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Abstract:
The Vision Zero (VZ, Nollvisionen) has been accepted by the Swedish parliament and implies that no people should have to be killed or seriously injured in the Swedish transport sector. From a conventional cost-benefit perspective it is concluded that the VZ will in most cases be incompatible with a cost efficient policy to reduce overall accidents in the Swedish society. Even though we find various reasons why it may be economically optimal to go beyond the basic cost-benefit rule for public investments in safety, or for safety regulations, this conclusion still holds if VZ is interpreted strictly. The possibility that a lower corner solution may be optimal is thus found to be unlikely. Still, it is possible that the productivity of the civil servants who work with safety regulations increases by (some version of) the VZ, or that people’s attitudes and preferences change in a way which is positive for the society as a whole. If so, a non-strict version of the VZ may actually from an economic point of view be part of an optimal second-best strategy.
1. Introduction

The purpose of this paper is to discuss from an economic point of view whether the application of the so-called "Vision Zero" (VZ) (Nollvisionen) in the Swedish transport sector is a wise strategy or not. VZ is a vision, passed by the Swedish parliament in October 1997, that no people should have to be killed or seriously injured in the Swedish transport sector.

Not many would argue against a public goal of reducing the number of killed and seriously injured people in the transport sector. Still, to propose that (presumably costly) measures should be taken so that no-one would be killed or seriously injured in the Swedish transport sector is indeed controversial, perhaps especially among economists, and it is easy to find arguments against the VZ.

In Section 2, the VZ is discussed from a conventional cost-benefit (CB) perspective, where, not surprisingly, it is found that the VZ will in most cases be incompatible with a cost efficient policy to reduce overall accidents in the Swedish society. The possibility that a lower corner solution may be optimal is discussed and found to be unlikely. Further, based on the basic expected utility model various empirically testable results are derived. Some of these are supported by most empirical evidence, but some are not.

Section 3 discusses some possible shortcomings with the basic CB approach. Simple models with respect to biased risk perceptions, altruism, cognitive dissonance, and positional externalities are developed, and it is shown that each of these could (but need not) justify going beyond the basic CB rule for safety investments or standards.

Section 4 of the paper is broadening the perspective of the VZ. The VZ is then interpreted more as a public statement used to encourage individuals and organizations, and to change preferences and attitudes, than as a strict policy strategy which would be undertaken at any cost. A simple model is developed where the optimal degree of strictness in the interpretation of the VZ is chosen. Section 5 draws conclusions.
2. The Basic Expected Utility Model

For an economist it is natural to start a discussion from a cost-benefit perspective. Consider a representative consumer who is facing a certain risk of an fatal accident \( r \), which can be reduced by a governmental investment \( T \). The objective of a social planner is to maximize expected utility which is given by

\[
(1 - r(T))u(c)
\]

(assuming that utility is zero in the case of a fatal accident) where \( u(c) \) is the utility associated with consumption \( c \) (under certainty). The government chooses the investment \( T \) knowing that private consumption must decrease to a corresponding degree, i.e.

\[
c = y - T / n
\]

Where \( n \) is the population size. Substituting (2) into (1) implies that the objective function to be maximized can be written

\[
(1 - r(T))u(y - T / n)
\]

(3)

The corresponding first order condition for an interior maximum with regard to \( T \) is then given by

\[
-n \frac{\partial r}{\partial T} U = (1 - r) \frac{\partial u}{\partial c}
\]

(4)

In words: At optimum we must have that the total increase in expected utility from investing one more dollar on risk reduction must be the same as the decrease in expected utility from reducing private consumption by one dollar.

We can also solve explicitly for the optimal risk level \( r \)

\[
r = 1 + n \frac{\partial r}{\partial T} / \frac{\partial u}{\partial c} U
\]

(5)

Since \( \frac{\partial r}{\partial T} < 0 \) we have (not surprisingly) that \( r < 1 \).

Alternatively, it is useful also to express the same problem as the governmental choice of \( r \), where the expenditure on risk reduction is a function of the risk level (instead of the other way around). The problem is then to maximize \((1 - r)u(c) \) where \( c = y - T(r) / n \), implying the objective function

\[
(1 - r)u(y - T(r) / n)
\]

(6)

The corresponding first order condition for an interior maximum with regard to \( r \) is then given by

\[
\frac{U}{1 - r} / \frac{\partial u}{\partial c} = - \frac{\partial T}{\partial r} / n
\]

(7)

On the left hand side we have the consumers’ marginal willingness to pay for a (small) risk reduction, which is also equal to their marginal willingness to accept a (small) risk increase. This value is typically denoted the value of a statistical life (VOSL). On the right hand side we have the marginal cost of a risk decrease (per person). Hence, at optimum we must have that investments should be made up to the point where the marginal cost (per person) is equal to the VOSL. Note that if \( n \) is a large number, i.e., the number of people living in the society is large, and everybody face the same risk, we can by the law of large numbers talk
about the number of people actually being killed and not only about probabilities. Hence,
what is a stochastic problem from an individual’s point of view is deterministic from a social
perspective. Consequently, it is possible to hide behind some statements that we are not
talking about “real lives” but only about “statistical lives”. It is true that these statistical
lives are not identified, which may be considered important from an ethical point of view,
but these lives are of course equally real as other lost lives, and sometimes we may be able
to predict the number of fatal accidents quite accurately.

Note that the fact that an individual is willing to trade a certain risk increase for a finite
monetary compensation does of course not imply that the value that an individual would put
on his own life would be finite. The minimum willingness to accept (WTA, or the Hicksian
compensating variation, CV) that the individual would require in compensation for
accepting a certain (non-marginal) risk-increase $\Delta r$ at the initial risk level $r$ and
consumption level $c$ is implicitly given by:

$$ (1-r)u(c) = (1-r-\Delta r)u(c+WTA) $$

(8)

implying

$$ \frac{u(c+WTA)}{u(c)} = \frac{1-r}{1-r-\Delta r} $$

(9)

which clearly goes to infinity when the risk level after the risk increase $(r + \Delta r)$ goes to 1,
implying in turn that $WTA$ goes to infinity as well.\(^1\) Still, despite this fact there is no doubt
that the use of VOSLs and similar measures is and will remain very controversial, at least by
lay persons. Indeed, as expressed by Margolis (1996, 154): “Almost no one but an
economist feels comfortable talking about what a human life is worth, hence what it would
be reasonable to pay to avoid a situation that involves a risk to human life.” Still, as noted
by many, real life includes many situations that clearly involves trade-offs between risk and
other characteristics such as time gains (e.g. in terms of travel mode choice), flexibility,
fresh air (cycling in urban areas is more dangerous than most other modes), monetary
charges (pay for a safe car with an air-bag or not) etc. So, as accurately observed by
Margolis (ibid): “We do what we cannot avoid doing. But we hate to be pushed into
noticing it.”

The maximum willingness to pay (WTP) for a risk reduction on the other hand will of
course not go to infinity, since the WTP is bounded by the actual income, or consumption $c$.
From the definition we have

$$ (1-r)u(c) = (1-r+\Delta r)u(c-WTP) $$

(10)

and hence

$$ \frac{u(c)}{u(c-WTP)} = \frac{1-r+\Delta r}{1-r} $$

(11)

This expression also goes to infinity when the risk level before the risk decrease $(r)$ goes to
1, implying in turn that $u(c-WTP)$ goes to zero, and that $WTP$ goes to $c$.

Further, even though many people may be very skeptical to arguments based on

\(^1\)Or, rather, this is a sufficient but not necessary condition for the equality in (9) to hold. The utility
function may be limited so that the utility associated with an infinite income level would be finite. If so, the
equality will not hold even when $WTA$ goes to infinity.
VOSL and similar reasoning, it may be more difficult to escape the cost efficiency argument. Assume now instead that the society decides to spend a certain amount of money $R$ (which may or may not be optimal due to any criteria) on reducing various fatal risks $r_j$ to $r_n$, associated with the public expenditures $T_1$ to $T_n$. Since $R$ is fixed $c$ will be fixed as well and we have no explicit trade-off between consumption and safety (and hence lost lives) here. The Lagrangean to be maximized is

$$\Pi_i(1 - r_j)u(c) + \lambda \left[ R - \sum_i T_i(r_i) / n \right]$$

(12)

Implying the following f.o.c. for an interior solution:

$$(1 - r_j) \frac{\partial T_j}{\partial r_j} = (1 - r_k) \frac{\partial T_k}{\partial r_k} \quad \forall j, k$$

(13)

Thus, at the margin we must have that the marginal cost for the government to obtain a percentage change in fatal risk should be the same. Hence, even if we do not impose any monetization of the accident risk it is hard to escape all kinds of economic efficiency requirements.

Further, even if we do not explicitly compare saved lives with consumption at the margin, there is of course an implicit shadow price of a statistical life here as well. The Lagrange multiplier $\lambda$ has here the interpretation of the expected utility increase due to a one dollar increased safety budget (holding private consumption constant). But if $R$ is chosen optimally in order to maximize expected utility, one dollar must of course give the same increase in expected utility if consumed instead.

However, it is theoretically possible that there is no optimal interior solution and that the optimal outcome is a lower corner solution in the transport sector. A necessary condition for this to be the case is that the expected utility increase associated with higher private consumption from increasing the number of accidents from 0 to 1 (per relevant time unit) would be lower than the expected loss in expected utility from the associated risk increase. Formally, we need that

$$nU(c|r = 0) \geq -\frac{\partial u(c)}{\partial c} \bigg|_{r=0} \frac{\partial T}{\partial r} \bigg|_{r=0}$$

(14)

Although this is theoretically possible, this situation has probably a limited relevance in reality, and it appears likely that the costs in terms of foregone consumption would be very large for avoiding the last fatal accident.

So far, the results are expected and perhaps also well-known by most economists. Before considering some generalizations of the simple model in Section 2, it is useful to work through some of the implicit requirements that follow from the basic model. These properties are often testable in empirical estimations. First consider how the WTA for a given risk increase varies with the initial risk level. From (8) we have that

$$-u(c)dr = \frac{\partial u(c + WTA)}{\partial c} (1 - r - \Delta r) dWTA - u(c + WTA)dr$$

(15)

and hence

$$\frac{dWTA}{dr} = \frac{u(c + WTA) - u(c)}{\mu(c + WTA)} \frac{1}{1 - r - \Delta r} > 0$$

(16)
where $\mu$ is the marginal utility of consumption. Thus, we see that the WTA for any additional risk increase (including a marginal one) increases with respect to the initial risk level. Similarly, we can derive how the WTP for a certain risk reduction varies with the initial risk. From (10) we have

$$-u(c)dr = -(1-r+\Delta r)\frac{\partial u(c - WTP)}{\partial c} dEV - u(c-WTP)dr$$

implying

$$\frac{dWTP}{dr} = \frac{u(c) - u(c - WTP)}{\mu(c-WTP)} \frac{1}{1-r+\Delta r} > 0$$

Thus, we see that also WTP for a risk reduction increases with the initial risk level.

These results, however, hold for an additive risk change. If instead the new risk is independent of the pre-existing risk we have that the probability to survive is $(1 - r)(1 - \Delta r)$. In the case of risk increase we then have

$$(1-r)u(c) = (1-r)(1-\Delta r)u(c + WTA)$$

or simply $u(c) = (1-\Delta r)u(c + WTA)$. We see then directly that WTA for a given risk reduction must be independent of the initial risk. The same applies for the WTP and a risk decrease.

Consider next how the WTA varies with the size of the risk change. From (8) we have

$$0 = -d\Delta ru(c + WTA) + (1-r-\Delta r)\frac{\partial u(c + WTA)}{\partial c} dWTA$$

implying

$$\frac{dWTA}{d\Delta r} = \frac{u(c + WTA)}{(1-r-\Delta r)\mu(c+WTA)} > 0$$

and

$$\frac{d^2WTA}{d\Delta r^2} = -\frac{dWTA}{d\Delta r} + \frac{u(c+WTA)}{(1-r-\Delta r)^2\mu(c+WTA)} - \frac{u(c+WTA)}{(1-r-\Delta r)(\mu(c+WTA))^2} \frac{d\mu(c+WTA)}{dc} \frac{dWTA}{d\Delta r}$$

$$= 2\frac{u(c+WTA)}{(1-r-\Delta r)^2\mu(c+WTA)} - \frac{(u(c+WTA))^2}{(1-r-\Delta r)^2(\mu(c+WTA))^3} \frac{d\mu(c+WTA)}{dc} \left( \frac{dWTA}{d\Delta r} \right)$$

$$= \frac{u(c+WTA)}{(1-r-\Delta r)^2\mu(c+WTA)} \left[ 2 - \frac{u(c+WTA)}{(\mu(c+WTA))^2} \frac{d\mu(c+WTA)}{dc} \right]$$

A sufficient (but not necessary) condition for this to be positive is that utility is concave so that marginal utility of consumption decreases in the consumption level. Hence, WTA is increasing at an increasing rate in $\Delta r$. Similarly, for a risk decrease we have from (10)

$$0 = d\Delta ru(c-WTP) - (1-r+\Delta r)\frac{\partial u(c-WTP)}{\partial c} dWTP$$

implying

$$\frac{dWTP}{d\Delta r} = \frac{u(c-WTP)}{(1-r+\Delta r)\mu(c-WTP)} > 0$$

and
\[
\frac{d^2\text{WTP}}{d\Delta r^2} = \frac{d\text{WTP}}{(1-r+\Delta r)\Delta r} - \frac{u(c-\text{WTP})}{(1-r+\Delta r)^2 \mu(c-\text{WTP})} + \frac{u(c-\text{WTP}) \frac{d\mu(c-\text{WTP})}{dc}}{(1-r+\Delta r)(\mu(c-\text{WTP}))^2} \]

\[
= -2 \frac{u(c-\text{WTP})}{(1-r+\Delta r)^2 \mu(c-\text{WTP})} + \frac{\left(\frac{\mu(c-\text{WTP})}{\mu(c-\text{WTP})}\right)^2 \frac{d\mu(c-\text{WTP})}{dc}}{(1-r+\Delta r)^2(\mu(c-\text{WTP}))^3} \]

\[
= \frac{u(c-\text{WTP})}{(1-r+\Delta r)^2 \mu(c-\text{WTP})} \left(-2 + \frac{u(c-\text{WTP}) \frac{d\mu(c-\text{WTP})}{dc}}{(\mu(c-\text{WTP}))^2}\right) \tag{24}
\]

which is negative if utility is concave. Hence, \(\text{WTP}\) is increasing at a decreasing rate in \(\Delta r\).

An issue which has been debated intensively with regard to the survey-based contingent valuation method is if this method implies a systematic underestimation of the income elasticity. Consider first the risk-increase case. From (8) we get

\[
(1-r) \frac{\partial u(c)}{\partial c} dc = (1-r-\Delta r) \frac{\partial u(c+\text{WTA})}{\partial c} (dc + d\text{WTA}) \tag{25}
\]

implying

\[
\frac{d\text{WTA}}{dc} = \frac{(1-r)\mu(c)}{(1-r-\Delta r)\mu(c+\text{WTA})} - 1 \tag{26}
\]

and by using (8) we get

\[
\varepsilon_{\text{WTA}} = \frac{d\text{WTA}}{dc} \frac{c + \text{WTA}}{\mu(c + \text{WTA})} \frac{\mu(c)}{\text{WTA}} - \frac{c}{\text{WTA}} > \frac{c}{\mu(c + \text{WTA})} - \frac{c}{\text{WTA}} \tag{27}
\]

where the first inequality holds for a strictly concave utility function together with \(u(0) = 0\), and the second inequality hold for a strictly concave utility function. Hence, the income elasticity for the WTA should be larger than 1 (irrespective of the risk change), which is rarely found empirically. A similar result can be shown for a risk decrease.
3. Generalizing the Basic Model

3.1 Biased risk perceptions

So far we have assumed the absence of any market failures. A possible one, of which there is much empirical psychological evidence is that individuals on average tend to be bad at estimating low probabilities, or generally problems of uncertainty.

Consider the same objective function as before: \((1 - r(S))u(c)\), where \(S\) is the total of safety equipment that an individual has access to. \(S = v + w\) where \(v\) is the amount of safety that the individual invests in him/herself, and \(w\) is the amount provided by the social planner. An individual who maximizes utility under perfect information subject to the constraint \(c = y - u - t\), where \(t\) is a tax paid which is exogenous for the individual. The following f.o.c. would then result:

\[
\frac{\partial r}{\partial S} U = (1 - r) \frac{\partial u}{\partial c}
\]

(28)

This is a Pareto efficient allocation and there are no reasons for the government to interfere by provide the individual with additional safety \(v > 0\). Consider now instead the situation where the risk perception is biased so that the individual perceives the risk \(\rho\), when the true risk is \(r\). The individual f.o.c. can then be written:

\[
\frac{\partial \rho}{\partial S} U = (1 - \rho) \frac{\partial u}{\partial c}
\]

(29)

Since the objective of the government is to maximize utility, which in this context is the same as obtaining a Pareto efficient allocation, the government would like to choose \(v\) to obtain (28). Combining (28) and (29) gives:

\[
\frac{\partial r}{\partial S} (v + w) = \frac{1 - r}{1 - \rho}
\]

(30)

If we have that the subjective risk is smaller than the objective (or true) risk then \(r > \rho\) and consequently

\[
\frac{\partial r}{\partial S} (v + w) < \frac{\partial \rho}{\partial S} (v)
\]

(31)

It is not directly clear that this expression implies that \(w > 0\), however. A sufficient condition is that \(\rho = kr\) where \(k < 1\) is a constant. In this case we have that

\[
\frac{\partial r}{\partial S} (v + w) < k \frac{\partial r}{\partial S} (v)
\]

(32)

and hence

\[
\frac{\partial r}{\partial S} (v + w) > \frac{\partial r}{\partial S} (v)
\]

(33)

Since \(\frac{\partial^2 r}{\partial S^2} > 0\) we have that \(w > 0\).
This result holds generally as long as
\[
\frac{\partial r}{\partial S}(v + w) \leq \frac{\partial p}{\partial S}(v + w)
\] (34)

Still, if \( \frac{\partial r}{\partial S} \) becomes sufficiently much larger than \( \frac{\partial p}{\partial S} \) (for the same level of \( S \)) than \( w \) should theoretically become negative. Hence, it is not a sufficient condition for additional governmental safety investments that the perceived subjective risk is lower than the objective risk. The responses of the objective and the subjective risk with respect to risk reduction investments also matter.

### 3.2 Cognitive Dissonance

Cognitive dissonance is a term introduced by Festinger (1957) reflecting a situation where an individual faces some kind of internal cost by observing the true information. An example discussed by Festinger is that many people who have just bought a new car tries actively to avoid information about other cars (which might have been a better choice). It is also well known that most people prefer to have (and also actually have) a self-image as “nice and smart” (Akerlof and Dickens, 1982). Hence, they (or we) have an incentive to choose and process information to maintain and even improve this image. In the traffic context Rothengatter (1993) quotes evidence that a large majority of drivers consider themselves to be better drivers than the average. Note that if we define rational behavior as actions which is consistent with utility maximization (or expected utility maximization in the case of uncertainty) there is no irrationality behind cognitive dissonance. If the expected benefit of knowing the truth is lower than the (psychological) cost, then it is better to stay in the illusory reality.

Consider now a simple model where the individual could make certain investments in road safety (for itself). Now, it follows in a straightforward way that those who are relatively bad (or unsafe) drivers have higher incentives to invest in safety equipment. (In the extreme case, if you are a perfect driver your accident risk may be close to zero.) Hence, it is easier to maintain an image of yourself as an extremely safe driver if you do not invest in a lot of safety equipment. Alternatively, it is possible simply to assume that buying safety equipments implies compulsory thinking about safety, and hence unsafety and accidents, which is presumably unpleasant thoughts.

The individual expected utility function is given by
\[
u(s(T), I(T), c) = u(s(T_1 + T_2), I(T_1), c)\]
(35)

where \( s \) is safety, \( T_1 \) and \( T_2 \) are the individual and public investment in safety, respectively. The government safety investment is more expensive per unit so that the individual budget is given by \( c = y - T_2 - (1 + \gamma)T_2 \).

where gamma can be seen as a measure of marginal excess burden (see e.g. Atkinson and Stern 1974, or Ballard and Fullerton 1992). The first order condition for public investments in safety is then given by
\[
\frac{\partial u}{\partial s} \frac{\partial s}{\partial T} / (1 + \gamma) = \frac{\partial u}{\partial s} \frac{\partial s}{\partial T} + \frac{\partial u}{\partial T_1} \frac{\partial T_1}{\partial c} \]

Hence, given an interior solution it would be optimal for the government to provide a certain amount of safety for individuals, even though the same amount of safety could have been provided by the individuals themselves to a lower cost. Such investments, however, would have been accompanied by the psychological cost in terms of cognitive dissonance, which we hence can reduce by the public investments.

### 3.3 Altruism

Although economic models often assume that individuals only care about their own consumption and safety, we know that in reality people care also about other people’s well-being and safety. Consider a society consisting of two individuals A and B with utility functions given by \( u^A = u^A(c^A, r^A, u^B) \) and \( u^B = u^B(c^B, r^B, u^A) \), where as before \( c \) is the private consumption and \( r \) is the probability of an accident. Thus, each individual derives utility from the other individual’s utility.

Now, would this change the condition for the optimal amount of safety investment by the government? The answer is no, as shown e.g. by Bergstrom (1982); cf. Lazo et al. (1997) and Johansson-Stenman (1998). To see this, consider the problem of finding a Pareto efficient allocation, i.e., we would like to maximize A’s utility subject to the constraint of constant utility for B and subject to production constraints for the economy. But this problem is clearly the same as maximizing \( u^A = u^A(c^A, r^A) \) subject to the same constraints, since we are holding \( u^B \) constant. But this problem is the problem without altruistic concern, implying that the problems are equivalent. Note that this does not hold for all kinds of altruism, but solely for this “pure” kind of altruism, where the altruistic concerns reflect only the utility of others, but not specific components to varying degrees.

Further, in CVM surveys where each individual is informed that others would pay their marginal WTP for an increase in (general) safety provision, A would not receive any additional “altruistic utility” from increased safety. Hence, his response to the WTP (or WTA) question would also be the same as without any altruistic concern. This is so since, at the margin, B’s utility increase from increased safety would be off-set by decreased \( c \) through increased taxes; see e.g. Lazo et al. (1997).

An alternative motivation is that individuals do not bother about others’ utilities per se, but about certain elements in their utility function (Archibald and Donaldson, 1976), such as their safety. The utility function in the two-individual case can then be written \( u^A = u^A(c^A, r^A, r^B) \) and \( u^B = u^B(c^B, r^B, r^A) \), respectively, where \( u \) is monotonically increasing in consumption and decreases in risks. Here investments in safety should go beyond the level without altruism, since it is here clearly optimal with a higher safety level than without altruism (Jones-Lee 1992). It is not equally clear that a higher VOSL than the one associated with a CVM survey should be applied, however. Indeed, if the respondents are informed that everybody will be affected by the change in safety, the response in terms of WTA or WTP will increase to a corresponding degree, and no

### 3.4 Positional Externalities

There is a growing awareness in mainstream economics that individual utility may also partly depend on relative income, i.e. the individual’s income compared to the incomes of other members of society, and not solely on absolute income; for classic contributions in economics; see Veblen (1899), Duesenberry (1949), Hirsh (1976), and Frank (1985a, b). Still, even though early economists such as Adam Smith and John Stuart Mill noted the importance of relative income, it has for a long time been unconventional to include such aspects in economic modelling.

Consider the following simple model where a representative individual maximizes the following expected utility function:

$$E(U) = u(S_A, S_R, c_A, c_R) \equiv u\left(S \frac{S}{S}, c, c_c \frac{c}{c}\right)$$

where $S$ is a safety good, subscript $A$ means absolute, $R$ is relative, a bar denotes mean value, and where utility is increasing in all arguments. The individual faces the following budget constraint $c = y - t - (1 - \sigma)S$ where $y$ is exogenous income, $t$ is a lump-sum tax, and $\sigma$ is a subsidy on the safety good $S$. The individual first order condition, where we assume that mean consumption levels are taken as given by the individual (the standard competitive assumption), can be written:

$$\frac{\partial u}{\partial S_A} + \frac{\partial u}{\partial S_R} \frac{1}{S} - \frac{\partial u}{\partial c_A} (1 - \sigma) - \frac{\partial u}{\partial c_R} \frac{1 - \sigma}{c} = 0$$

(38)

The social problem is to maximize utility subject to the resource constraint $y = c + S$. The social optimum condition is given by

$$\frac{\partial S}{\partial S_A} - \frac{\partial u}{\partial c_A} = 0$$

(39)

Combining the private and the social conditions implies, after some standard manipulations:

$$\sigma = \frac{\alpha_c - \alpha_S}{1 - \alpha_S}$$

(40)

where

$$\alpha_c = \frac{\partial u}{\partial c_R} \frac{1}{c} ; \quad \alpha_S = \frac{\partial u}{\partial S_R} \frac{1}{S}$$

(41)

reflect the marginal positionality, i.e., the fraction to which a dollar spent on each good gives utility from the increase in relative consumption. Hence, we see that safety should be subsidized if and only if safety is less positional on the margin compared to other consumption. Since safety is often less observable compared to other consumption it appears likely that this is actually the case in reality (Frank 1985b).
4. A Broader Perspective of the VZ

So far we have interpreted VZ rather strictly, but we can easily compare with other sectors and phenomena in the society. Consider for example violence against women (often undertaken within the home). This is in most countries a very serious problem, although it is perhaps not “on the agenda” in some countries right now. The government in (democratic) countries invests, in various ways, more or less resources to decrease this problem. Even though some measures are taken there is still violence against women. Further, it is likely that if significantly more resources would be devoted to the problem of violence against women (say increased by a factor 10) violence would decrease.

So the official view is that any violence against women is too much, and that we should do anything we can to avoid such violence. Even though we may argue against this statement, and point to the fact that it appears clear that nowhere are the government doing everything it can to avoid violence against women, it is still an impossible public statement to argue that we have to trade costs and benefits for undertaking measures to reduce violence against women further. The paradoxical thing here is that this is, implicitly, exactly what the authorities do, and probably also have to do. It is in any case hard to come up with a better motivation for why it does not invest more than it does on this purpose.

Hence, even though the government can not publically say that the costs are larger than the benefits from undertaking measures to reduce violence against women, it acts (for whatever reason) as if they are. Now, if the vision zero is seen in the same way, that is as a public statement to indicate that the government is very concerned about road accidents, but not as anything one will seriously consider literally, it may be part of a wise strategy. So, almost ironically, VZ may be a wise vision also from an economic point of view, as long as it is not taken too seriously!

[to be expanded]

5. Conclusion

The Vision Zero taken literally that no people should have to be killed or seriously injured in the Swedish transport sector can hardly be motivated on economic grounds. This is so also when we consider more general models which take various market failures or psychological effects into account. Still, it is possible that the productivity of the civil servants who work with safety regulations increases by (some version of) the VZ, or that people’s attitudes and preferences change in a way which is positive for the society as a whole. If so, a non-strict version of the VZ may actually from an economic point of view be part of an optimal second-best strategy.

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