



# Life is now! Time preferences and crime: Aggregate evidence from the Italian regions



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## ABSTRACT

This paper tests the relationship between time preferences and crime rates as posited by Davis (1988), whose theoretical analysis suggests that individuals' attitude towards the future significantly affects their propensity to commit crime. Our empirical analysis is based on a panel of Italian regions from 2003 to 2007. Various proxies for time preferences are considered: the consumer credit share out of the total amount of loans to households, the share of obese individuals out of the total population, the rate of marriages out of the total population, and the teenage pregnancy rate. Controlling for a great number of factors suggested by the scientific literature on the determinants of crime, adding to the model also time and regional fixed effects, and clustering standard errors to account for both serial and panel correlations, our results basically provide support to the 'Davis' hypothesis' for property crimes, while for violent crimes there seems to be less evidence that these are higher where people discount the future more heavily. Moreover, there is no evidence of a reverse effect from crime to time preferences at this aggregate level.

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## 1. Introduction

The Ant and the Grasshopper – an Aesopian fable which became very popular just before the French Revolution – remarks the misfortune accruing to the grasshopper from imprudence, having it spent the warm months of the year singing away instead of storing up foods for the incoming winter. The allegory was used to give a bright description of the bourgeois virtues of hard working and saving, those virtues that the rising class – which would have soon taken the power – tried to attribute exclusively to itself. The bourgeois was depicted as *l'honnête homme* who grounds his success on both personal effort and the awareness that much *patience* is needed before the fruits accruing from hard-working and trustworthiness can be reaped.

A long-standing tradition in economics echoes similar arguments. This tradition emphasizes that the socially desirable respect of established ethical codes of conduct is possible only in the presence of a *proper concern for the future*. Such a concern, however, has varied significantly over the centuries and across cultures. Sociologists and anthropologists have in recent times emphasized that the vanishing of the future is actually one of the most distinctive

features of modern societies: as uncertainty grows, individuals act as they were condemned to live an everlasting present (e.g. Augé, 2008).

In the eyes of an economist, the reduced concern for the future shows up in the long-term fall in saving rates across countries – a well-established feature of modern industrialized societies – but also in the widespread tendency of the amount of (short-term) debt to raise beyond what can be considered a socially responsible level, as the recent financial crisis has dramatically shown. Possibly, even the recent remarkable increase in corporate scandals may be ultimately due to a reduced concern for the future (coupled with some institutional changes which have considerably affected the pay-off structure faced by managers and entrepreneurs in modern economies)<sup>1</sup>.

In what follows, we test whether there are grounds to argue that a 'life-is-now'-perspective may be detrimental for societies, stimulating undesirable activities like delinquency and crime. Davis (1988) was the first to identify a *theoretical* link between crime

<sup>1</sup> Beraldo and Turati (2011) discuss several institutional changes that may have shortened the agents' time horizon. There are reasons to believe, for example, that contracts designed to provide professional managers adequate monetary incentives in order to align their objectives with those of the firms' owners may have led managers to maximize short term gains instead of long-term profits.

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and time preferences. In his words, this link finds an easy explanation in the fact that “the fruits of illegal activity. . . can be savoured before the costs of their acquisition must be paid” (Davis, 1988: 383). Hence, ceteris paribus, individuals who discount the future more heavily may be more prone to commit crimes.

The goal of this work is to provide a first empirical test to this theoretical prediction considering aggregate crime data on Italian regions from 2003 to 2007. As for the proxies for time preferences, we focus on four very different measures, all of which aggregate individual choices guided by idiosyncratic time preferences: *consumer credit*, which represents short-term debt typically used by households to finance their consumption; *obesity*, which is linked to the intake of calories more than it is recommended by the consideration of future health; *marriage*, interpreted as an institution denoting the willingness of individuals to engage in stable relationships; *teenage pregnancy*, capturing the impatience of individuals for having sexual adult experiences. All these variables show clear trends in recent decades. The widespread tendency of both the amount of short-term debt and the number of obese people to increase, as well as the reduction in the willingness to engage in stable relationships, are common features of western industrialized countries, all of which may be (at least partly) related to time preferences.

Controlling for the factors highlighted by the literature on the determinants of crime, adding to the model also time and regional fixed effects, and clustering standard error to account for both serial and panel correlations, our results basically provide support to the ‘Davis’ hypothesis’ for property crimes, while for violent crimes there seems to be less evidence – at the aggregate level – that these are higher where people discount the future more heavily. Moreover, there is no evidence of a reverse effect from crime to time preferences at this aggregate level.

The remainder of the paper is organized as follows. In Section 2 we briefly describe the theoretical model due to Davis (1988). In Section 3 we illustrate our empirical strategy and our data. Results are discussed in Section 4. Section 5 concludes.

**2. The theoretical framework: time discounting and attitude to crime**

Following Davis (1988), let us consider an individual contemplating illegal activity. If undetected she will get an income  $U(\sigma)$ , where  $\sigma$  is the rate at which offences are committed. Suppose that the individual sees the future as split in two sub-periods: in the first sub-period she enjoys the fruits of illegal activity; in the second one she is possibly detected and punished. The individual does not know exactly when detection will occur. However, as soon as she is detected, a fine  $F$  must be paid, and – from then on – only an income  $Y$  accruing from some legal activity may be earned. Over an infinite time horizon, the expected present value of future income, accruing from both legal and illegal activity can be expressed as:

$$V(\sigma) = \int_0^\infty \{U(\sigma)[1 - G(t)] + YG(t) - Fg(t)\}e^{-rt} dt \tag{1}$$

where  $g(\cdot)$  is the probability density function of the time of detection,  $G(\cdot)$  is the cumulative of  $g(\cdot)$  and  $r$  is the individual discount rate, which summarize here the way individuals discount the future.

Let us now consider the probability of being detected within some small interval in the neighbourhood of  $t$ ,  $P(\cdot)$ , after having breached the law up to  $t$ . Assuming that the chances of being detected depend only on the offence rate at  $t$  and on the level of enforcement  $E$ , this can be written as:

$$P(\sigma, E) = \frac{g(t)}{1 - G(t)} \tag{2}$$

The individual choice problem is that of maximizing (1) subject to (2). This optimal control problem is greatly simplified by the fact that  $P(\sigma, E)$  is independent from time. With an infinite time horizon this implies  $\sigma$  to be constant, hence (2) can be written as a linear differential equation which can be substituted into (1). Integrating yields a reformulation of the objective of the agent, which is choosing  $\sigma$  such as to maximize:

$$V(\sigma, E) = \frac{U(\sigma) - Y - P(\sigma, E)F}{r + P(\sigma, E)} + \frac{Y}{r} \tag{3}$$

The numerator of the first term on the right-hand side of (3) represents the expected gains from crime (e.g., Becker, 1968); the denominator is the rate at which these gains are discounted. It is worth noticing that the effective discount rate is composed by the agent’s usual time preference plus the probability of being detected. Therefore, the rate at which offences are committed,  $\sigma$ , determines both the expected income from crime and the rate at which such income is discounted.

The first order condition for a maximum,  $\partial V(\sigma, E) / \partial \sigma = 0$ , imposes that the usual condition of equating marginal costs and benefits must be satisfied in order for the choice of  $\sigma$  to be optimal. Some comparative statics then reveals that  $\partial \sigma / \partial r > 0$ : that is, agents with higher discount rates will be more likely to commit crime, or, in other words, the amount of crime committed by different individuals can be explained by their attitudes towards the future. This is the theoretical prediction we aim at testing in the remainder of the paper.

**3. The empirical strategy**

*3.1. An aggregate model of regional crime rates*

We test the theoretical prediction briefly presented above by considering Italian regional data over the period 2003–2007. Since we use here aggregate data starting from an individual choice problem, we need to discuss aggregation issues before moving to our empirical analysis (e.g., Blundell and Stoker, 2005; Durlauf et al., 2008, 2010). A standard representation of the individual expected utility associated with the choice of committing crime, which can be interpreted as a (linear) empirical counterpart of Eq. (3) above, is:

$$u_{it}(\sigma_{it}) = r_{it} \phi \sigma_{it} + X_{it} \gamma \sigma_{it} + Z_{it} \beta \sigma_{it} + \xi_{it} \sigma_{it} + \varepsilon_{it} \sigma_{it} \tag{4}$$

where  $\sigma = \{0,1\}$  is an indicator for having (1) or not (0) committed crime;  $r$  is the individual discount rate;  $X$  and  $Z$  are, respectively, individual (index  $i$ ) and region (index  $l$ ) specific observable variables emphasized by the scientific literature on the determinants of crime;  $\xi$  and  $\varepsilon$  are individual and region specific unobservables; finally,  $\phi$ ,  $\gamma$ , and  $\beta$  are (unknown) parameters describing preferences. Following Durlauf et al. (2008), we make the following assumptions to restrict the nature of unobserved heterogeneity:

- A.1.  $E[\varepsilon_{it}(1) - \varepsilon_{it}(0)] = 0$
- A.2.  $[\xi_{it}(1) - \xi_{it}(0)]$  is independent of  $[\varepsilon_{it}(1) - \varepsilon_{it}(0)]$
- A.3.  $[\varepsilon_{it}(1) - \varepsilon_{it}(0)]$  is independent of  $r, X$  and  $Z$ .

The  $i$ -th individual will commit crime if and only if  $[u_{it}(1) - u_{it}(0)]$  is (strictly) positive, which implies:

$$r_{it} \phi + X_{it} \gamma + Z_{it} \beta + [\xi_{it}(1) - \xi_{it}(0)] + [\varepsilon_{it}(1) - \varepsilon_{it}(0)] > 0 \tag{5}$$

or:

$$r_{it} \phi + X_{it} \gamma + Z_{it} \beta + [\xi_{it}(1) - \xi_{it}(0)] > [\varepsilon_{it}(0) - \varepsilon_{it}(1)] \tag{6}$$

Eq. (6) makes clear that, conditional on  $r, X, Z$ , and  $[\xi_{it}(1) - \xi_{it}(0)]$ , individual choices are stochastic. Let us denote by  $A_{it}$  the cumulative distribution function of  $[\varepsilon_{it}(0) - \varepsilon_{it}(1)]$ ; the probability

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