



HAUTE AUTORITÉ DE SANTÉ

USING EQUIVALENT INCOME CONCEPT IN BLOOD PRESSURE LOWERING DRUGS ASSESSMENT

HOW INCLUDE INEQUALITY AVERSION IN COST/BENEFIT ANALYSIS?



CHAIRE SANTÉ

UNE CHAIRE DE
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Context

Health equivalent income concept

- **Developed by Fleurbaey (2005) and Fleurbaey & Maniquet (2011)**
 - A non-welfarist measure of well-being
 - A variant of the concept of money-metric utility (Samuelson, 1974 ; Samuelson and Swamy, 1974).
- **Level of income that would put the individuals in an equivalent situation, from their point of view, if they were in perfect health rather than in their actual health states.**
- **Health equivalent income = income – willingness to pay to be in perfect health**

Close link with willingness to pay : however when using equivalent income concept, we keep information on level of income and not only on variation of income.

Health equivalent income concept

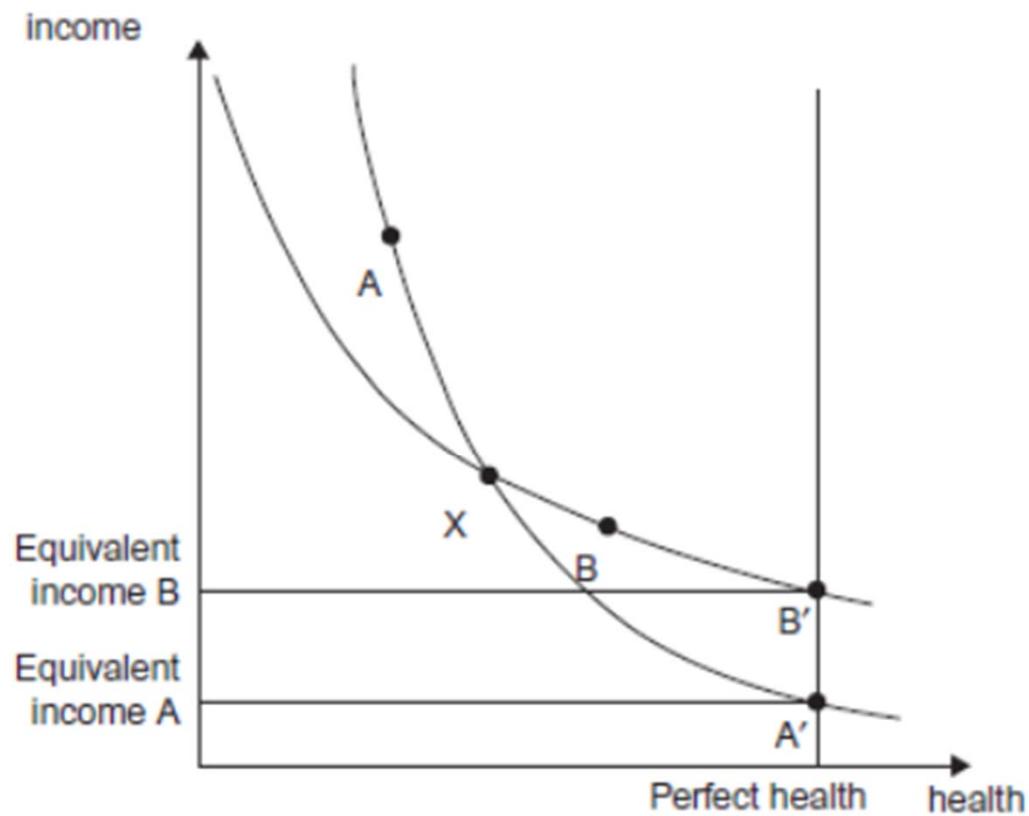


Fig. 1. Equivalent Income.

Aim of the paper

- **To test feasibility of using equivalent income approach in the context of public health decision-making**
 1. Antihypertensive treatments for patients with essential hypertension
 - Strategy A : Placebo
 - Strategy B : 1° angiotensin converting enzyme (ACE) inhibitors ; 2° ACE inhibitors-diuretics ; 3° tritherapy (cheaper in HAS model)
 - Strategy C : 1° calcium antagonists ; 2° calcium antagonists-ACE inhibitors ; 3° tritherapy (most effective in HAS model)
 2. Two databases:
 - A survey on a representative sample of the French population on equivalent incomes (n=3331)
 - A cost-effectiveness model about antihypertensive treatments in essential hypertension (cost/life years gained) from HAS



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Methodology

General methodology

- Cost-benefit analyses imply to sum WTP to avoid CV events and compare it to the sum of the costs associated with strategies A, B and C
- Here it is proposed :
 - To estimate what would be the equivalent incomes of individuals if strategy A, B and C were implemented,
 - To compute a social welfare function for each strategy as the sum of the HEI within the population,
 - To apply a concave function to the sum of the HEI in order to introduce inequality aversion (Atkinson, 1970), denoted ρ .

$$SW_K = \frac{1}{1-\rho} \sum_i (y_i^{*K})^{1-\rho}$$

- If $\rho = 0$: $SW_K = \sum_i HEI^K$
 - If $\rho = 1$: $SW_K = \sum_i \ln(HEI^K)$
 - If $\rho = 2$: $SW_K = -\sum_i \frac{1}{HEI^K}$
 - If $\rho = 3$: $SW_K = -\frac{1}{2} \sum_i \frac{1}{(HEI^K)^2}$
- The social welfare function SWA, SWB and SWC that dominates the two others is considered as being welfare improving: the associated strategy is therefore efficient.

To estimate equivalent incomes with strategy A, B and C

1. To estimate the probabilities of occurrence of CVE for all individuals with hypertension in the sample with strategies A, B and C for each year on ten years
2. To measure the consequences of CV event for all individuals of the sample (those with and without HTA)
 - In terms of health
 - To simulate the SAH that individuals would have declared if they had all their current diseases as well as an extra CVE.
 1. For example, the simulated SAH obtained for an individual that experiences a stroke is the following:

$$\tilde{SAH}_i = SAH_i + \hat{a}_1 * \text{stroke}_i$$

To estimate equivalent incomes with strategy A, B and C

- In terms of income : tax payers' income and individuals with HTA
 - *HTA treatments, medical cares following CV events, out-of-pocket*
 - *Total cost of insurance divided between all individuals within the sample according to their participation to the national health insurance expenditures (data given by Caussat et al. 2005)*
- In terms of equivalent income
 - *We compute an estimation of the individuals' equivalent incomes \tilde{HEI}_i^K using the simulated health \tilde{SAH}_i and the estimated income for all individuals $\tilde{\log}(\text{income})_i$*

3. Ex post analysis

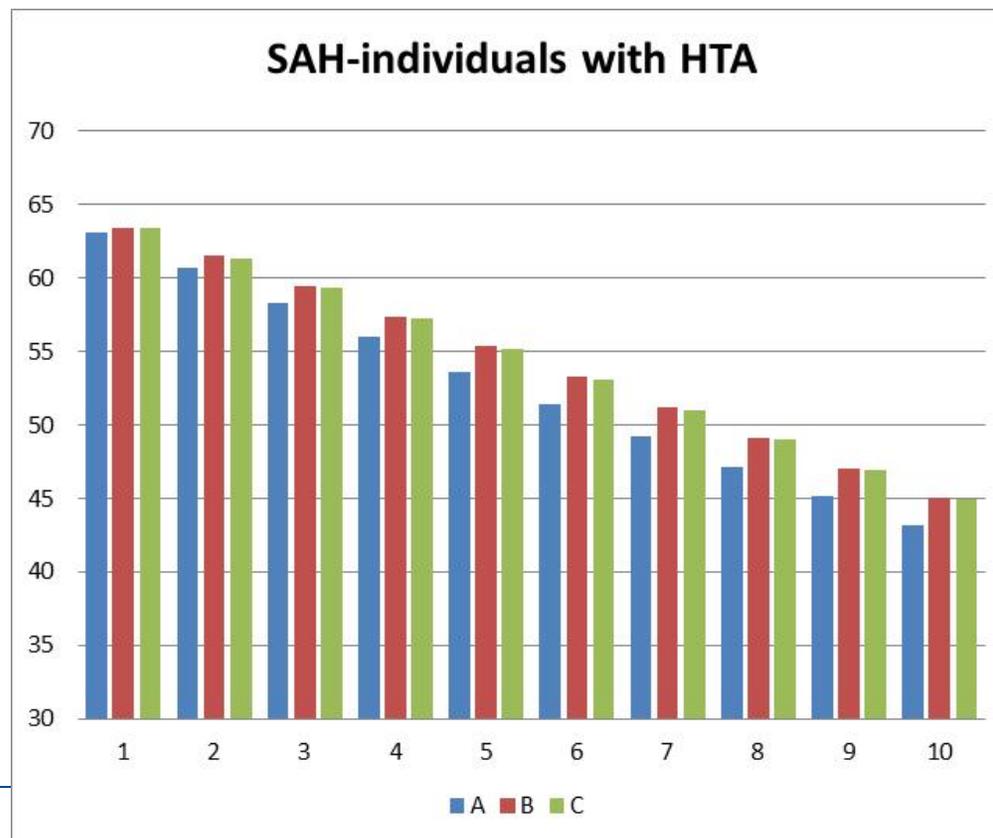


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First results

Simulated SAH

1. SAH is always better in B & C than in A (placebo)
2. Very close between B & C



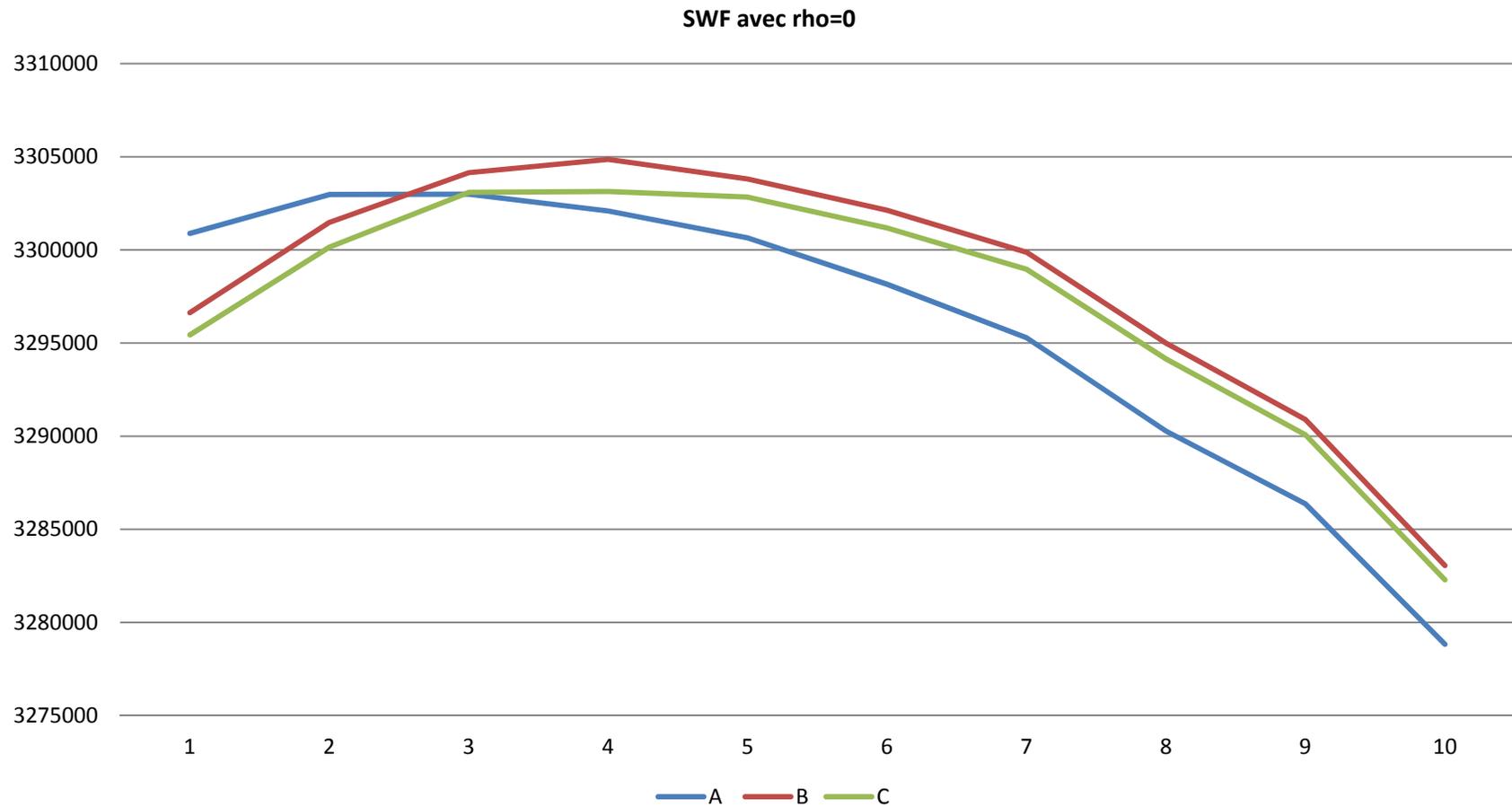
Simulated costs

1. Cost of insurance paid by all individuals:

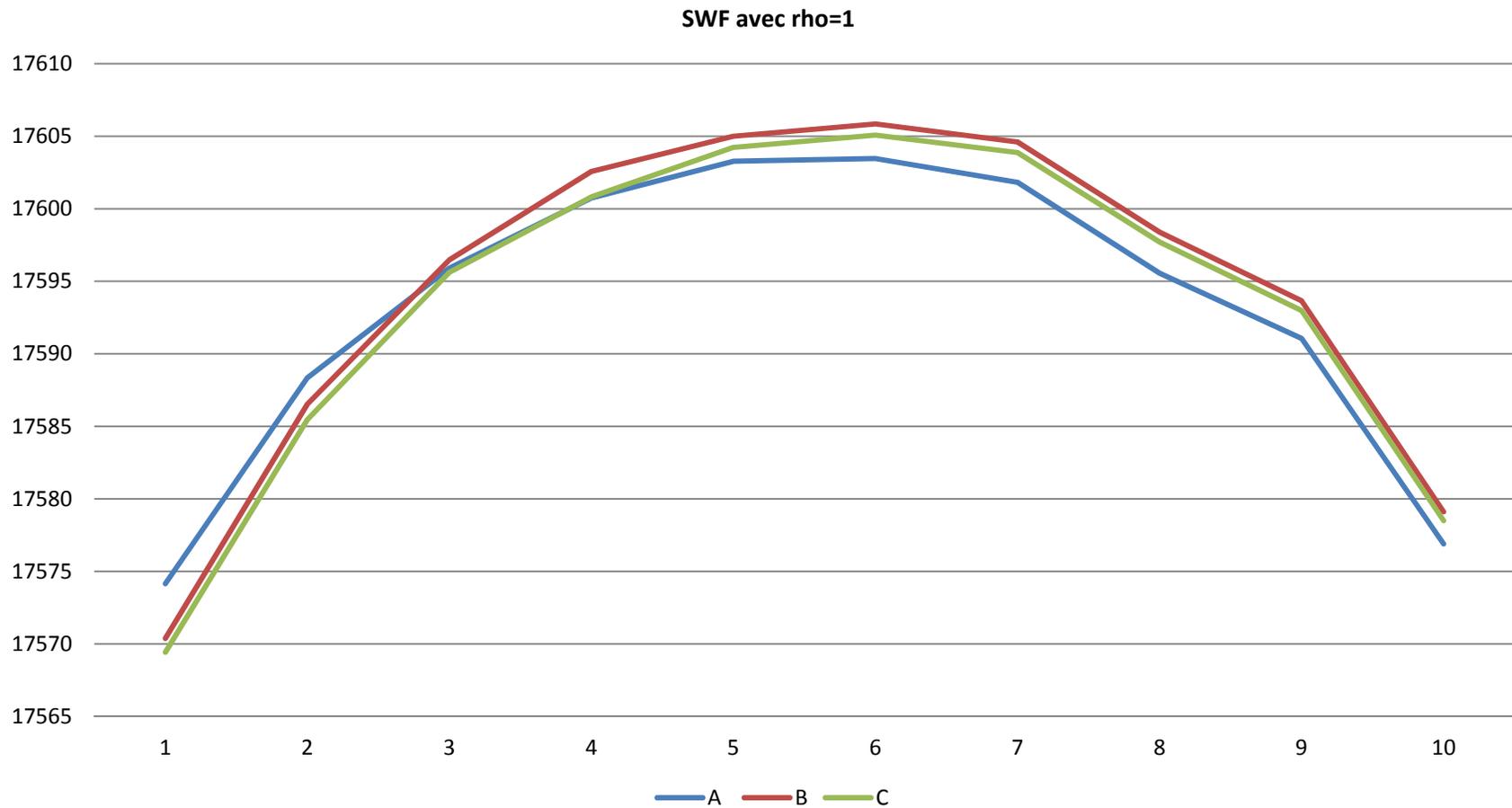
1. increase/decrease due to the price of HTA treatments
2. increase/decrease due to the price of medical cares following CV events



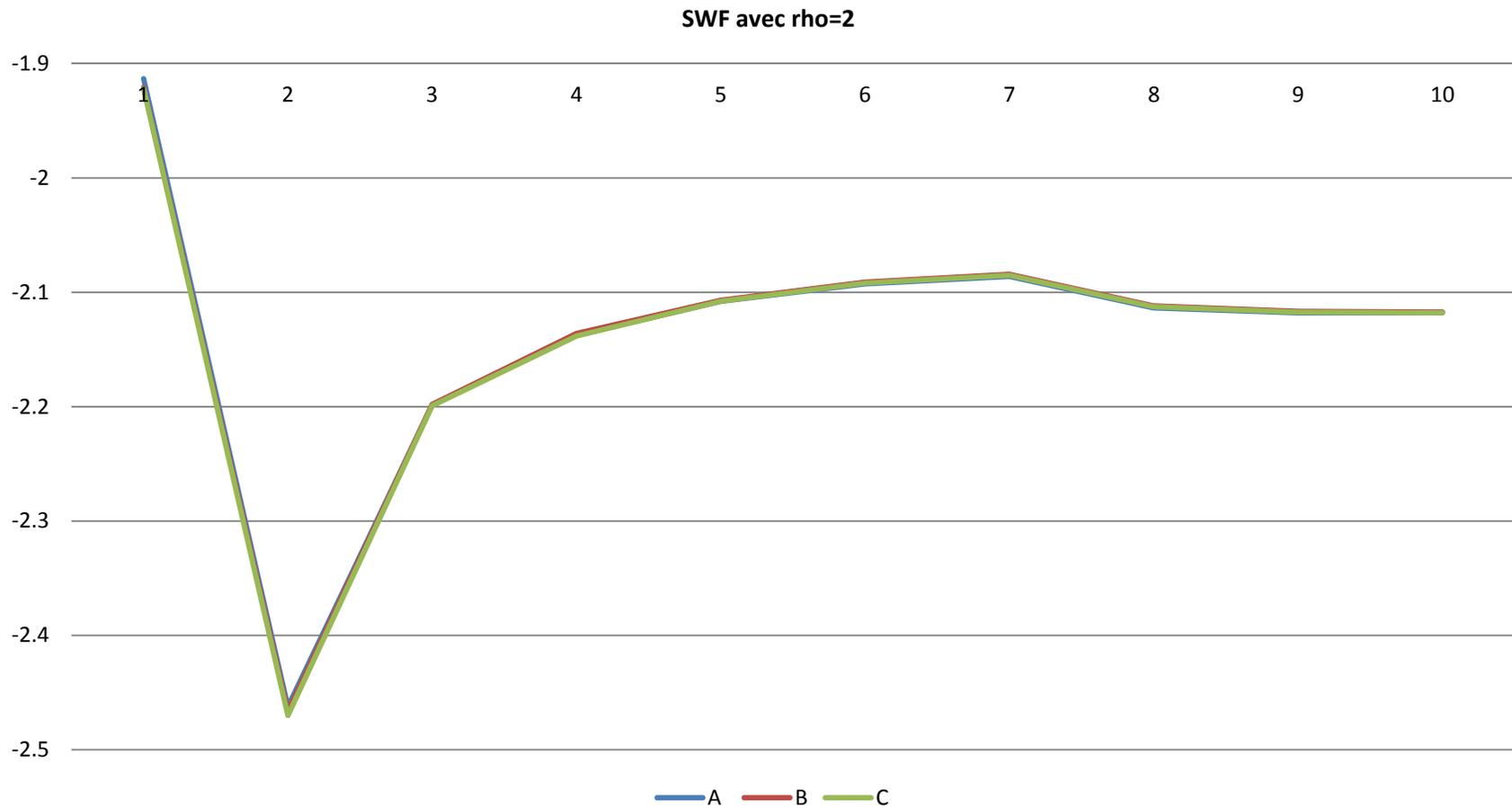
Distribution of the social welfare functions



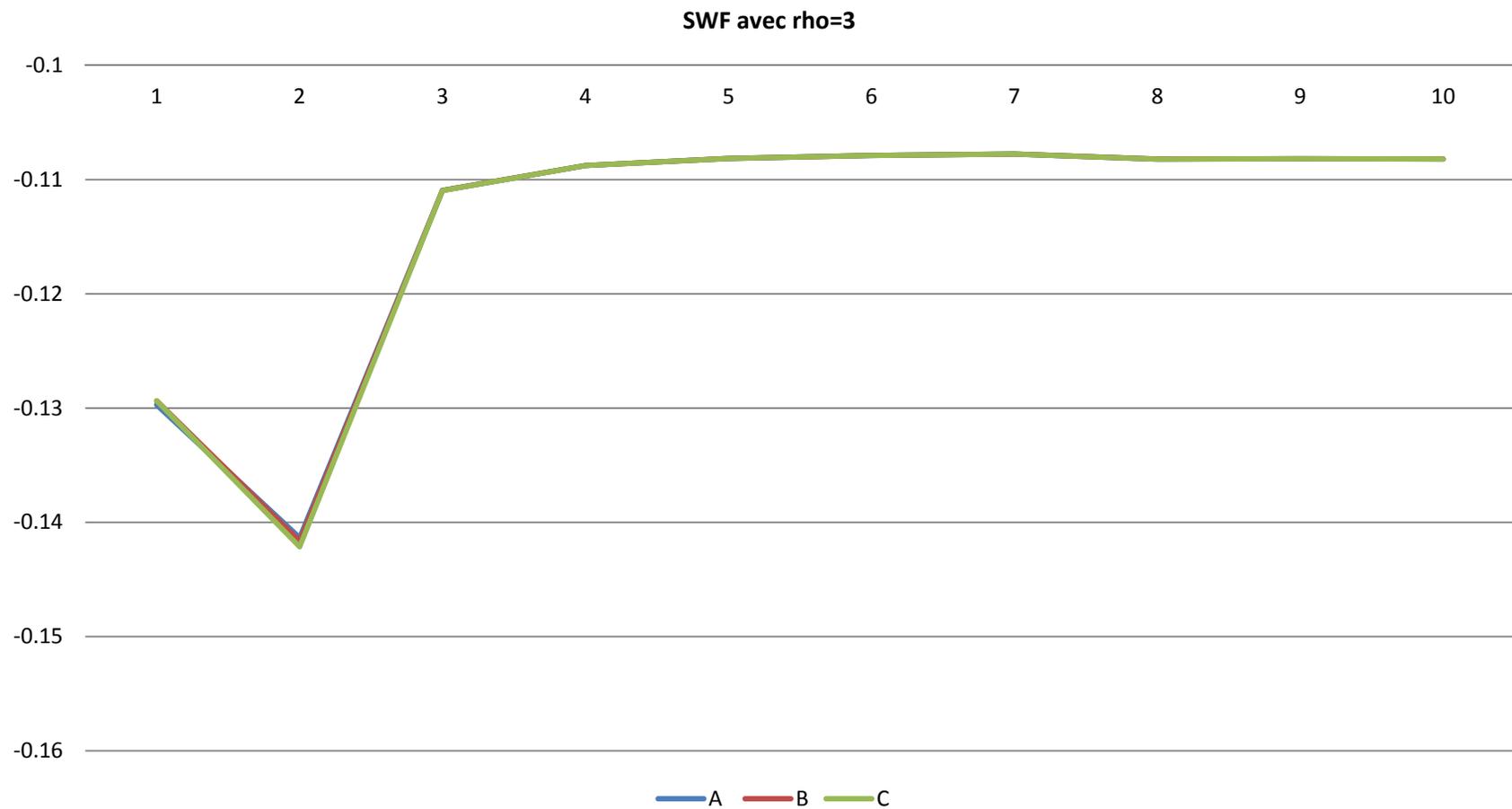
Distribution of the social welfare functions



Distribution of the social welfare functions



Distribution of the social welfare functions





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Conclusion

Conclusions

1. Much work is still needed because some results are inconsistent → another modelization process is currently being tested.
2. This study provides some demonstration about the feasibility of this approach for public decision making.
3. Clinical data and costs are the same as those used in traditional cost/effectiveness analysis.
4. WTP to be in perfect health and SAH are specifically needed to compute individuals' equivalent incomes...
5. ...however, they aren't more difficult to obtain than utility weights in the EQ-5D scoring function used in cost/QALY studies.
6. As for the EQ-5D scoring function, once a survey on equivalent income is conducted on a representative sample of the population, it provides generic information that can be used to assess various treatments in many conditions.