

Enforcement of Regulation, Irregular Sector, and Firm Performance

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Abstract

In this paper we investigate how enforcement of regulation affects the size of irregular sector, firm performance and the exit rate to the market. Three kinds of enforcement policy will be tested in the model: control, punish and legitimacy. The first policy is based on the number of inspectors present in the economy; the second is defined by the magnitude of punish; the third is measured by the social legitimacy. Our results show the negligible influence of control to enforce irregularity; the strong effect of punish on irregular sector with a high exit rate; the good effect of legitimacy policy in promoting regularity with a low output performance.

Keywords: Irregular sector, enforcement policies, exit rate, firm performance.

JEL classification: C63, E61, K42, O17

1 Introduction

This paper develops an agent-based model (abm) that sheds light on the evolution of the irregular sector. The irregular sector, which produces legal goods but does not comply with official regulation, is a functioning part of all economies, employing up to 60% of the workforce and producing nearly 40% of GDP¹. Throughout time, governments and international organizations have taken actions that affect the size of this sector. In 1998 the European Commission proposed a formal document, on underground economy and off-the-books employment, to all the member countries. The main objectives of this document were, on the one hand, the need of liberalizing the labour market, reducing fiscal pressure and simplifying the tax system; on the other hand, an urge to increasing control on regularity and respect for the institutions.

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¹Schneider and Enste (2000)

Only a few countries, however, adopted an integrated policy of intervention. In Italy, for instance, the only policies adopted were those concerning incentive, with greater flexibility of the labour market regulations and fiscal benefits. Two instruments in particular have been adopted over recent years: *realignment contracts* in the law n.196/1997 and the *Program for emersion* in the law n. 383/2001. These interventions were characterized by tax incentives, deregulation of production activities, bonuses paid for cancellation of previous tax debts, etc., without any enforcement action taking place at the same time. The failure of the last Program for emersion is showed in the data of Labour Minister: only 3854 irregular workers emerged that are about the 0.0008% of the 3.5 millions of irregular workers in Italy!

In the light of previous failures and the empirical evidence that shows an increasing level of irregularity ratio in the Centre-South Italian regions (table1); a new policy was introduced in Italy in 2003 with the Biagi law reforming the labour market. In particular, by means of the d.lgs. n. 124/2004 a new enforcement approach was adopted against the underground economy. Following the UE directive, an increase in the level of control and the social promotion of regulation legitimacy are proposed as the main instruments.

By means of a simulation model² we propose to explain what is the impact of enforcement on the size of irregular sector. In particular, we put to the test a control policy based on the number of inspectors, an enforcement policy based on the magnitude of sanctions, and, finally, a policy based on the level of social legitimacy of regulation.

The paper is organized as follows. In section 2 we describe the common framework of the economic literature about the informal activity. Section 3 describes the model and its characteristics. In section 4 we present the analysis of policy interventions and their effects on different regions. Section 5 concludes.

2 A framework for irregular behaviour

Economic literature on underground economy is based on a cost-benefit analysis of individual behaviour. Generally, it represents the firm's choice to operate on an underground basis or in a regular economy, and how governments can fight the phenomenon effectively. The literature offers two explanations of why firms choose the underground sector, which, while not mutually exclusive, have distinct policy implications.

First, firms may go underground when statutory tax rates are high and other official regulations are onerous [De Soto 1989; Schneider and Enste 2000]. Cutting taxes and a process of deregulation are, according to this view, the main ways to bring firms into the official economy. Second, the underground economy may be due primarily to predatory behavior by government officials [Kaufmann 1994; Johnson, Kaufmann and Zoido-Lobaton 1998]. In this view the problem that needs to be addressed is bureaucratic corruption.

²The simulation is written in Java. The code is available from the authors upon request.

For all these explanations there is a common simple approach: firm receives an economic benefit from irregularity. A reduction in taxation, lower production costs and more flexibility in the labour market represent some of these benefits.

Every firm compares the benefits of irregular activity with the corresponding expected costs. The costs of irregularity depend on the punishment level and the probability of sanctions. This simple outline represents the theoretical foundation of two alternative policies for government intervention. It is possible to introduce a policy that reduces the benefits of irregular activity, and/or a policy that increases the expected costs. The choice of the better policy mix depends on the level of the resources locally needed for vigilance.

3 Model

Risk-averse firms do business in a local economy system and might decide to violate the official regulation and operate in the irregular economy. One key difference between the regular and irregular sector is that regular sector is taxed by the government, while irregular sector is only taxed when caught by the authorities. The decision depends on the benefits that they would obtain from doing so and the probability and magnitude of sanctions they would face for the violation.

We define a set of heterogenous firms, $i \in F$; a set of inspectors $j \in I$; a set of available actions that a firm i can choose, $a_i \in A$. In each period, every firm receives a *pay-off* that depends on his choice and these of the other firms in the neighbourhood $V(i)$.

In particular, we assume that every firm has an individual level of benefit (β_i) with respect to irregular activity. The benefit is defined by two variables: subjective and objective. The subjective cost's variable (h_i), measures the firm's internal costs of regulation. The other objective variable is determined globally (i.e. is equal for all firms) and measures the level of legitimacy to regulation (l). The individual level of β_i is reduced by the number of inspectors in the individual neighborhood $V(i)$ and the magnitude of punishment (s).

The firm's benefit level will be:

$$\beta_i = [h_i \times (1 - l)] - [s + I_{V(i)}]$$

where:

$h \in [0, 1]$, firm's costs;

$l \in [0, 1]$, level of legitimacy to regulation;

$s \geq 0$, magnitude of punishment;

$I_{V(i)}$, number of inspectors in the firm's neighbourhood.

Each firm calculates the risk of being sanctioned in every period. The risk depends on the number of inspectors and irregular firms in its neighbourhood, and the individual *risk-aversion*.

Every firm calculates this value, as below:

$$risk = \pi \times r$$

where:

$$\pi = 1 - \exp \left[k \times \frac{I_{V(i)}}{F_{V(i)}} \right]$$

k is a constant that ensures a reasonable value with only one inspector and one firm.

$r \in [0, 1]$, individual *risk-aversion*.

The behaviour of firms is determined by the difference between the benefit and the risk of irregular activity. If the difference between the individual benefit (β) and the *risk* is positive, the firm will become irregular, and viceversa, if the difference is negative, it will operate in the regular economy. For every period each firm can redefine its position, passing from a regular position to an irregular one.

$$\beta - risk > 0 \Rightarrow irregular$$

$$\beta - risk \leq 0 \Rightarrow regular$$

Regular and irregular sectors are modeled as producing a homogenous good and their production methods are homogenous and employ solely capital.³ This characteristic suggests the model many more accurately depict an industrialized, rather than a developing, economy.

A production function is defined for the regular and irregular sector and the distinguishing feature is the number of regular and irregular firms in the $V(i)$ of each firm. Firms production function will be as following defined:

$$Y_i = f(c_i, \Delta F_{V(i)})$$

where:

$c_i \in [0, 1]$, individual capital stock;

$\Delta F_{V(i)} = F_{reg} - F_{irr}$, the difference between the regular and irregular firms on each firm neighbourhood $V(i)$.

The form of the production $Y(.)$ function is different for each firm and depends on the regular or irregular sector and individual local conditions $\Delta F_{V(i)}$.

	$\Delta F_{V(i)} \geq 0$	$\Delta F_{V(i)} < 0$
Irregular	$Y(.) = c + \lambda \Delta F $	$Y(.) = c + \phi \Delta F $
Regular	$Y(.) = c + \phi \Delta F $	$Y(.) = c - \lambda \Delta F $

³Typically, one finds irregular firms do not have access to capital markets and production methods are much more labour intense than the regular sector (Thomas, 1992; Ihrig Moe, 2004)

*with $\lambda > \phi$ output rates

An independent population of inspectors, with very simple characteristics, moves around at random, seeking for irregular firms in his or her neighbourhood. In each run, the inspector will randomly select a firm for punishment. The sanction magnitude (s) is defined by the *punish*, representing a monetary fee to pay reducing the production level. After the sanction the firm will go back into the regular sector or, if the production level is equal to zero ($Y_i = 0$), it will exit to the market.

The following table shows the sequence of events of the model.

TABLE 1 - Sequence of events

Order	Time	Who	What
1	0	Model	Create firms
2	0	Model	Create inspectors
3	1	Firms	Choice sector
4	2	Inspectors	Enforce
5	3	Firms	Calculate output

4 Policy analysis

The empirical starting point of this analysis is shown by the following italian regional situation. We will distinguish three different situations for each areas: North, Centre and South. Three areas are distinguished for the number of inspectors, number of firms and irregularity rate. The regulation legitimacy index was indirectly set, given the irregularity rate, inspectors, firms and a constant punish level. The following table 2 shows the benchmark situation for each regional area.

TABLE 2: regional conditions (benchmark)

Regions	irregularity (%)	Inspectors	Firms	Inspectors/firms(%)
North	11,0	2670	2154484	0,123928
Centre	15,4	1947	894724	0,217609
South	22,4	2412	1186177	0,203342
Total Italy	13,4	7029	4235385	0,165959

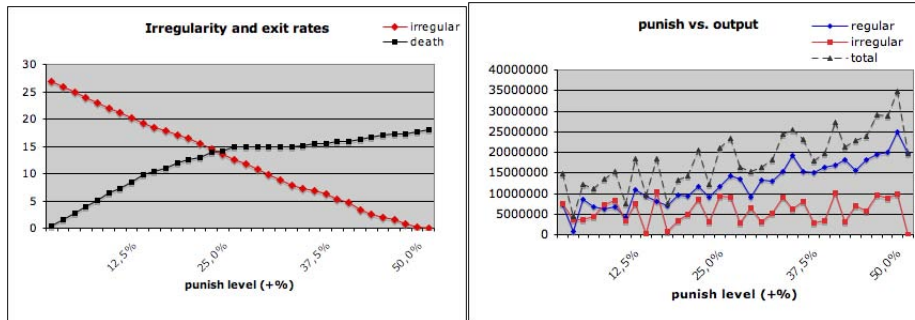
Number of inspectors, with new assumptions in 2005. Source: Ministry of Labour

Number of firms for regions. Source: ISTAT 2003.

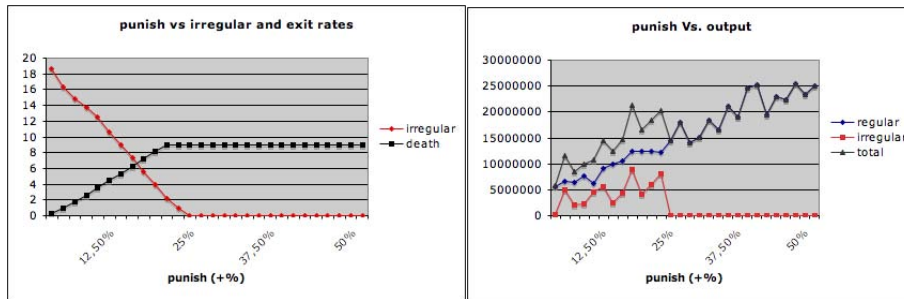
4.1 Punish

The test simulates the effects of an increase in the magnitude of punish (s) on the irregularity and the exit ratio and output level. The following graphics 1 show the impact of this enforcement policy in the different regions for a progressive increasing (+5%) of punish magnitude.

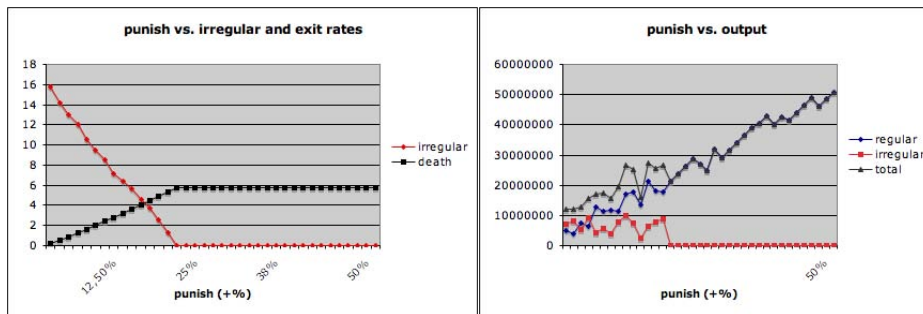
graphic 1a - SOUTH -



graphic 1b - CENTRE -



graphic 1c - NORTH -

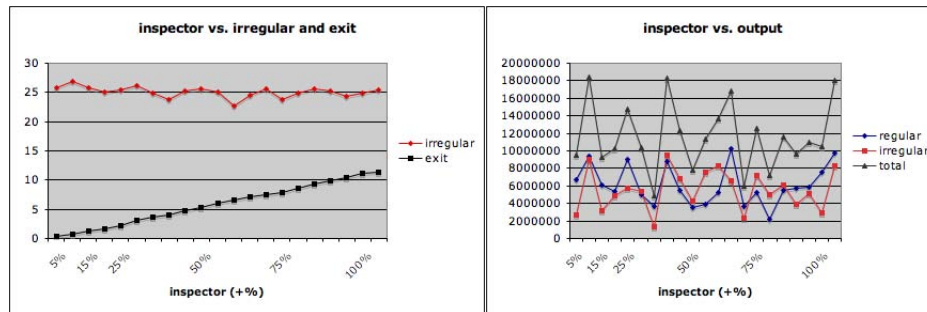


The results show a positive effect on the irregularity ratio with just little increasing of punish for all regions. With an increase of +25% of sanctions it can be observed a reduction of irregularity of -12,5% in the South and equal to zero in the other regions. It is important to note that we will might observe an exit rate of about 15% in the South, 9% in the Centre and 6% in the North. The output shows a positive aggregate dynamics.

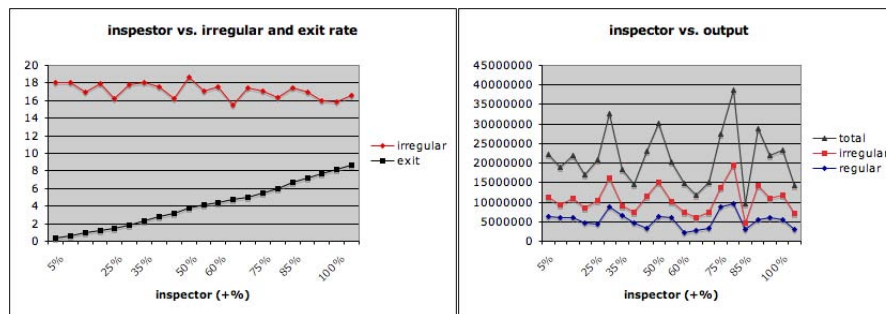
4.2 Control

The test simulates the effects of an increase in the number of inspectors. The following graphics 2 show the impact in the different regions for a progressive increasing (+5%) of the number of inspectors, until its double value (+100%).

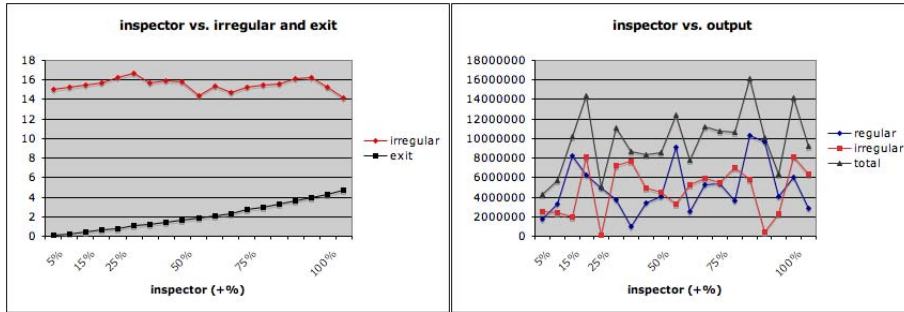
graphic 2a - SOUTH -



graphic 2b - CENTRE -



graphic 2c - NORTH -



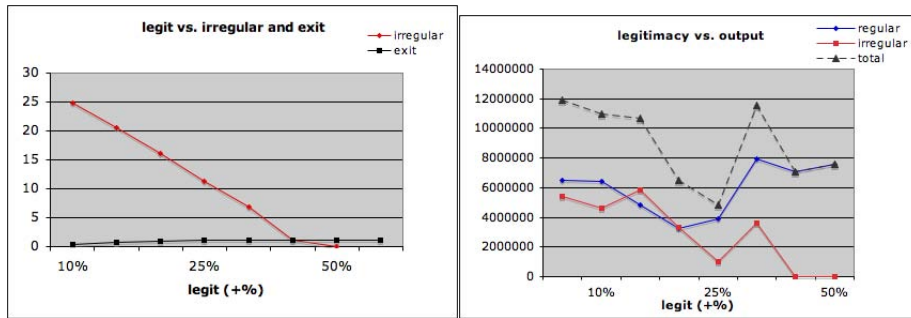
The simulation shows low effects of control increasing for all regions. In fact, an increasing of 100% of inspectors does not reduce the irregularity ratio, but shows an increasing exit rate. The aggregate output dynamics does not show any positive trend. Briefly, for all Italian regions, the simulation points out to avoid the use of control policy to enforce the irregular sector. This result suggests that it is advisable to avoid an exclusive control policy, and to contain investments in this direction. It is important to note that control policies are generally very expensive for administrations and their use should therefore be limited.

4.3 Legitimacy

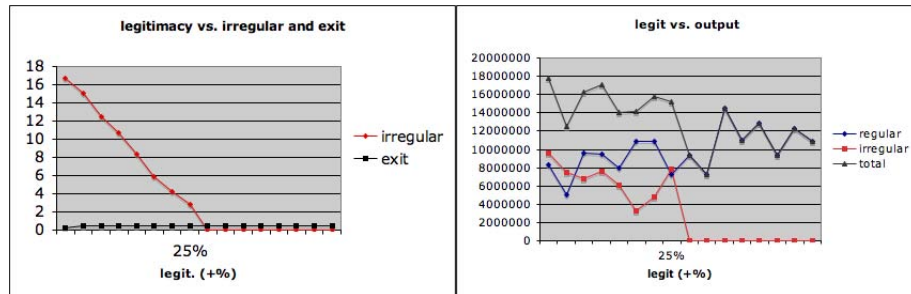
It is very difficult to define a direct correspondence between intervention policies and the social level of legitimacy. In this work, regulation legitimacy was adopted as an index of the policy of promotion and diffusion of legality. The simulation results showed a strong causal dependence between social legitimacy and the irregularity ratio of the economy.

Starting from the benchmark levels for each area we increased the legitimacy level of small percentage (+5%). The simulation data show that with just a small increasing of legitimacy the irregularity ratio is reduced to nil. For all three areas the increasing in legitimacy shows a very strong effect on the irregularity ratio and low exit rates. It needed an increase of about 50% in the South, 25% in the Centre and 20% in the North to wipe off entirely the irregularity in all the areas. An interesting result about the aggregate output that has shown a quasi-decreasing trend for more and more legitimacy. The following graphics 3 show the results of the test.

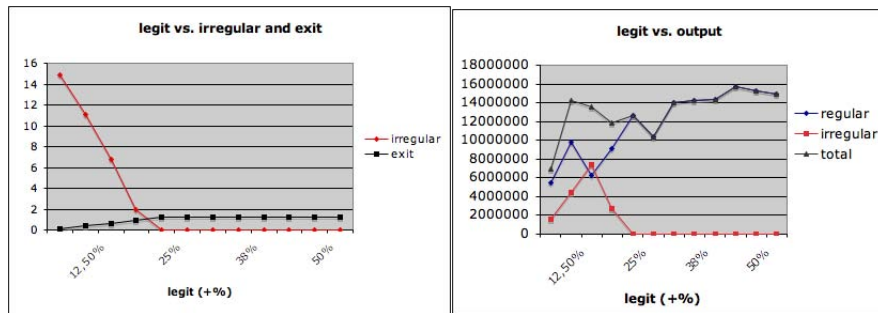
graphic 3a - SOUTH -



graphic 3b - CENTRE -



graphic 3c - NORTH



5 Conclusion

What is the best policy mix to enforce the irregularity? In this paper, the effects of enforcement policies have been studied in a simulated underground economy. Thi paper has two main themes. First, we study the incentives firms face to choice regular or irregular sector. In particular, we study the role of enforcement of regulation (in the form of inspections, punish and legitimacy) on the behavior of firms. Second, we analyze how enforcement affects firm performace and their exit rate to the market.

In the one hand, high magnitude of punish level reduces the access of firms to irregular sector but there will be high exit rates. The output shows a positive dynamics. In the second hand, the control policy has shown negligible effects on the irregular sector size, with a increasing exit rates. Furthermore, in all regions, the increasing legitimacy level produces a very good effect on the irregularity with low exit rates, but the aggregate output did show a quasi-negative trend. Too much legality is not good for the social welfare!

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