SOCIAL AND FISCAL IMPACTS OF SEASONAL FLU VACCINATION IN FRANCE

Spillover effects and structural factors

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Introduction

Public spending is under pressure in many high-income countries. **Fiscal health modeling** has been introduced to estimate the impact of health policies on government revenues and expenditures (e.g., taxes, public transfers). **Social impact assessment**, by contrast, estimates the impact of policies on the welfare of society as a whole (e.g., utilities, use of resources). Social impact assessment is **prescriptive,** while fiscal impact assessment, in itself, is not.

Seasonal flu imposes a significant burden in France, primarily among older adults. Vaccination coverage among individuals aged $\geq$65 years has been ranging between 50% and 60% in the previous years, falling short of WHO's 75% coverage recommendation.

We estimate the social and fiscal impacts of seasonal influenza vaccination in France under different coverage scenarios. We outline how **structural factors** (e.g., the pension system) and **spillover effects** (e.g., through reduction in disease transmission) may influence social and fiscal impact assessments and their interpretation.

Methods

We implement an age-stratified SIRV (susceptible, infected, recovered, vaccinated) **dynamic transmission model** of flu for one season in France (Figure 1a). The contact matrix is shown in Figure 1b [1]. The population age structure and **demographic trends** are derived from the French national statistics bureau [2]. We model a representative seasonal flu vaccine with age-dependent efficacy against health outcomes and a 50% reduction in susceptibility to infection [3]. The model reflects a medium intensity flu season under current vaccination coverage.

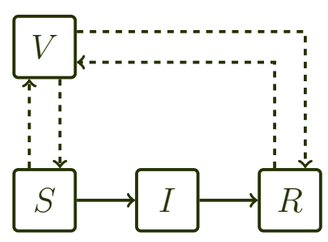


Figure 1a. Dynamic disease transmission model.

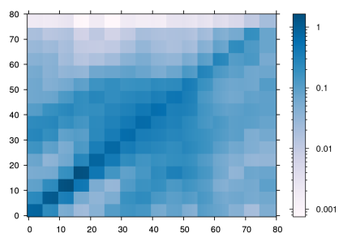


Figure 1b. Daily contacts. x-axis: age of individual. y-axis: age of contact.

Our **social impact model** (societal perspective) includes healthcare spending (GP visits and hospitalizations), vaccine production and administration costs, economic production loss, and QALYs (quality-adjusted life years) lost due to illness and death.

Our **fiscal impact model** uses a generational accounting approach based on National Transfer Accounts data [4]. It includes vaccine production and administration costs, healthcare spending covered by the state, direct taxes, and indirect transfers (including pensions). We assume a 3% discount rate.

Results

Current coverage v. no vaccination

Table 1 shows the social and fiscal impacts of current age-dependent vaccination coverage and reimbursement compared to no vaccination. From a societal perspective, current vaccination coverage **dominates** no vaccination: it saves both resources and QALYs. From a fiscal perspective, vaccination imposes a net cost of about **€973 million** on the state. This cost is driven by the cost of pensions corresponding to averted deaths.

Impact of vaccination	Social	Fiscal
Vaccine production and administration (€m)	−340	−233
Healthcare (€m)	+121	+93.8
Production / direct taxes (€m)	+393	+171
Indirect transfers, incl. pensions (€m)	**def. 0**	−1,005
QALYs	+56,405	**def. 0**

Table 1. Incremental social and fiscal impacts of current vaccination coverage and reimbursement levels compared to no vaccination. def. 0: 0 by definition. Indirect transfers are transfers from some individuals to others. Saved QALYs do not generate direct revenues for the state.

Increasing current coverage to 100% in all age groups

From a societal perspective, increasing coverage from current levels to 100% would induce an additional cost of €7,288 per QALY saved, which is **below typical societal willingness-to-pay thresholds** in high-income countries. Saved healthcare costs (€159 million) and averted production losses (€646 million) would not offset the increase in vaccination costs (€1,368 million), but 77,250 more QALYs would be saved.

From a fiscal perspective, and assuming 100% reimbursement of vaccination (additional €1,474 million cost), increasing coverage to 100% would impose an additional **net cost of €2,154 million** on the state. This result is, again, amplified by indirect transfers (additional €1,082 million cost), primarily pensions.

KEY TAKE-AWAYS

- In France, seasonal flu vaccination generates **a net benefit for society**. Increasing coverage would increase this benefit.
- From a fiscal perspective, flu vaccination imposes **a net cost on the state,** especially (and counterintuitively) when increasing coverage in younger working-age adults.
- Fiscal insights are a **valuable tool to support discussions** with stakeholders. **Context** is key to their interpretation and use.

Targeting working-age adults?

Figure 2 shows the total expected **future (lifetime)** net fiscal contributions of individuals as a function of their age in 2027. Notice the higher expected lifetime contributions of younger working-age adults. The cost of their education has already been incurred, and their retirement is still distant. **Can the fiscal impact of seasonal flu vaccination be improved by increasing coverage among younger working-age adults?**

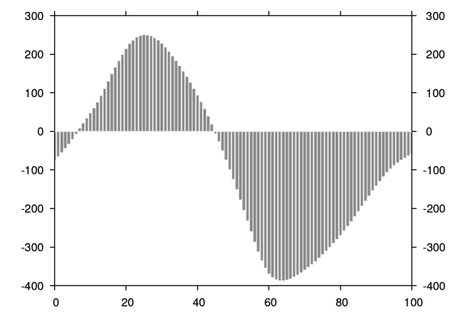
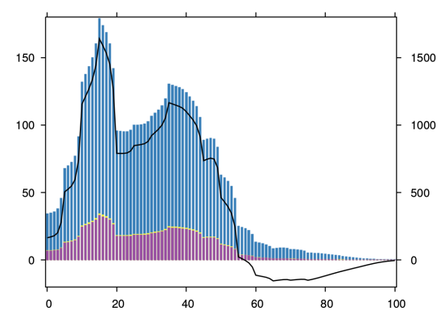


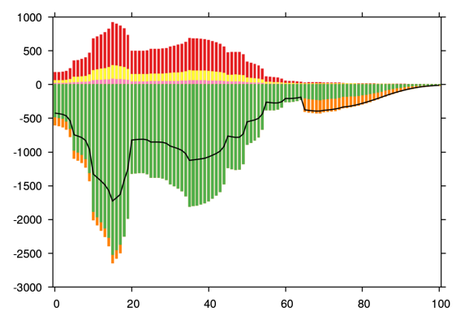
Figure 2. Per capita expected *future* net fiscal contributions (€ thousand) as a function of age (2027).

From a societal perspective (Figure 3a), an **increase in coverage by 1 percentage point (pp)** in any age group below 56 years **dominates** the current coverage.

From a fiscal perspective, the net impact of increasing coverage by 1 pp in any age group is negative (Figure 3b). Counterintuitively, the impact is **most negative** when increasing coverage in adolescents and **younger adults.** This is explained by **spillover effects.** Adolescents and younger adults have more contacts with one another (Figure 1b), which strongly amplifies the impact of vaccination in these age groups on flu transmission in the *entire* population. Resulting averted deaths among older adults are socially desirable but translate into higher pension costs for the state.



a. Social impact. Color bars: QALYs saved (left y-axis). Black line: net resource use impact (€ thousand, right y-axis).



b. Fiscal impact (€ thousand). Black line: net impact.

Figure 3. Social and fiscal impacts, *in the entire population,* of increasing coverage by 1 pp in each age group (x-axes). Blue: deaths. Yellow: hospitalizations. Purple: infections. Red: direct taxes. Pink: GP visits. Green: indirect transfers. Orange: vaccine production and administration.

Conclusion

We assessed the social and fiscal impacts of seasonal flu vaccination in France. From a societal perspective, the current coverage dominates no vaccination and a further increase in coverage would bring **additional benefits.** From a fiscal perspective, flu vaccination imposes a net cost on the state, and this cost would increase with coverage. This is explained by the **public cost of pensions.**

Increasing coverage among younger working-age adults not only does not make the fiscal impact less negative, as would be expected, but increases the fiscal cost more dramatically than increasing coverage in other age groups. This is explained by **contact patterns** in the population and their **impact on disease transmission.**

The fiscal cost of vaccination could be put into perspective with the total public expenditure (about €1,700 billion in recent years), the public deficit (€170 billion), or the public pension system deficit (€6.6 billion). Yet, abstracting from the case of France, fiscal impact analyses provide a partial perspective *in general.* The state is best described as a **resource mobilization and allocation mechanism,** rather than an economic agent comparable to a private investor. Fiscal health modeling is a valuable tool to **help respond to existing concerns** among stakeholders, with fiscal insights requiring careful contextualization for interpretation.

References

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