

Crowding Effects:

How Money Influences Open Source Projects and its Contributors

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Content

1. Different Perspectives on Community Building
2. About Economics, Motivation and Crowding-Out
3. Incentive Systems in Open Source Communities
4. Debian/dunc-tank and Google Summer of Code
5. Conclusions

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Macro and Micro Perspective on Communities

- Macro
 - Best practices of successful OSS projects
 - Some hints based on anecdotal evidence
- Micro
 - Interaction between actors: social behavior
 - Human behavior: **Crowding-out of intrinsic motivation**

Best Practices of Successful OSS Projects

- Modular structure of the code
- Documentation for different stakeholders
- Controlled release management
- Efficient collaboration platform
- Regular physical meetings
- Real-world organization such as a foundation

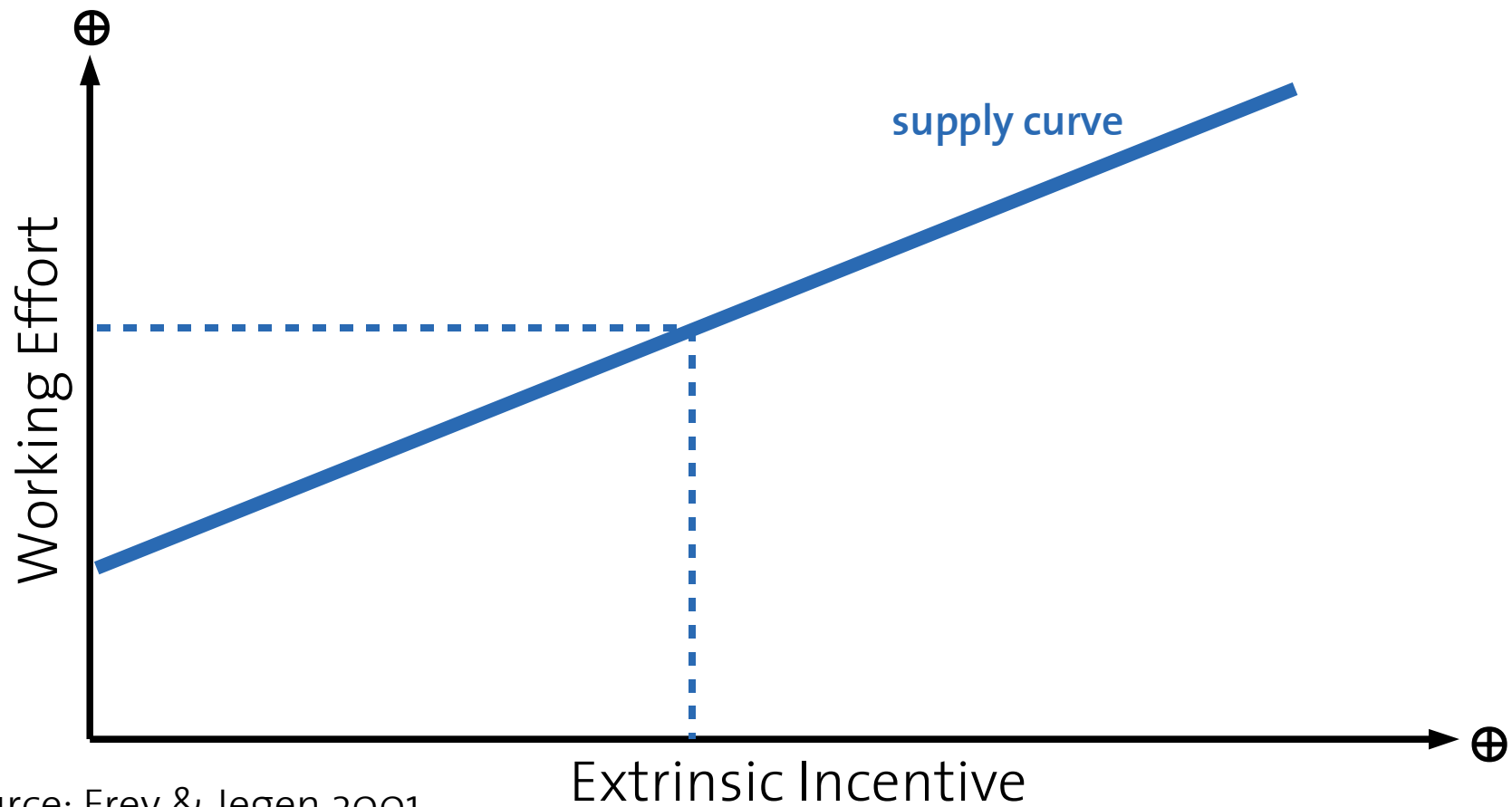
Some hints based on anecdotal evidence

- Structure follows problems → re-act, not pro-act
 - Openness for newcomers, new ideas, new leaders
 - Do provide incentives for writing documentation
- More about OSS leadership and preconditions for new OSS projects: [Stuermer, 2005](#)

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Standard Economic Model



Source: Frey & Jegen 2001

Intrinsic vs. Extrinsic Motivation

- **Intrinsic Motivation** (from within the person)
 - Enjoyment-based
 - Obligation-based
- **Extrinsic Motivation** (underlying preferences)
 - Non-monetary: reputation, career options...
 - Monetary: employment, rewards, sponsoring...

Importance of Intrinsic Motivation

- Basis for uncompensated voluntary work
→ foundation of OSS contributions
- When results cannot be observed and attributed (complex tasks)
- Necessary in all knowledge-intensive tasks
- Relevant for team work

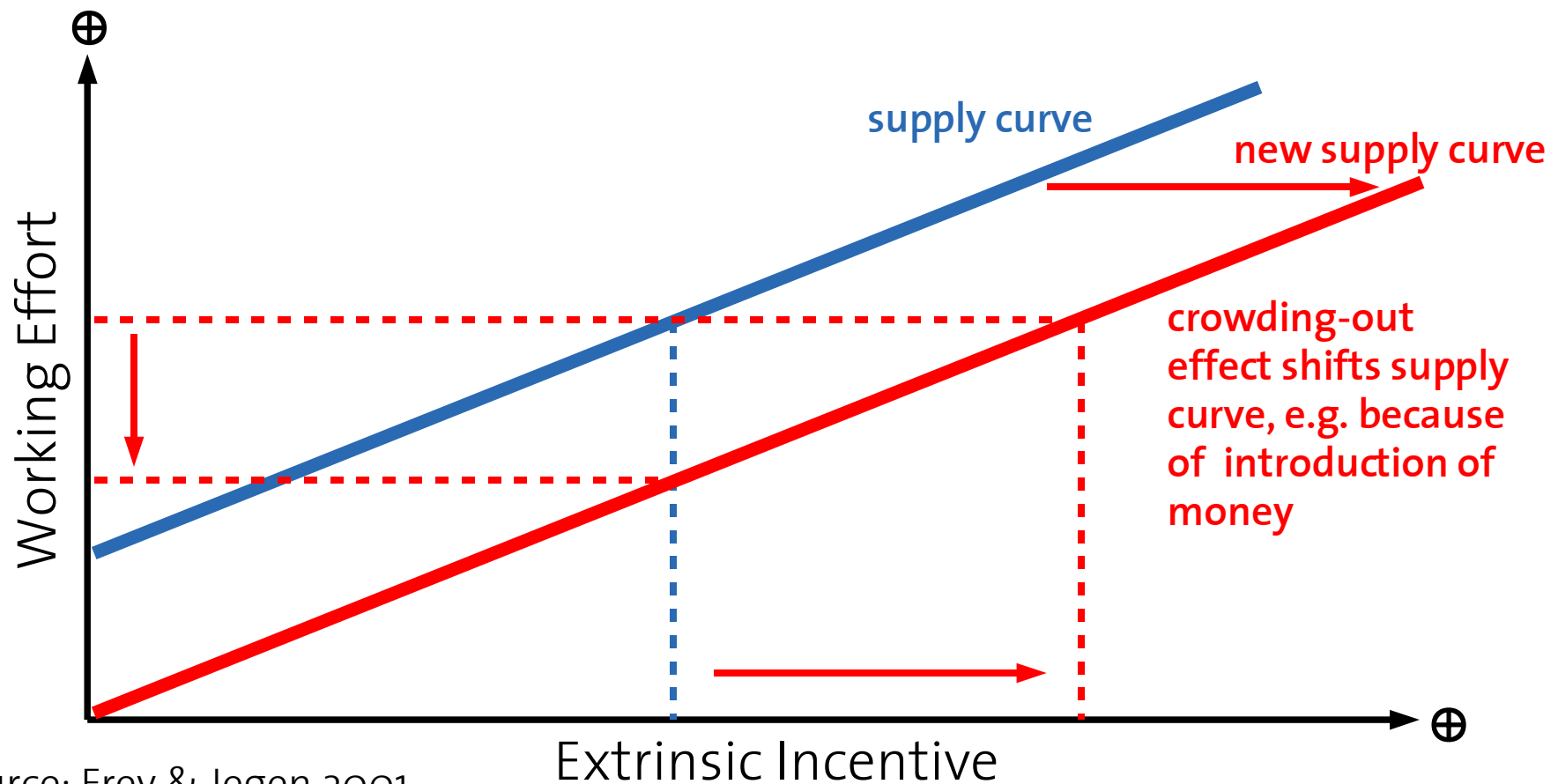
Source: Weibel et al. 2007

Crowding-out effect:

Experiment 1 of Gneezy & Rusticini (2000)

- **Voluntary collection:** 180 pupils divided in 3 groups
 - 1: Motivation speech and no reward
 - 2: Motivation speech and 1% of collected sum
 - 3: Motivation speech and 10% of collected sum
- Who collected the **most money?**
 - Group 1: Highest intrinsic motivation
- Who collected the **least money?**
 - Groups 2: **Crowding-out of intrinsic motivation**
- Conclusion: **“Pay Enough or Don't Pay at all”**

Crowding-Out with a Negative Net Effect



Source: Frey & Jegen 2001

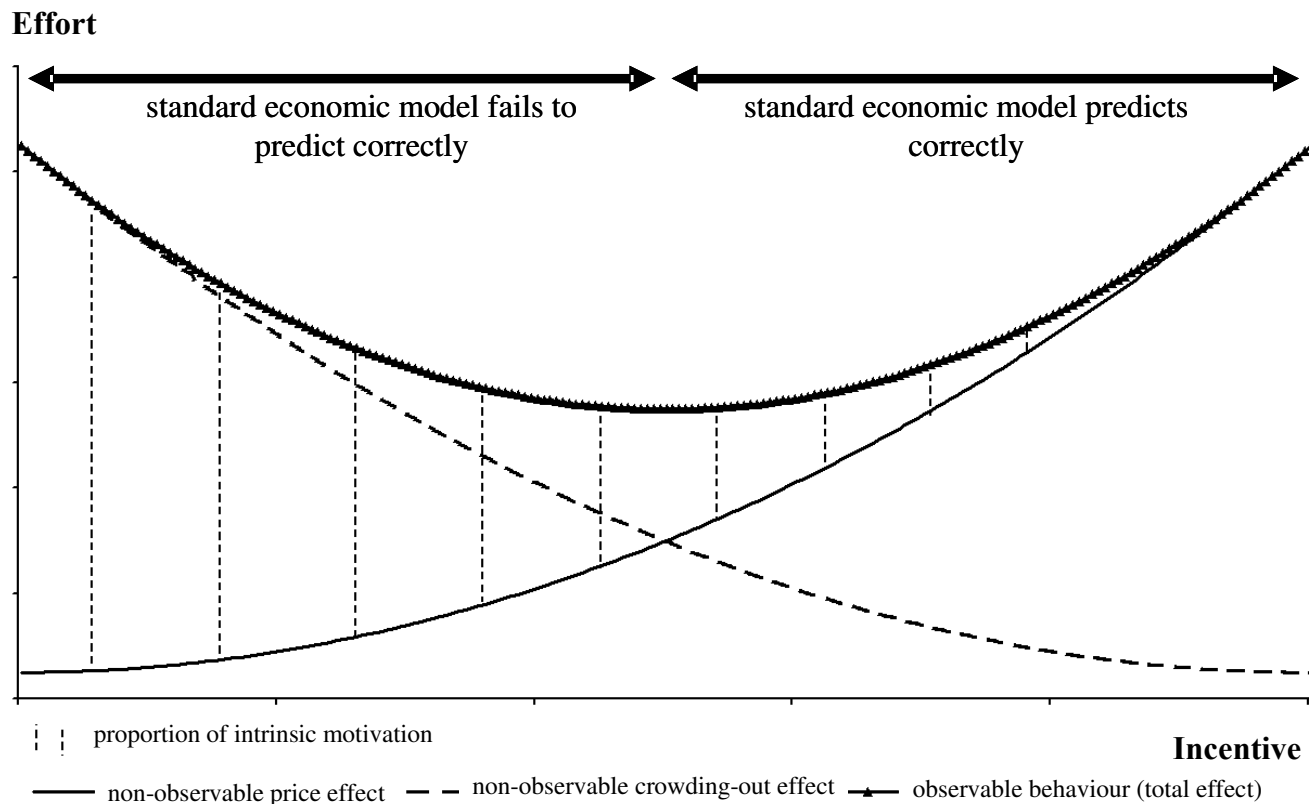
Experiment 2 of Gneezy & Rusticini (2000)

- Parents come late to pick up their child from day-care
- **Deterrence theory:** Penalty reduces bad behavior
- **Results** from introducing fine for coming late:
 - Parents arrive even later!
 - After withdrawing fine, parents still come later
- **Conclusions** from experiment:
 - Incomplete contracts become preciser with fine
 - New perception of the situation: “A fine is a price”
 - Outcome of intervention depends on initial perception

Crowding-in and -out of Intrinsic Motivation

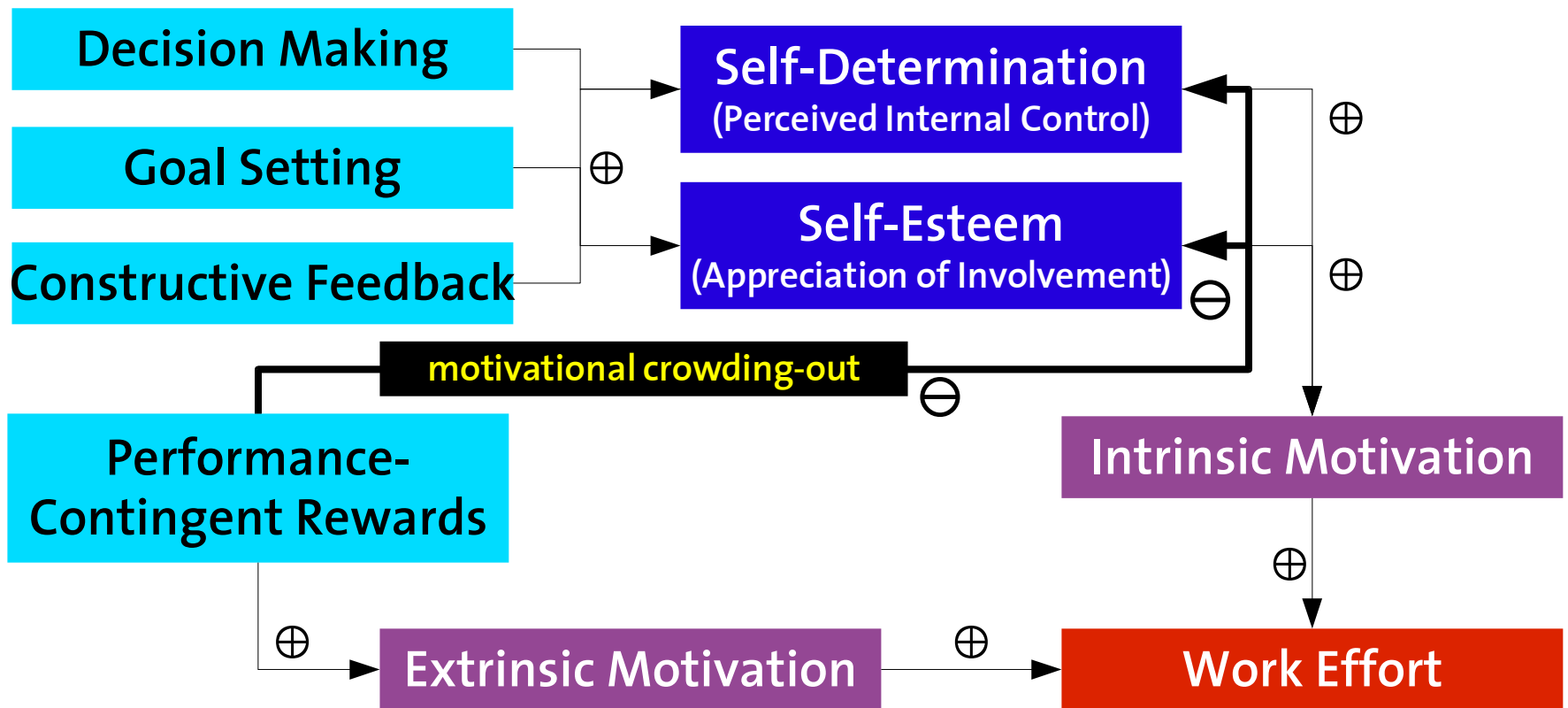
- External intervention has **two opposite effects**:
 - Price effect
 - Crowding-out effect
- Big question: **Which effect is stronger?**
 - Determines if net effect of intervention is positive or negative

Combining Standard Economic Model and Crowding-Out Effect of Intrinsic Motivation



Source: Weibel et al. 2007

Effects of Motivational Incentives on Effort



Source: Weibel et al. 2007; Frey and Jegen, 2000

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The Motivation Mix of OSS Contributors

■ Intrinsic motivation

- Fun, curiosity
- Ideology („Software must be free.“)
- Responsibility, commitment (maintainer's fate)

■ Extrinsic motivation

- Reputation
- Career options (learning effect, student projects)
- Employment, contracts, own business

→ How much are we **really** intrinsically motivated?

Unattractive Tasks in Open Source Projects

- What gets done? → **Itches of developers**
 - Unattractive tasks 1: **Usability**
 - High quality documentation for different target groups
 - GUI design
 - End user features
 - Unattractive tasks 2: **Quality**
 - Code review
 - Bug fixing
- Tasks of „**The Last Mile**“ are often neglected.

Why introducing incentive system?

1. **Gaps of contributions:** Solve unattractive tasks
2. Motivate **new people** getting into the community
3. 'Weed-out' **old, inactive people**

→ Who should be attracted with incentive system?
Long-term vs. short-term contributors

Examples of Extrinsic Incentives in OSS

■ Monetary

- Employment of contributors
- Bounty system
- Sponsoring of projects
- Awards, competitions

■ Near-Monetary

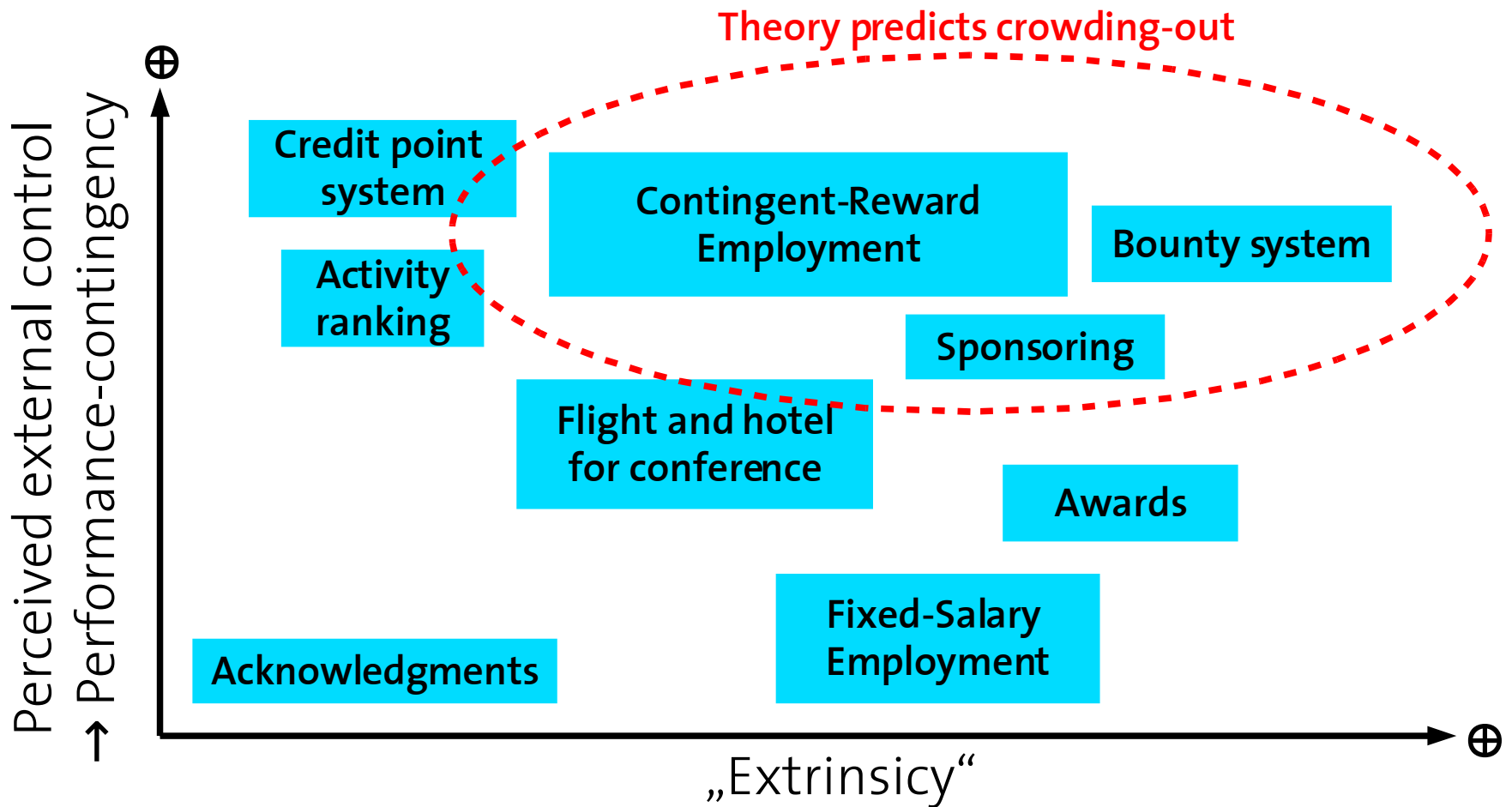
- Flight and hotel for conference

■ Non-Monetary

- Acknowledgments
- Credit point system
- Activity ranking

How does it affect **self-determination?**
(performance-contingent or fixed)

Controlling Effect of Extrinsic Incentives



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Unhappy example: Debian/dunc-tank

- *Disclaimer: Highly controversial topic in Debian community*
Google “Debian dunc tank”: $\approx 10'100$ entries... (and much more 'private')
- **About Debian/dunc-tank**
 - Paying 2 release managers to get out Debian 4.0 on time (Dec 4th)
 - Started Sept 2006, goal of Dec 4th not reached because of...?
- **Preliminary conclusions**
 - Impossible to measure crowding-out of intrinsic motivation
 - Envy because of selection process → Why not silently employed?
 - Payment from Debian itself vs. from external entity
 - Don't experiment with money – or at least don't declare it as this!
 - Employment issues depend on community characteristics

Successful example: Google Summer of Code

■ About GSoC

- 2007: Accepted 905 students for 136 OSS projects
- Projects sign up, students apply for tasks, mentor supervises
- Student receive 4500\$ on completion, mentoring orgs 500\$

■ Preliminary conclusions

- Highly successful: Everybody seems happy, just little chaotic...
- Positive because of funding new community entrants
- Participating in GSoC becomes level of 'certification'
- Focus only on code, documentation is secondary
- Implementation of new code in projects?

Other Influences on Success of Extrinsic Incentive Systems in OSS communities

■ Group effects

- Crowding-out occurs only on individual level
- Envy between contributors → fair/unfair intervention
- Literature on group dynamics → no data in OSS so far

■ Community characteristics

- Target group of software
- Project age and activity level
- Software complexity, programming language, OS
- Working situation of contributors (paid vs. voluntary)
- Dominant ideology (Free Software vs. OSS)

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Conclusions

- **What intervention is definitively positive? → Moral call**
 - „Make them feel the pain“ (Kasper Skårhøj, TYPO3)
 - Increase identification to elevate importance of certain tasks
 - No penalties
- **New insights and future research**
 - Differentiation between *personal motivation* (=not knowing what others do or receive) and *social behavior* (fair/unfair)
 - Extrinsic incentives in OSS sometimes positive, sometimes negative → perception of participants is relevant
 - Economists often oversimplify, empirical tests are necessary
 - No empirical studies in OSS environments so far

Discussion, Acknowledgments

- What are your experiences in this area?
- To OSS project leads: Interested in collaboration on research about crowding-out?
- Thanks to
 - Kasper Skårhøj
 - /ch/open - www.ch-open.ch
 - LinuxTag

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