Double Moral Hazard and the Energy Efficiency Gap

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Moral Hazard: *e.g.* Home Energy Retrofit

2013 Winner
"Best Construction Defect" Photo Contest
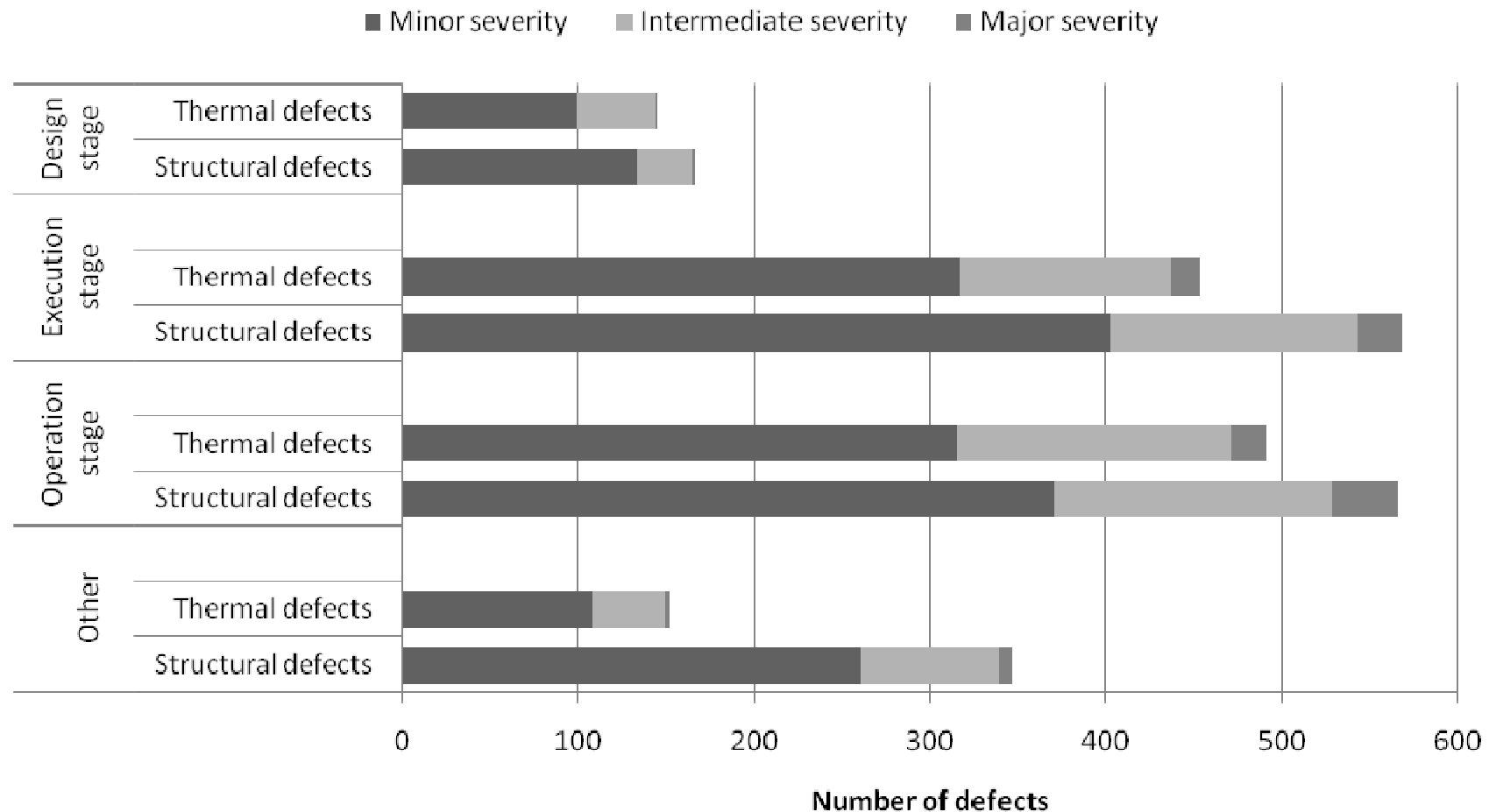*Awarded by AQC, the French Construction Quality Agency*

check out more! http://www.qualiteconstruction.com/manifestations/concours-photo/2013.html

The Energy Efficiency Gap

Jaffe, Newell, Stavins (2004)

Energy efficiency

Technologist's optimum

Market barriers to energy efficiency:
consumer heterogeneity, hidden costs, etc.

Theoretical social optimum

Market failures in energy markets:
environmental externalities, etc.

Ec... ...um

Moral hazard

Too few investments
Too low a quality

...s:
...illovers, etc.

Formalization?
Magnitude?
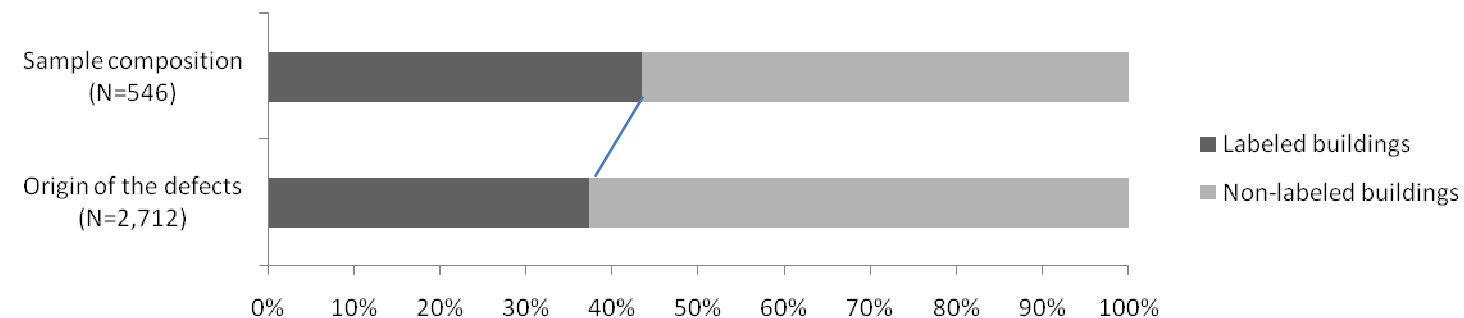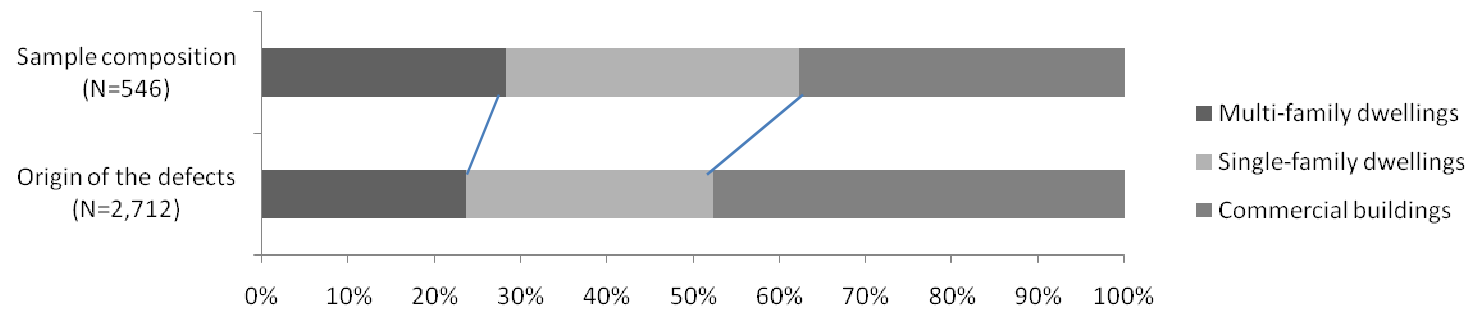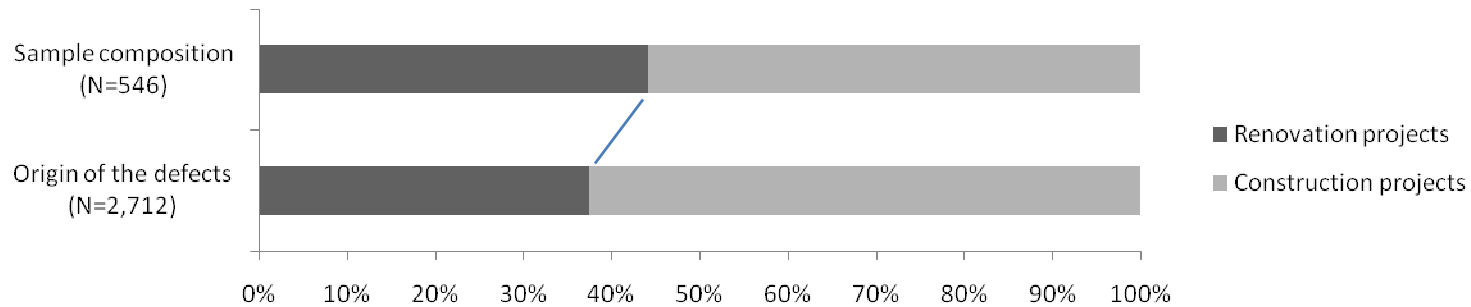*Policy solutions?*
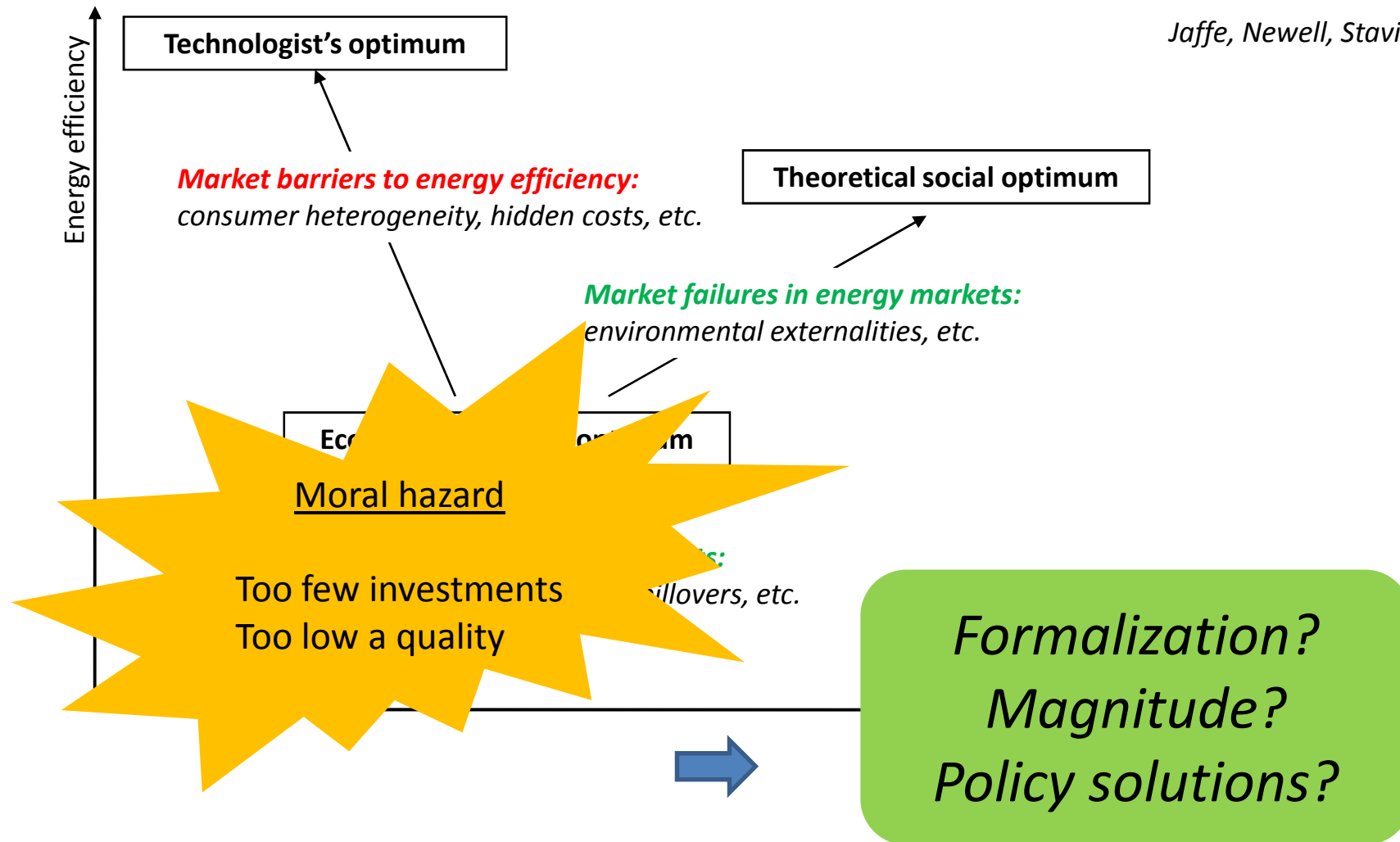
Suggestive evidence

Data: AQC (France)

AQC Audits of 'Bâtiments basse consommation'

Overall frequency of defects (per building): median 4, mean 5.1, standard error 4.9

Distribution of Defects by Building Characteristics

Model

Data: RECS (US)

Two Hidden Actions

Energy use for space heating

$$\tilde{E}(s,q)$$

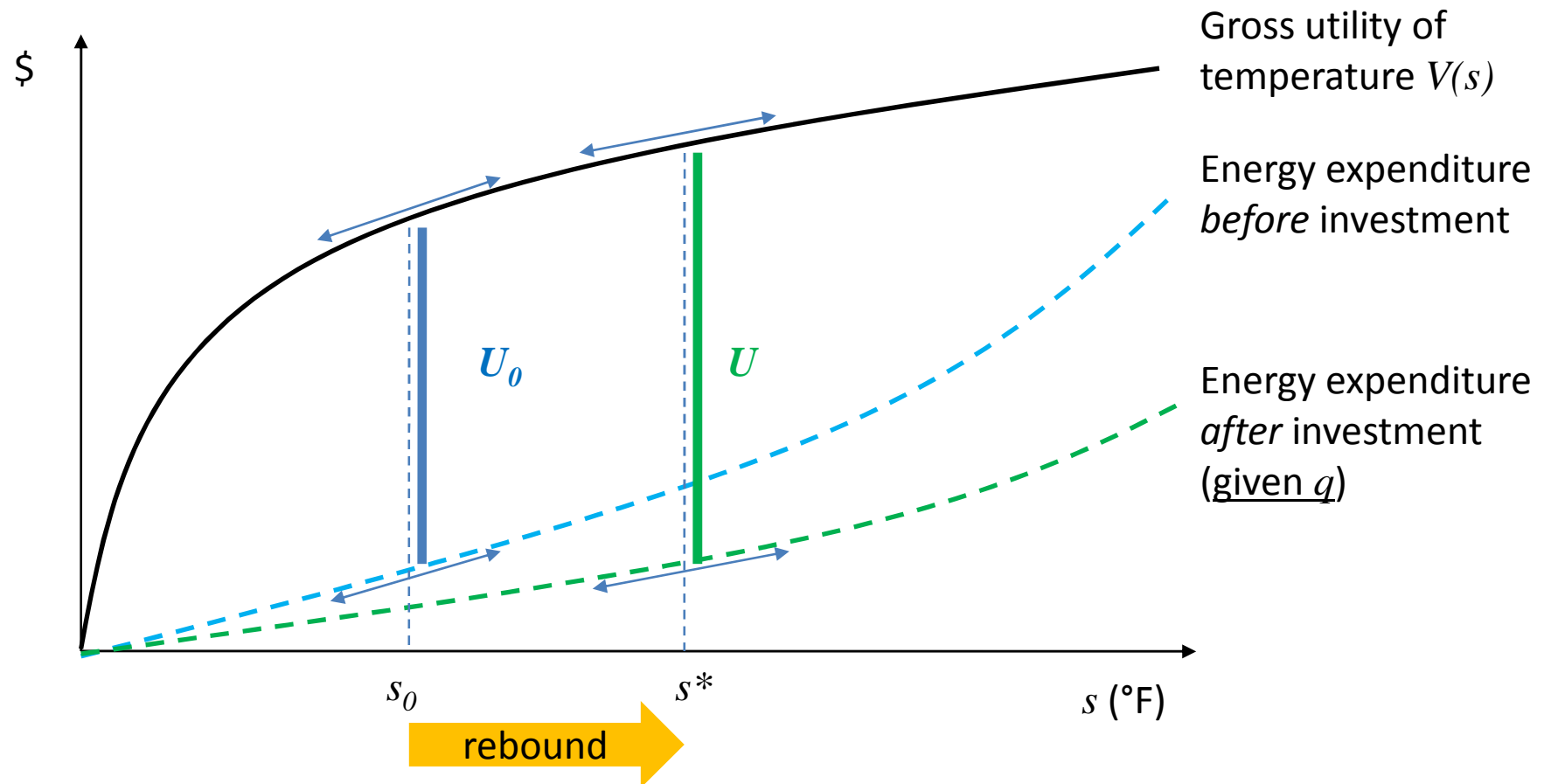Homeowner's **energy service**

→ *unobservable to the contractor*

Contractor's **quality** of installation

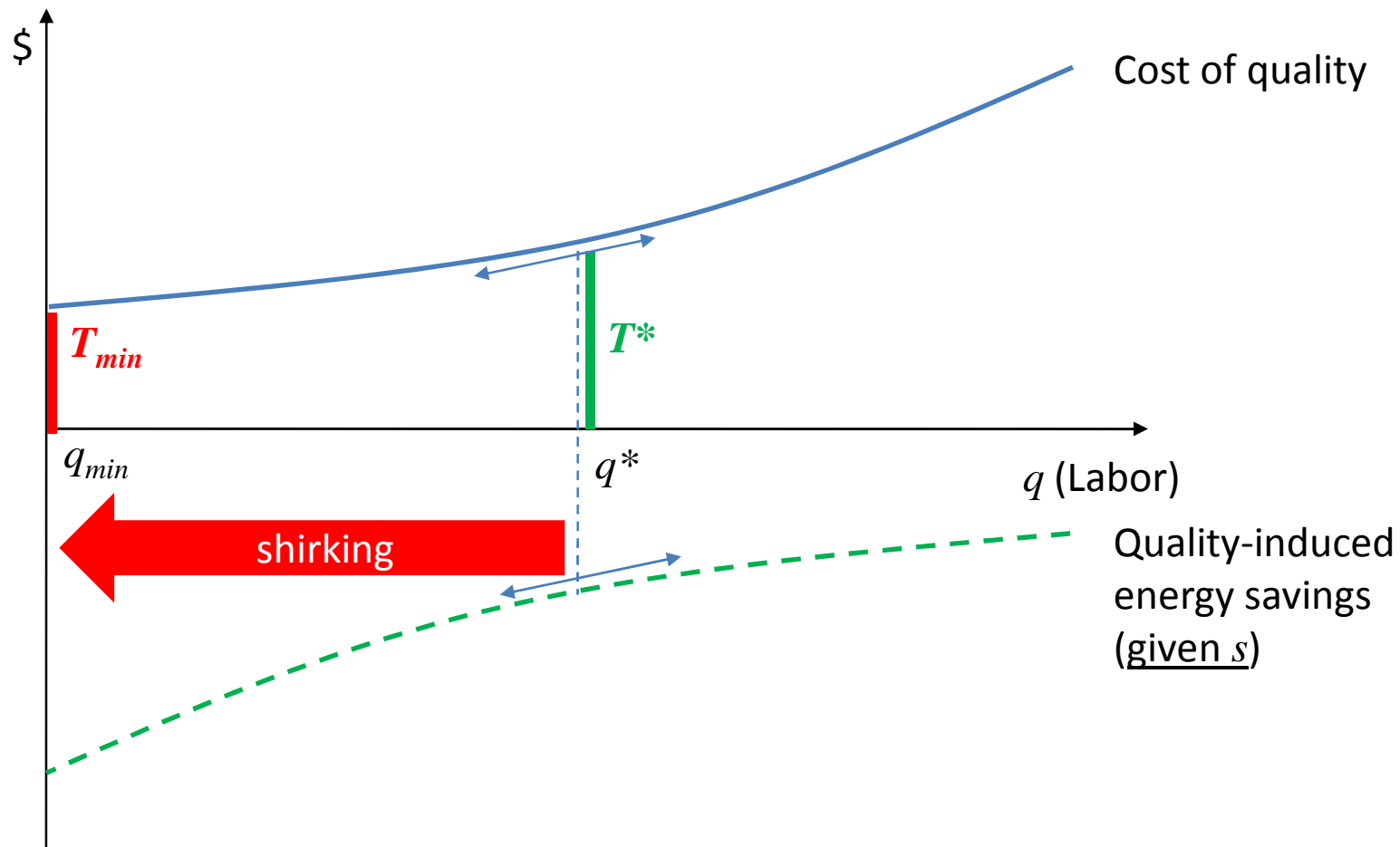→ *unobservable to the homeowner*

Consumer sets s, given q

Stage 2

$

Gross utility of
temperature $V(s)$

U_0 U

Energy expenditure
before investment

Energy expenditure
after investment
(<u>given</u> q)

s_0 $s*$ s (°F)

rebound

Stage 1   Participation   iif $U - U_0 \geq T$
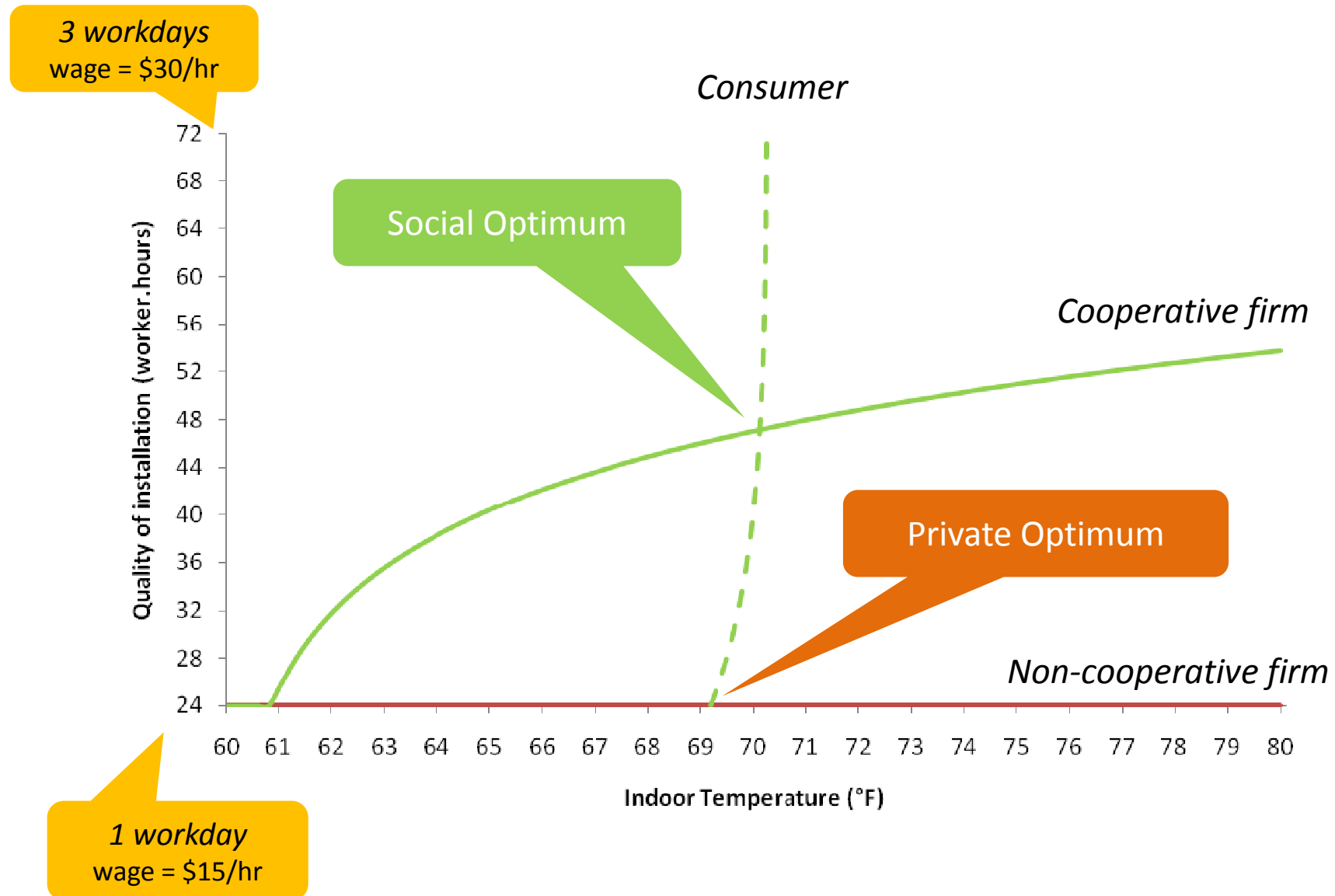
Firm sets q, given s

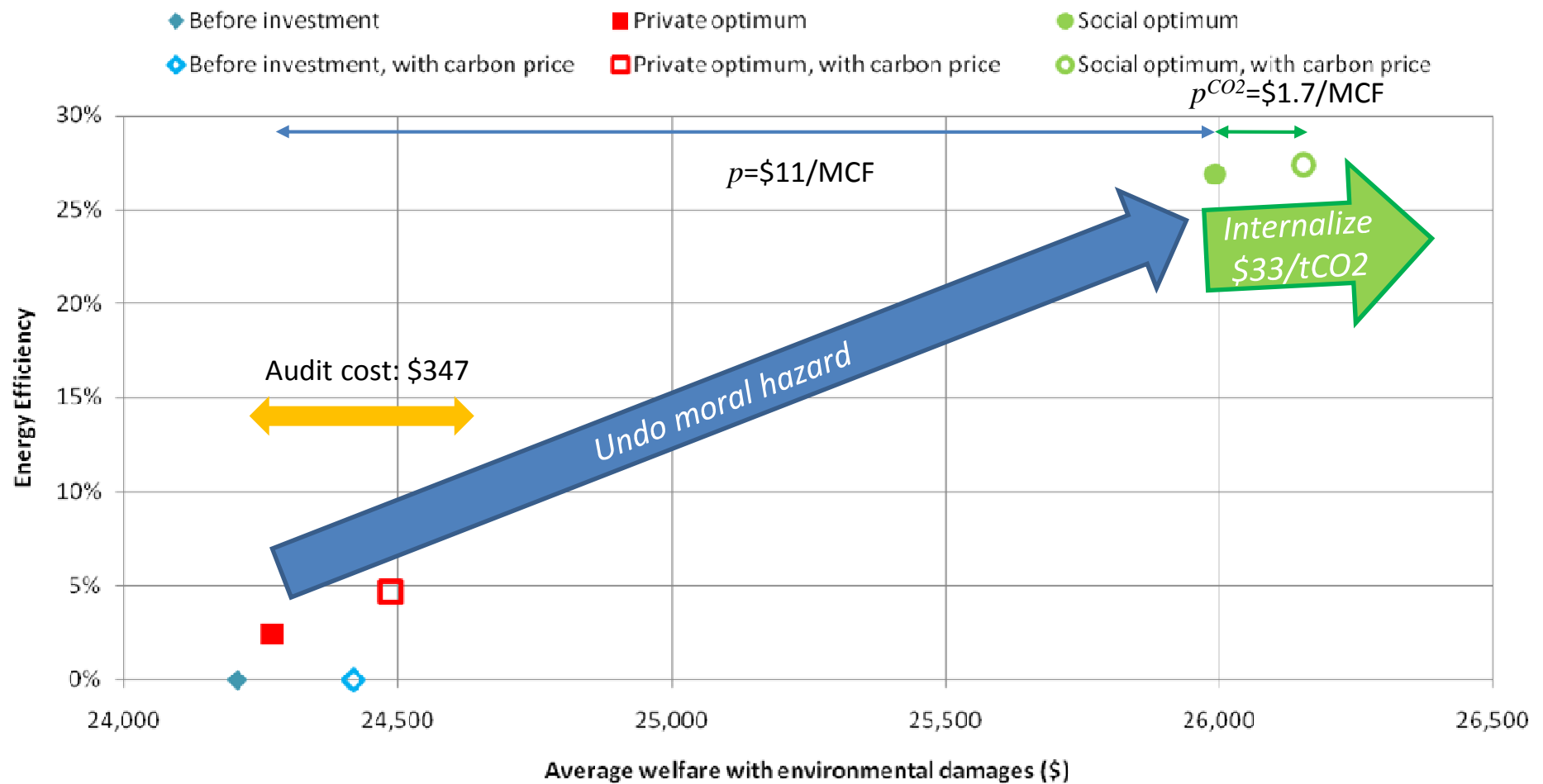**Stage 2**

$$T = C(q)$$

Assumption: Perfect competition

Stage 1

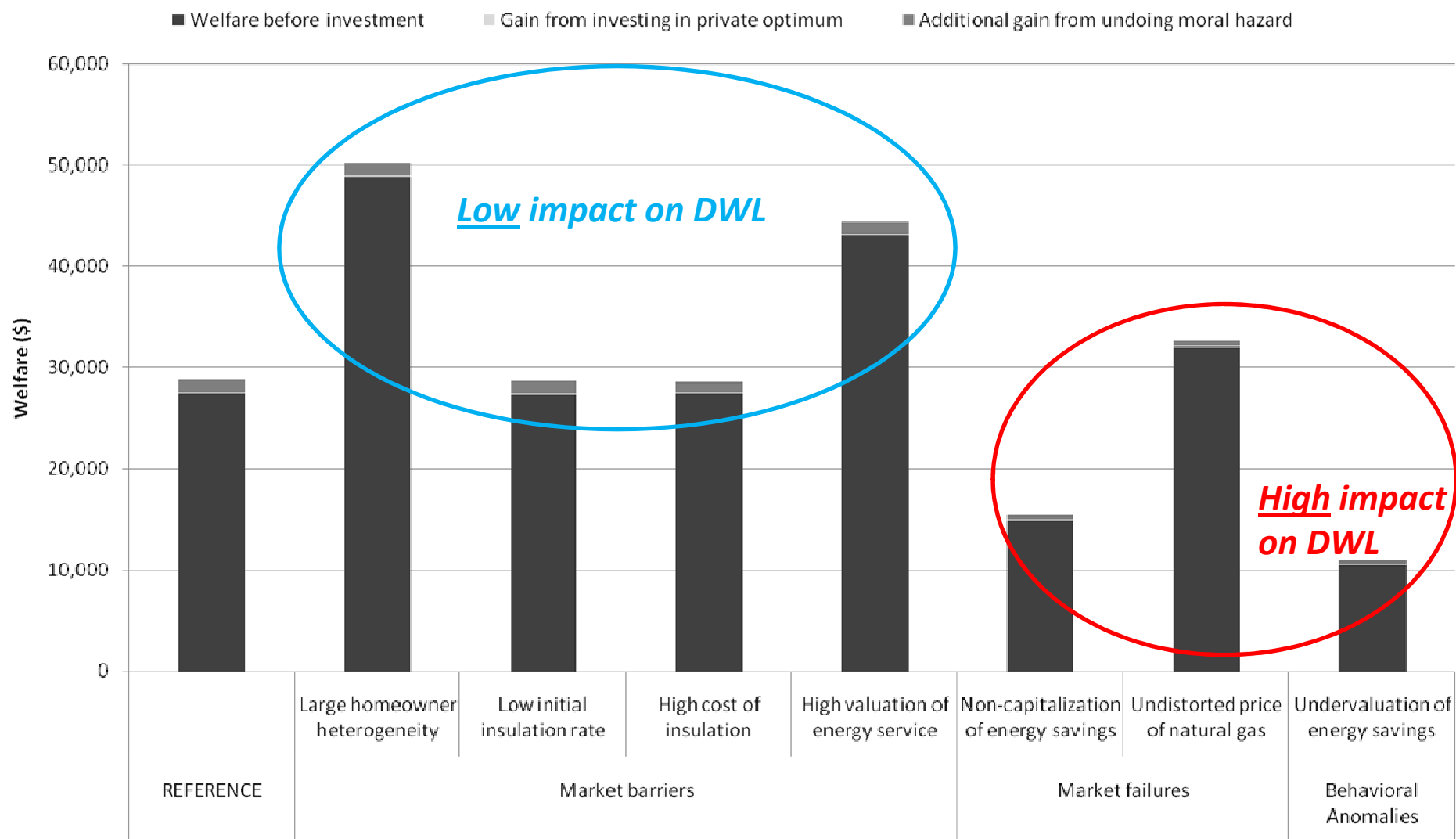# Best Response Equilibria (*e.g.* insulation)

Magnitude

Energy Efficiency Gap

Sensitivity Analysis of Deadweight Loss

Implied discount rates: 15-35% (against 7%)

Engineer's Heuristics as a Sufficient Statistic

Discounted monetary savings   *Upfront* cost

$$\Delta_q W \geq -p\Delta_q E(s,q)\Gamma(r,l) - \Delta_q C(q)$$

Economic information needed

NOT needed: Rebound effect ($V(s)$)

Scenario	REF	1	2	3	4	5	6	7	8
Exact DWL	1,258	1,239	1,206	1,085	1,260	517	486	289	1,258
Suff. Stat.	1,158	1,158	1,158	997	1,158	473	443	263	1,158
Approxi-mation	*-7.9%*	*-6.5%*	*-3.9%*	*-8.1%*	*-8.1%*	*-8.6%*	*-9.0%*	*-9.1%*	*-7.9%*

Policy solutions

Remedies Found in the Marketplace (U.S.)

Voluntary certifications

Incentives

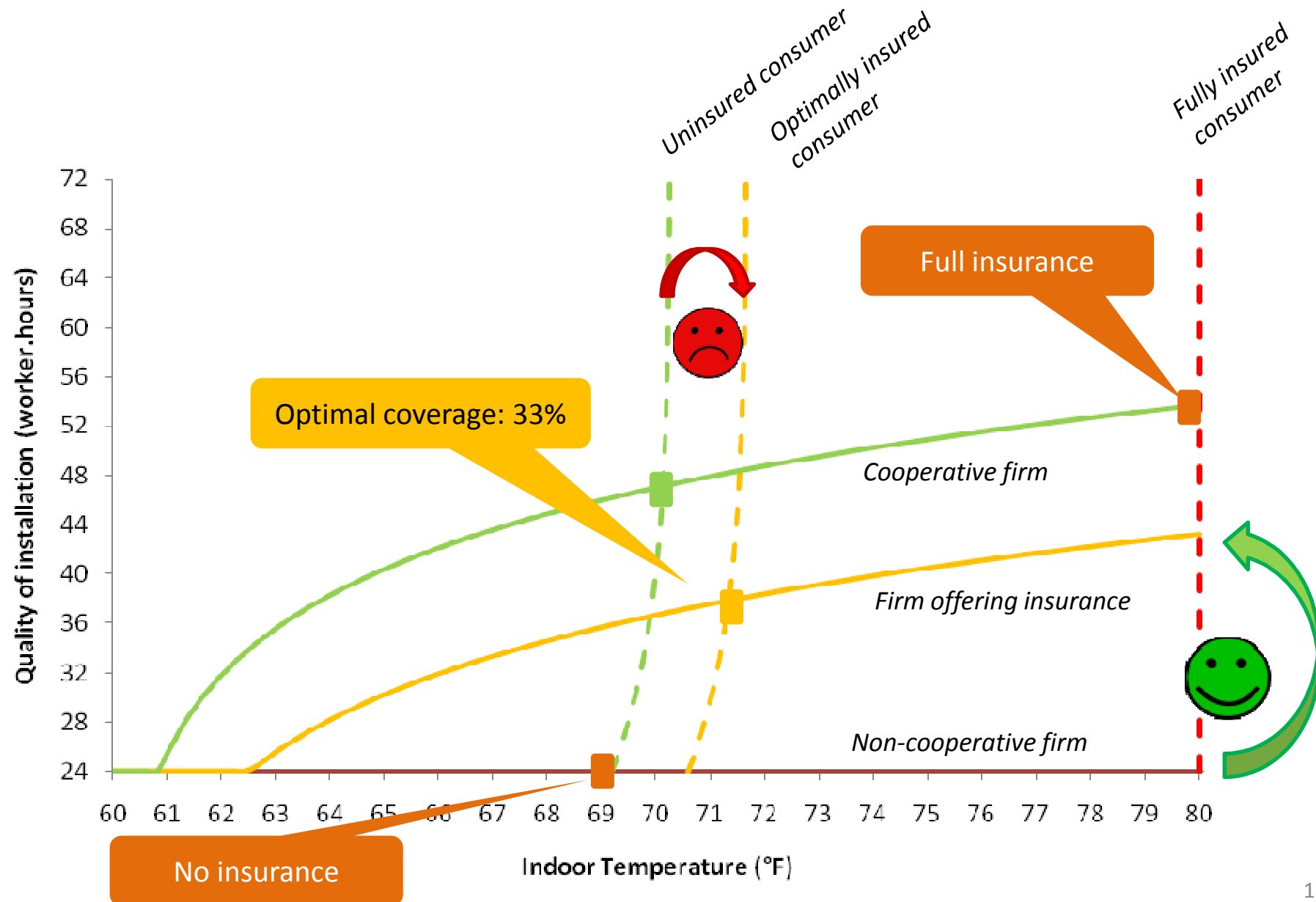**Eco-conditionnalité des aides**

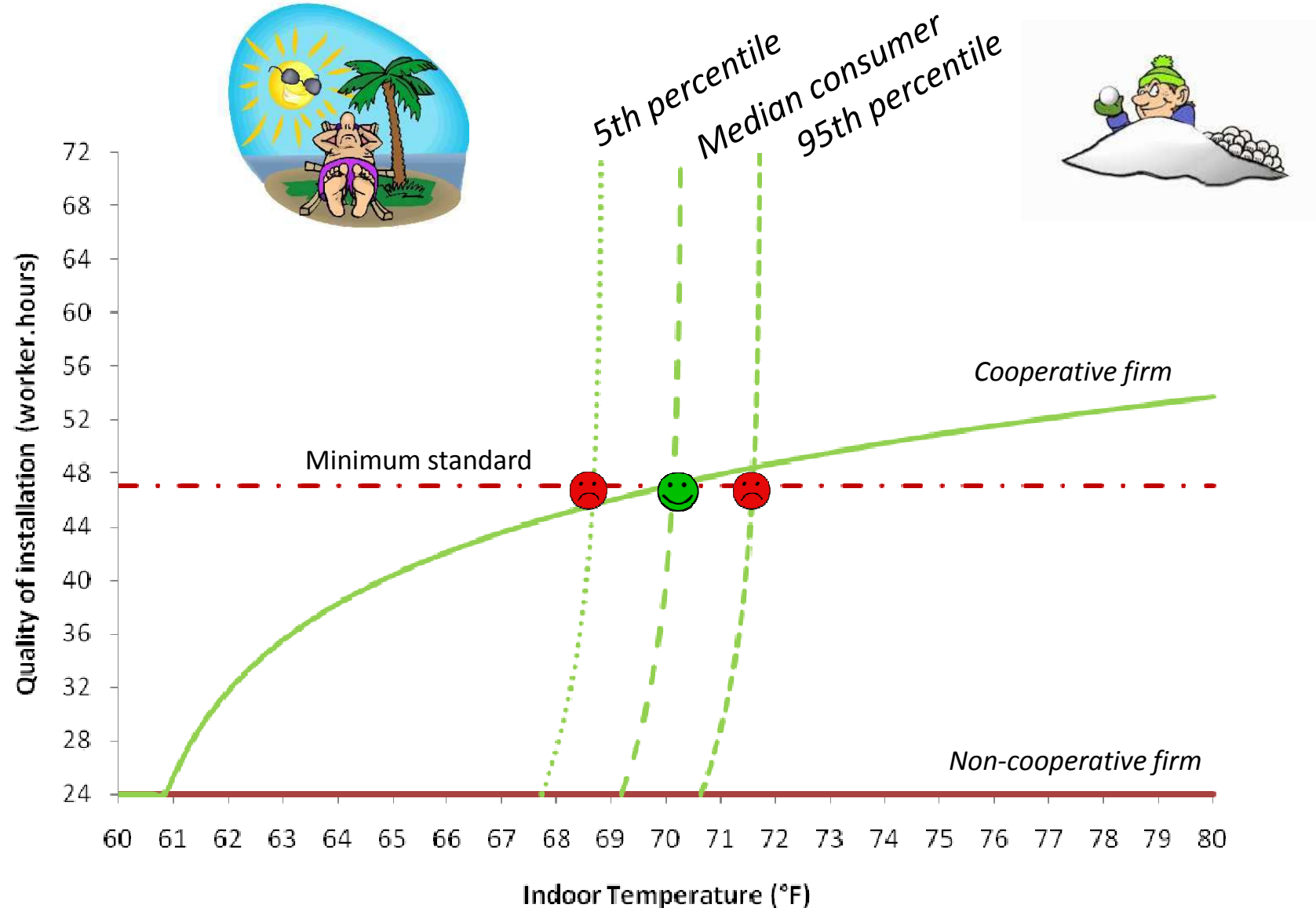**Garanties énergétiques contractuelles**
→ "sur la performance intrinsèque" (GPEI)
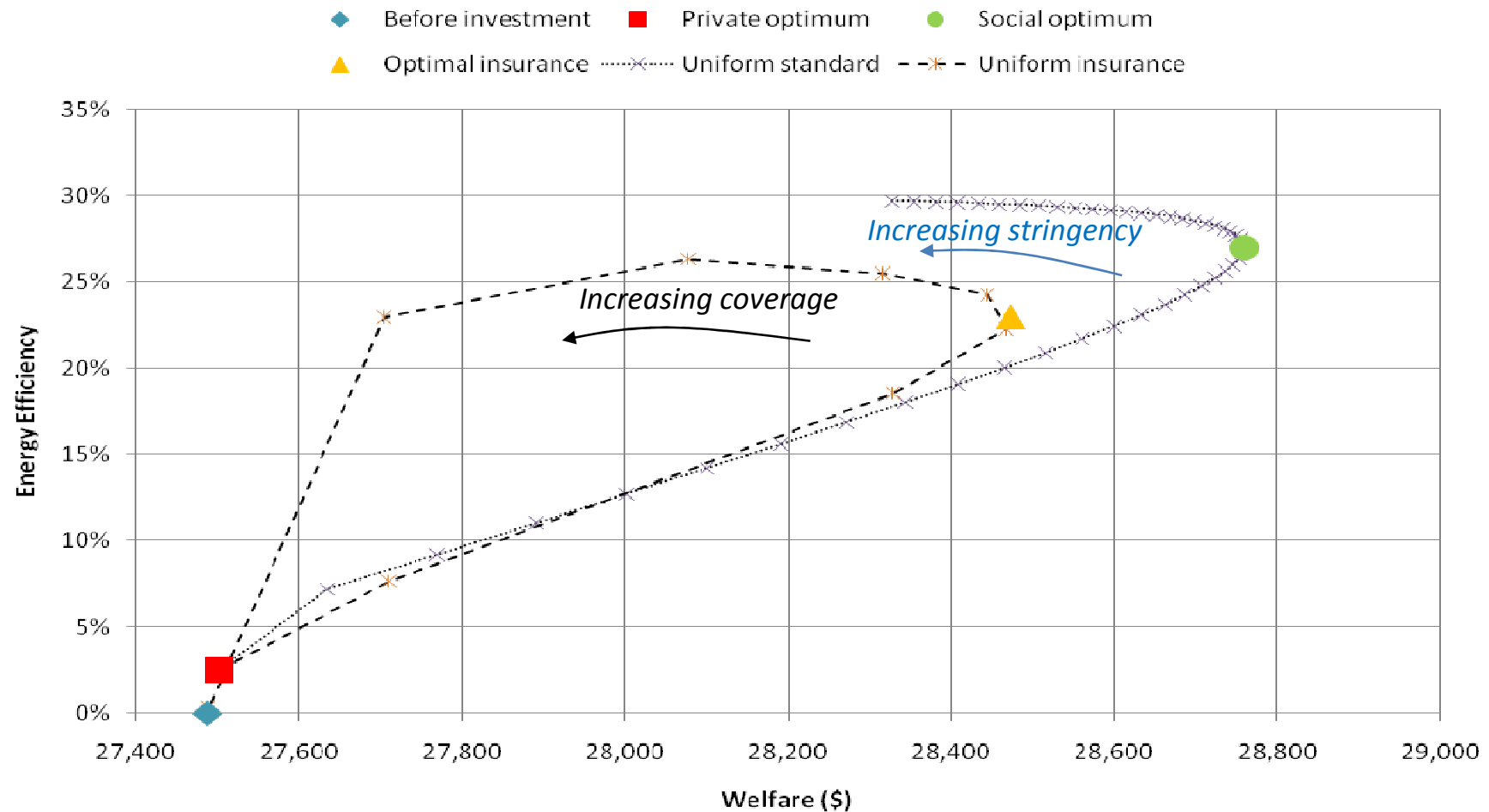→ "de résultat sur l'usage" (GRE)

Energy-Savings Insurance
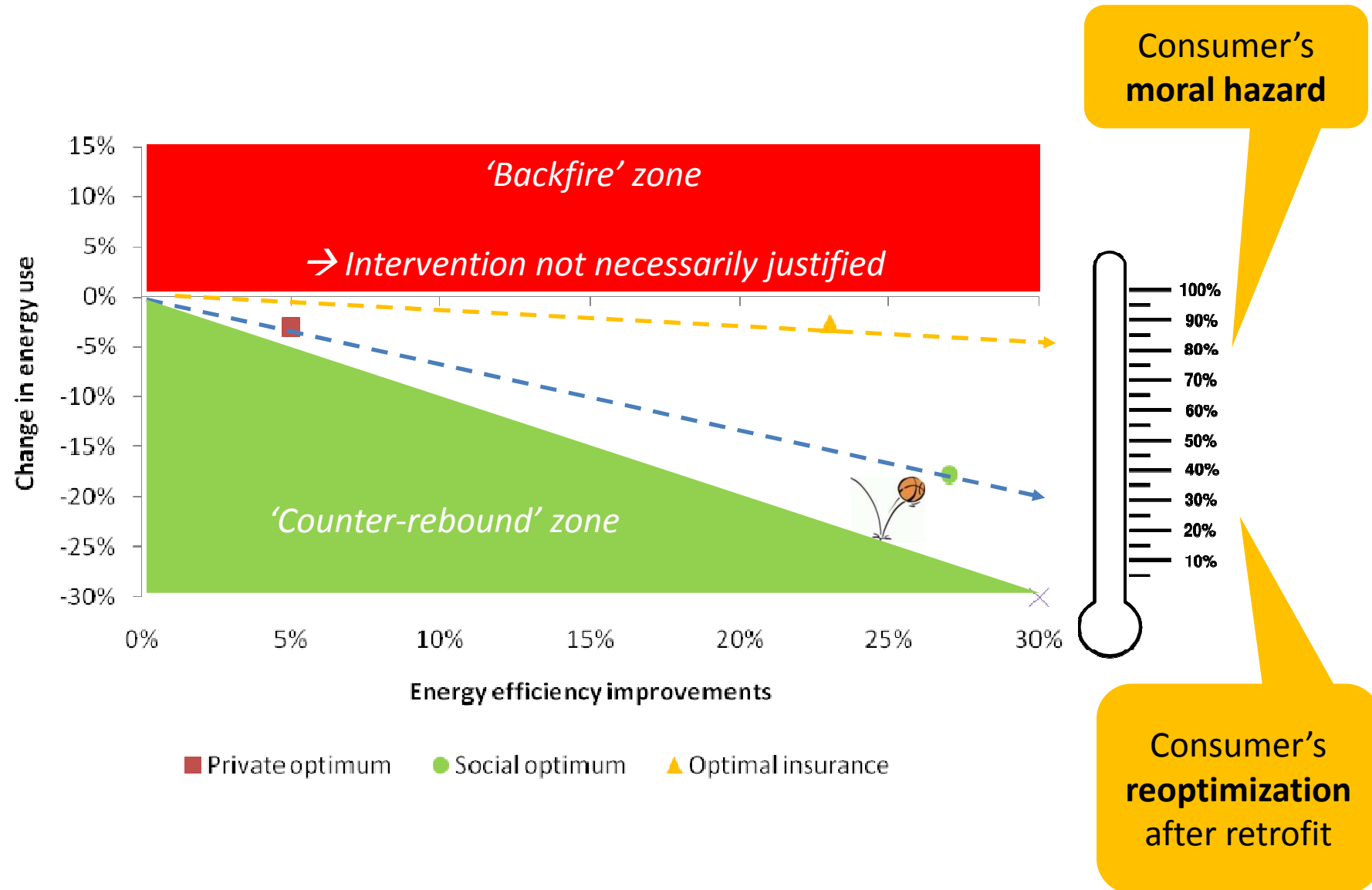
Minimum Quality Standard

Uniform Standards and Insurance

Deadweight loss from second moral hazard with insurance…
but, unlike standard, no control cost.

Rebound Effects

Conclusions

⇒ *Formally*, moral hazard can plausibly cause an energy efficiency gap (too low a quality, too few investments)

⇒ *Quantitatively*, it motivates public intervention beyond what is needed to internalize energy-use externalities

⇒ *Policy solutions* are only second-best. The merit order depends on control costs versus second moral hazard