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# Simulating the enforcement policies for irregular sector in the Italian labour reform

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## Abstract

In this paper an agent-based model (abm) will be used to study the effects of enforcement policy in Italy: d.lgs. 124/2004. Three kinds of policy will be tested in the model: control, sanction and legitimacy-regulation. The first policy is based on the number of inspectors present in the economy; the second is defined by the magnitude of punishment; the third is measured by the social legitimacy of regulation. This simulation has produced a number of results, the most important of which are: the negligible influence of control increasing to enforce irregularity; the strong influence of the level of punishment on the irregularity ratio in all Italian areas; the good political choice to increase the social legitimacy to regulation in promoting regularity.

Key words: enforcement policies, irregular sector, agent-based model.  
JEL: C63; E61; K42; O17.

## 1 Introduction

Strategies to combat underground economy have become a priority issue on the European political agenda over the last few years. The European Commission [1998] 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.

For an optimal mix of policies the European Commission recommended the following points:

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*i)* a change in the fiscal and regulatory system; for instance, a greater flexibility of the labour market, a simpler and lighter tax system, a reduction in the cost of labour;

*ii)* a more effective enforcement of the system, through a more intense control activity and an increase in the severity of sanctions;

*iii)* a change in behaviour and attitudes, through a progressive spread of fiscal morality and loyalty in the institutions.

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!

An explanation of this failure is based on the low investment in control and punishment policy. In reality, some controls' improvements were made at the end of 1997, but there was a progressive reduction of inspections during 1998-2001 period (graphic 1).

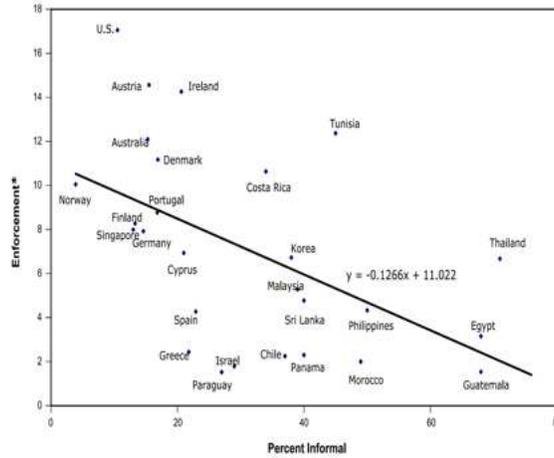


Graphic 1: number of inspections in Italy (years 1997-2001). Source: Ministry of Labour.

Much debate exists in traditional literature [Ihrig J., Moe K.S. 2004; Johnson, Simon, et al. 1998] about the results of the policies adopted and the main causes of their failure. In particular, in Ihrig J. and Moe K.S., the results suggest that only incentive policy combined with increased enforcement reduce the size of the irregular sector. Some international empirical evidence<sup>1</sup> shows that

<sup>1</sup>There are a few proxies used in the literature to measure enforcement. In this example we used the International Financial Statistics data.

the countries with high enforcement tend to have smaller informal sectors and viceversa (graphic 2).



Graphic 2: size of informal sector vs. enforcement. Source: International Financial Statistics.

In the light of previous failures and the empirical evidence that shows an increasing level of irregularity ratio in the Centre-South Italian regions (table 1); 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 EU directive, an increase in the level of control and the social promotion of regulation legitimacy are proposed as the main instruments.

Regions	1995	1996	1997	1998	1999	2000
North-west	11.3	11.3	11.2	11.2	11.1	10.8
North-east	11.2	11.1	11.1	11.2	10.9	11.3
Centre	14.2	14.2	14.8	15.0	15.2	15.4
South	20.7	20.9	21.6	22.3	22.6	22.4
<b>Total Italy</b>	<b>14.5</b>	<b>14.5</b>	<b>14.8</b>	<b>15.1</b>	<b>15.0</b>	<b>15.0</b>

Table 1: irregular employment years 1995-2000 for regions. Source: Istat

The debate, in Italy, about this policy has influenced the present work. Many lawyers [Monticelli, Tiraboschi 2004; Scarpelli F. 2004], have analysed some legal inconsistencies of the device. In particular, the reform provides for an increase of inspection activity, of promotion of legality but, at the same time, an unjustified reduction of punishment level<sup>2</sup>. The aim of this paper is to analyse the different

<sup>2</sup>This result is contained in two devices: the *conciliazione monocratica* (art.11), and the *diffida* (art.13).

effects of this reform on the size of irregular sector, distinguishing the policy intervention for the different Italian regions.

By means of a simulation model<sup>3</sup> I propose to explain how the different policy devices could influence the irregularity ratio in the economy. In particular, I put to the test a control policy based on the number of inspectors present in the economy, an enforcement policy based on the severity of sanctions, and, finally, a policy based on the level of social legitimacy of regulation.

The paper is organized as follows. In section 2 I describe the common framework of the economic literature about the informal activity. Section 3 describes the agent-based model and its characteristics. In section 4 I present the analysis of policy interventions and their effects on regional irregular ratio. 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.

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.

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<sup>3</sup>The simulation is written in NetLogo. The code is available from the author upon request.

### 3 Model and analysis

Risk-averse firms do business in a local economy system and might decide to violate the official regulation and operate in the irregular economy. 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. In particular, we assume that every firm has an individual level of benefit ( $b$ ) with respect to irregular activity. The benefit is defined by two variables: subjective and objective. The subjective cost's variable ( $h$ ), 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 social legitimacy of regulation ( $l$ ). The individual level of  $b$  is reduced by the number of inspectors in the individual neighborhood and the magnitude of punishment.

The firm's benefit level will be:

$$b = [h \times (1 - l)] - [punish + (inspectors - on - neighbourhood) \div 100]$$

where:

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

$l \in [0, 1]$ , social legitimacy of regulation (*regulation - legitimacy*);

$punish \geq 0$ , magnitude of punishment;

$inspectors - on - neighbourhood$ , number of inspectors in the firm's neighbourhood.

Each firm calculates the probability of being sanctioned in every period. The probability depends on the number of inspectors and of irregular firms in its neighbourhood.

Every firm calculates this value, as below:

$$\pi = 1 - \exp \left[ -K^* \left( \frac{I}{F} \right) \right]$$

where:

$I$  is the number of inspectors in the neighbourhood;

$F$  is the number of irregular firms in the neighbourhood;

$K^*$  is a constant that ensures a reasonable value with only one inspector and one firm.

In each period, every firm calculates the risk of its irregular activity. The risk is the product of the probability of punishment ( $\pi$ ) and the individual *risk - aversion*.

It will be:

$$risk = \pi \times r$$

where:

$r \in [0, 1]$ , is the firm's 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 ( $b$ ) 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.

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

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

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 an irregular firm for punishment. The sanction magnitude is defined by the *punish*, representing a temporary monetary fee to pay. At the end of the sanction time the firm will go back into a regular economy<sup>4</sup>.

## 4 Policy analysis

In this section, some of the enforcement policies have been tested. In Italy, the recent labour market reform (Biagi law) is based on the following points:

1. an increase in the legitimacy of social regulation;
2. an increase in control policies;
3. a decrease in the level of sanction policies.

The traditional literature about the optimal enforcement policy [Becker 1968; Shavell, 1993; Mitchell Polinsky, Shavell, 2000], represents the theoretical foundation that points out the contradictory choice of this reform: it does not represent the best way to prevent irregular economy, above all because it reduces the sanctions for irregular firms, while increasing the resources for control activities. For instance, Becker has shown that, from the social welfare standpoint, it is always optimal to substitute a higher sanction for a lower control level, and that punishment should be optimally set at its maximum level. The results of tests confirm this critical judgement and the inconsistent political choice of reducing the level of sanctions, showing, on the contrary, that it represents the best instrument to enforce the irregularity. The next section illustrates the results of the policies of control, sanctions and social legitimacy of regulation.

The empirical starting point of this analysis is shown by the following Italian regional situation. I will distinguish three different situations for each area:

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<sup>4</sup>The structure of agent-based model is made up as in A appendix.

North, Centre and South. Three areas are distinguished for the control ratio (number of inspectors/firms)<sup>5</sup>, irregularity and social legitimacy to regulation (regulation legitimacy). The following table 2 shows the benchmark situation for each regional area.

Regions	irregularity(%)	control ratio	regulation legitimacy*
North	11.0	.1239	.83
Centre	15.4	.2176	.82
South	22.4	.2033	.80

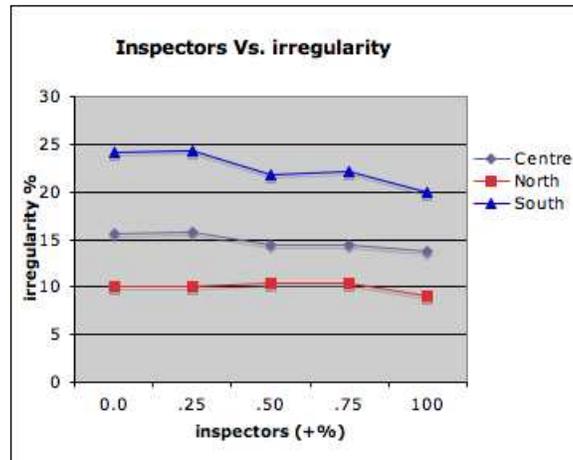
Table 2: regional conditions (benchmark)

\* it was indirectly set, given the irregularity(%), the control, and the same level of punish

#### 4.1 The increasing of the number of inspectors.

The first policy in the reform (d.lgs.124/04) consists in a more efficient inspection activity. In particular, an increase in the presence of inspectors in the economy is the main purpose of the policy. In the model, this intervention is defined by the number of inspectors (*inspector-density*), and how this policy effects on the irregular ratio for each region.

The test simulates the effects of an increase in the number of inspectors on the ratio of regularity. The following graphic 3 shows the reduction of irregularity in the different regions for a progressive increasing (+25%) of the number of inspectors.



Graphic 3: irregularity ratio for increasing levels (+25%) of the inspectors.

<sup>5</sup>see table 6 in B appendix.

The simulation shows low effects for all the regions. Infact, an increasing of 25% of inspectors does not reduce the irregularity ratio. South is the area in which the control policy is more effective. It is possible to notice a reduction of -4,15% of the irregularity ratio but with a too much expensive increasing of the number of inspectors of 100%. In the Centre and in the North the effects are very small. Briefly, for all italian regions, the simulation points out to avoid the use of control policy to enforce the irregular sector.

	.25	.5	.75	100
North	-	+0.26	+0.31	-1.02
Centre	-	-1.21	-1.24	-1.86
South	-	-2.37	-2.01	-4.15

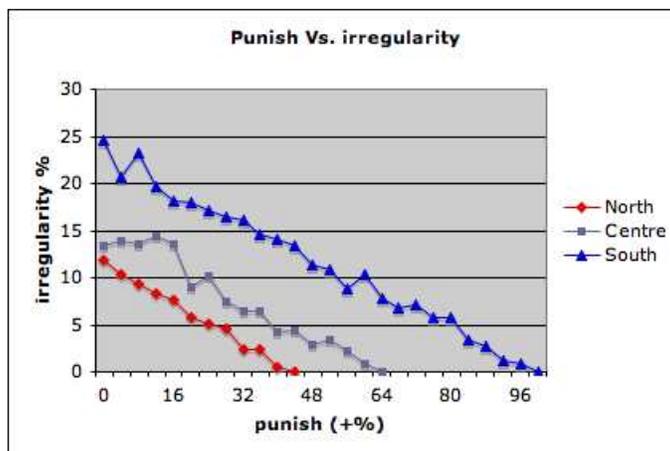
Table 3: Percentage variation of irregularity for increasing number of inspectors

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.

## 4.2 The magnitude of sanctions

The second instrument of enforcement consists in the severity of sanctions for irregular activity. The Italian labor market reform neglected this aspect, which nevertheless represents one of the most important expected costs for irregular firms. In practice, the severity level of punishment has been reduced in the reform. This omission is not supported by the results of the simulation; the tests confirm, in fact, a negative causal correlation between the level of punishment and the ratio of irregularity.

In the model, the magnitude of punishment is progressively increased (+4%) for all regions, until its double value (+100%); the following graphic 4 shows the results of the test.



Graphic 4: irregularity ratio for increasing magnitude of punishment (+4%).

The results show a positive effect on the ratio of irregularity with just little increasing of sanctions. With an increase of +20% of sanctions it can be observed a reduction of irregularity of -5,98% in the North, -4,38% in the Centre and -6,64% in the South. It is important to note that we will might observe a total cancellation of irregularity for a increasing of sanctions of +44% in the North, +64% in the Centre and +100% in the South!

We summarize the results in the following table 4.

	.20	.32	.44	.64	100
North	-5,98	-9,34	setting to zero		
Centre	-4,38	-6,82		setting to zero	
South	-6,64	-8,61			setting to zero

Table 4: reduction of irregularity for increasing levels of punishment.

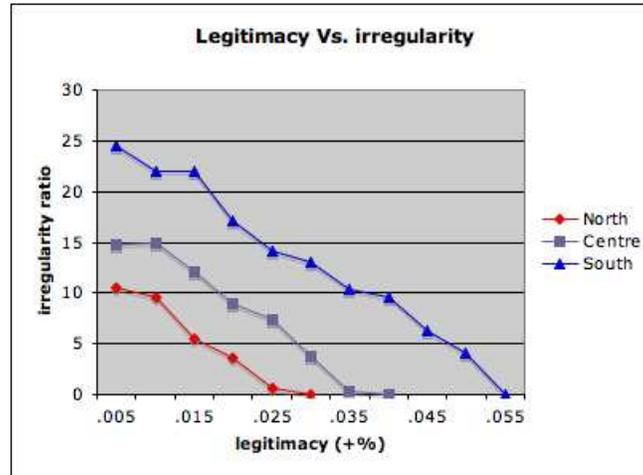
The results imply a policy recommendation: an increase in the punishment level is a good instrument for the prevention of irregular economies even with small increase. Considering that punishment policies do not imply any administrative investment, it can be concluded that it would be a good thing to set the sanctions level at its maximum.

### 4.3 The increasing social legitimacy

It is very difficult to define a direct correspondence between intervention policies and the social level of regulation 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 I increased the legitimacy level of small percentage (+1%). The simulation data show that with just a small

increasing of legitimacy the irregularity ratio is reduced to nil. The following graphic 5 shows the results of the test.



Graphic 5: irregularity ratio Vs. a percentage increasing (+1%) of social legitimacy.

For all three areas the increasing in social legitimacy shows a very strong effect on the irregularity ratio. It needed an increase of about 3% to wipe off entirely the irregularity in the Centre and in North areas; and an increase of 5,5% for the South.

## 5 Conclusion

How does the Italian labour market reform (Biagi) affect the irregular sector in the Italian regions? 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. The analysis confirmed the common opinion regarding the ineffectiveness of enforcement policies when they are not accompanied by an activity of promotion of social legality. The last test showed the strong effectiveness of the social legitimacy on the irregularity, but it is not easy to settle. Enforcement policies represent a necessary support for the prevention of underground economy, but they are not able alone to rule out irregularity.

The choice to increase the control policy is not supported by the simulation results. The results imply a limited use of this policy, because it needed a very expensive administrative investment compared to the low effects on the irregular sector. In the best case, i.e. the South, it is necessary an increase of 100% of the inspectors number to reduce the irregularity by 4%!

In the light of previous results, the Italian labour market reform (n.124/2004) shows some inefficiencies. With the exception of the promotion of social legitimacy policy, in particular, there is no advantage in reducing the magnitude of

punishment, because this represents a cheap and effective policy for the prevention of underground economy. In all regions this device, consistent with the literature, showed a strong effectiveness on the irregularity ratio. We observed that an increase of 30% of magnitude will reduce of about 10% the irregularity in all regions.

## Appendix

### A. The simulation

The simulation is constructed as follows. At  $t = 0$   $N$  regular firms are created. An independent population of  $I$  inspectors randomly looking for irregular firms. At the start of every period all firms compared the benefits with the costs of irregularity and choice the sector in which operate. Firms that have chosen the irregular sector can be sanctioned by inspectors. The sequence of events is reported in the following table.

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

Table 5: Sequence of events

A typical simulation run lasts for about 1000 periods. The simulation is written in NetLogo (<http://ccl.northwestern.edu/netlogo/>), the code is available from the author upon request.

### B. Tables

Regions	inspectors	firms	Inspectors/firms%
North	2670	2154484	.123928
Centre	1947	894724	.217609
South	2412	1186177	.203342
Total Italy	7029	4235385	.165959

Table 6:

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

Number of firms for regions. Source: Istat 2003.

## References

- [1] Becker G. (1968), *Crime and Punishment: an economic approach*, Journal of Political Economy, vol.76, pp.169-217.
- [2] DeSoto H. (1989), *The other path: the invisible revolution in the third world*. Harper & Row, New York.
- [3] European Commission (1998), *Communication on Undeclared Work*, Brussels.
- [4] Ihrig J., Moe K.S. (2004), *Lurking in the Shadows: the informal sector and government policy*, Journal of Development Economics, 73, pp.541-557.
- [5] Johnson, Simon, Kaufmann, Daniel and Zoido-Lobaton (1998), *Regulatory Discretion and the Unofficial Economy*, American Economic Review, vol.88, pp.387-392.
- [6] Monticelli C.L., Tiraboschi M. (a cura di ) 2004, *La riforma dei servizi ispettivi in materia di lavoro e previdenza sociale*, Giuffrè editore, Milano.
- [7] Mitchell Polinsky, Shavell S. (2000), *The Economic Theory of Public Enforcement of Law*, Journal of Economic Literature, vol. 38, pp.45-76.
- [8] Scarpelli F. (2004), *La riforma dei servizi ispettivi: non mancano i punti critici*, in Note informative, 31.
- [9] Shavell S. (1993), *The Optimal Structure of Law Enforcement*, Journal of Law & Economics, vol. 36.
- [10] Schneider F., Enste D. (2000), *Shadow economies: size, causes, and consequences*. Journal of Economic Literature, 38, pp.77-114.