$ | $\tau = 1$ | $\tau = 1$ | | τ^* |
| e^l | e^h | e^l | | e^h |

0    $\bar{q}$ $\hat{q}$ $q \in [\hat{q}, 1/2]$ **1/2**   1

Conf. Inef SE

Conf. Ef SE

N Ent Pool E.

Entrep Ef SE

Cultures in the long run

- **Confiscatory taxes and low-entrepreneurship culture.**
  - Most individuals work on traditional sectors or as civil servants. Risk-aversion attitudes are more extended among the population.
  - Individuals vote for a confiscatory tax policy on entrepreneurs's profits. Consequently, the net payoff of entrepreneurs are lower than in the entrepreneurial culture.
  - The Public Sector is efficient and higher wages are paid to officials than in the entrepreneurial culture because the taxes on the entrepreneur's profits are very high (confiscatory).
  - Net profits of entrepreneurs are low.

Concluding remarks

- This paper formalizes the coevolution of the level of entrepreneurship in a society and the efficiency of its public sector. The efficiency of the Public Sector affects the expected profits (or probability of success) of any new project and, consequently, the decision to become an entrepreneur or not. But more importantly, it affects the parents´ incentives to socialize their children on risk taking preferences.

- We characterize the equilibria of the society on the long run. The dynamics of the society converges to one of three Cultures: the Entrepreneurial Culture, the Non Entrepreneurial Culture and the Confiscatory and low-Entrepreneurial Culture.

- Our analysis can contribute to account for the differences observed among countries (Mediterranean vs. Nordic) or within countries (north vs. south of Italy or Spain) concerning the dynamics of the productive structure and the public sector efficiency.