
Testing for fragility: a valuable public policy and an opportunity for postal operators

Claire Borsenberger, Helmuth Cremer, Denis Joram,
Jean-Marie Lozachmeur and Estelle Malavolti



Introduction

- Due to population aging dependency will represent a major challenge.
- Issue is not just to provide care, but also to enhance disability-free life expectancy as a proportion of life expectancy, which in France at age 65 is less than 50%.
- Overall, a better designed dependency policy is required.
- In particular it seems necessary to develop preventive care.

- World Health Organization (WHO) advocates deploying throughout the territory a renewed and systematic approach to the prevention of loss of autonomy called ICOPE (Integrated Care for Older People).
- Involves several stages.
- The first stage consists in testing and screening individuals for their risk. These screening tests use simple tools and can be performed by persons who are not health professionals such as for instance specially trained postal employees.
- Preventive actions are then implemented for individuals at risk and are declined in 4 steps (from step 2 to step 5) by health care professionals.

- We present a simple model, assuming that a certain proportion of the relevant age group is screened for their dependency risk.
- This screening makes it possible to target prevention according to the individual risk.
- Prevention reduces the probability of dependence and the cost of dependence, by reducing its severity or delaying its onset.
- The cost of dependence includes that of formal and informal care.

- We determine the optimal levels of expenditures on screening and prevention to maximize welfare subject to a budget constraint.
- We provide a precise description of costs and benefits of testing and of providing preventive care and show when a universal testing program is desirable.

Model

- We consider a subgroup of total population identified by an observable exogenous variable like age.
- A proportion n_i ($i = 1, 2$) is of type θ_i , where θ measures the health status, which determines the probability that the individual will become dependent.
- We suppose that $\theta_1 > \theta_2$, so that θ_1 has a better health status, and a smaller probability of becoming dependent: $\pi(p, \theta_1) < \pi(p, \theta_2)$, where p measures expenditures on prevention.
- We have $\partial\pi(p, \theta_i) / \partial p < 0$ and $\partial\pi(p, \theta_2) / \partial p < \partial\pi(p, \theta_1) / \partial p$: prevention decreases the risk of dependency and more so for high risk individuals.

- When dependent, an individual causes healthcare expenditures of $S(p)$ with $S'(p) < 0$.
- In addition to formal care, dependent individuals also receive informal care, $\alpha(p)$ with $\alpha'(p) < 0$ which involves a utility cost of $V(\alpha)$ for the caregivers.
- A proportion a of the population belonging to the relevant subgroup is tested. A test perfectly reveals an individual's type, but testing involves a cost of $c(a)$.

- Individuals who are tested receive level of prevention p_i .
- Utility of “healthy” and “dependent” individuals $u_H > u_D$; do not account for formal health care expenditures which we assume to be covered by public health insurance.
- Expected utility of type i

$$EU(p_1, \theta_1) = \pi(p_1, \theta_1) u_D + (1 - \pi(p_1, \theta_1)) u_H,$$

when tested and

$$EU(0, \theta_1) = \pi(0, \theta_1) u_D + (1 - \pi(0, \theta_1)) u_H$$

otherwise.

Policy design

Maximize social welfare given by

$$SWF = a [n_1(EU(p_1, \theta_1) - \pi(p_1, \theta_1) V(\alpha(p_1))) + n_2(EU(p_2, \theta_2) - \pi(p_2, \theta_2) V(\alpha(p_2)))] \\ + (1 - a) [n_1(EU(0, \theta_1) - \pi(0, \theta_1) V(\bar{\alpha})) + n_2(EU(0, \theta_2) - \pi(0, \theta_2) V(\bar{\alpha}))].$$

subject to the resource constraint

$$B - an_1p_1 - an_2p_2 - c(a) - a [n_1\pi(p_1, \theta_1) S(p_1) + n_2\pi(p_2, \theta_2) S(p_2)] \\ - (1 - a) [n_1\pi(0, \theta_1) \bar{S} + n_2\pi(0, \theta_2) \bar{S}] \geq 0$$

with respect to a, p_1, p_2 .

Share of population tested

FOC shows that increasing the testing rate a has several effects:

1. It increases expected utility $[EU(p_i, \theta_i) - EU(0, \theta_i)]$ for $i = 1, 2$ of the elderly, because the proportion of the population who can benefit from targeted prevention increases.
2. It increases the expected utility of caregivers (decreases their expected disutility) by $[\pi(0, \theta_i) V(\bar{\alpha}) - \pi(p_i, \theta_i) V(\alpha(p_i))]$ for $i = 1, 2$.
3. Expected health expenditures decrease as measured by $n_i (\pi(0, \theta_i) \bar{S} - \pi(p_i, \theta_i) S(p_i))$ for $i = 1, 2$.
4. Testing costs increase by $n_1 p_1 + n_2 p_2 + c'(a)$.

- The optimal level of a is determined by trading off these benefits and costs.
- An interior solution requires equalizing the marginal benefit to the marginal cost.
- Note that when the cost is linear with $c'(a) = c_a$ we have a corner solution for $a = 0$ or $a = 1$ depending on costs and benefits. This is because all the other terms do not depend on a . With $a = 1$ testing is universal.
- In words, when the cost of testing is not too large and/or the benefits of targeted prevention sufficiently large, it is optimal to test the entire population.

Expenditures on preventive care

FOCs show that increasing expenditures on prevention on type $i = 1, 2$, p_i reduces both the probability of dependency and its cost (for the elderly and for the caregivers). More precisely, it has the following effects on welfare

1. By reducing the probability of dependency by $\partial \pi(p_i, \theta_i) / \partial p_i < 0$
 - it increases the expected utility of the elderly.
 - it also increases the utility of the caregivers (decreases their expected utility cost of caregiving).
2. The expected utility cost of caregivers is further increased because $\alpha'(p_1) < 0$ so that the amount of care needed is reduced because prevention decreases the severity (or duration) of the dependency.

3. It decreases health and long-term care costs measured by $a [n_i \pi (p_i, \theta_2) S' (p_i) + S(p_i) \dot{c}]$

4. Prevention cost increases.

Summing up

- As for a , the optimal level of p_i is determined by trading off benefits and costs so that an interior solution implies equalizing the marginal benefit to the marginal cost.
- Unlike for a , our assumptions ensure that the objective is *strictly* convex in p_i so that the solution can be expected to be interior.
- In further development we show that *laissez-faire* (preventive care chosen and paid by individuals) is inefficient: insufficient level.
- Individuals neglect impact on informal caregivers and cost saving for health insurance.

Practical implementation: an opportunity for national postal operators?

- Major difficulty: deployment of prevention policies at large scale.
- Relying on a pre-existing infrastructure covering the whole territory could be an efficient and quick solution.
- In particular, step 1 of the ICOPE program, which does not require health professional, could rely on NPOs.
- NPOs, in charge of the universal postal service (and other SGEIs), have a pre-installed human network deployed throughout the whole territory, able to reach each citizens at home.
- Mutualizing the provision of postal services with such screening and prevention activities could be cost effective.

- Such a cooperation has already been experimented in France.
- Health professionals implementing the ICOPE program in Occitanie (a region of France) and La Poste Groupe, set up experiments in three cities in the Toulouse agglomeration in order to carry out step 1 by specially trained employees.
- A first experiment on a small scale showed encouraging results.
- More extended test are planned by La Poste Groupe at the request of the Gérontopôle of Toulouse and the regional agency of health (ARS Occitanie).

Concluding comments

- We have provided a precise description of costs and benefits of testing and of providing preventive care.
- This provides a framework for the empirical assessment of the policy.
- Currently, the data that are available are not sufficient, but the ICOPE experiments will provide additional evidence, in particular on the impact of prevention on the incidence of dependence.
- In the meantime only rough “back of the envelope” calculations are possible.

- However, it is well documented that the cost of dependence to society, the patients and the caregivers is huge.
- Screening, on the other hand, does not appear to involve a prohibitive cost (especially when it can rely on existing infrastructure).
- Consequently, universal screening is likely to be desirable.
- However, the fine tuning of overall prevention policy requires further empirical and theoretical studies.