



Trustworthy and Secure Future Internet



Using Incentives to Analyze Social Web Services' Behaviors

Gianpiero Costantino

IIT - National Research Council - Pisa, Italy

in collaboration with

Zakaria Maamar, Marinella Petrocchi and Fabio Martinelli

PCS | 2014/10/12

e-mail : gianpiero.costantino@iit.cnr.it

Overview

▶ **Social Web Services**

- What they are;
- Scenario;
- Actors' parameters;
- Experiments and Results;

▶ **Conclusion**



Social Web Service

- SWS is the result of **blending** social computing and service-oriented computing.
- Generically, Social Web Services (**SWS**)s are entities that provide services.
- SWSs are similar to traditional Web Service, but they keep a network of collaborative social group.
- SWSs can be grouped to form a **Composition**.

Social Web Service (2)

- A SWS can **sign up** to be part of a Composition of SWSs.
- It can **Substitute or Collaborate** in a Social Network:
 - Within a Substitution Network SWSs can **replace** peers that fails in their composition.
 - Within a Collaboration Network all SWSs **cooperate** to provide a service.

Goal

*“In this work we analyse the behaviour of SWSs comparing **Honesty** Vs **Dishonesty**, and what are the consequences of such a decision on its reputation and revenue.”*

Scenario

- **Social Networks** are led by authorities, i.e. SN_{auth} ;
- **SWSs** sign up to be part of a Composition within SNs.
- SWS can assume a **honest** or **dishonest** behaviour.
- SWSs can be kicked out from SNs;
- **Users** call SWSs for services.

SN_{auth} Parameters

- **Membership fee** (mf): it is a fee for those SWSs that wish to sign up in the network.
- **Quality-level** (ql): it establishes a quality level for the network based on users **feedback**.
- **Maintenance cost** (mc): it is a cost related to the infrastructure;

SWS Parameters

- Performance level (*pl*): it reflects the behaviour of SWSs with respect to their QoS. We relate “*pl*” with the number of concurrent users’ request (*nbr*).

$$\text{SWS-pl} = \begin{cases} 1 & \text{if } nbr \leq thresh \\ \frac{1}{nbr - thresh} & \text{otherwise} \end{cases}$$

- **Usage fee** (*uf*): it is the price asked to users to carry out a service;
 - **A portion of “*uf*”** is assigned to the SN_{auth} ;

User Parameters

- **Budget request** (br): it is the monthly budget that a user can spend on services;
- **Service cost** (sc): it is the cost needed for a single service

Experiments

- Two scenarios:
 - **Scenario A:** SWSs always accept users' requests independently of the current number of requests (*nbr*) that are under processing. If (**$nbr > thresh$**) the performance level of SWS will decrease and the user will be refunded in a probabilistic way.
 - **Scenario B:** A SWS accepts a user's request with a probability of 50% when (**$nbr > thresh$**). Like in Scenario A, the user will be refunded in a probabilistic way.

Experiments (2)

- A user **is not refunded** with a probability of
 - 60% when $0.75 \leq \text{SWS-pl} < 1$
 - 70% when $0.5 \leq \text{SWS-pl} < 0.75$
 - 80% when $0 \leq \text{SWS-pl} < 0.5$
- $\text{SN}_{\text{auth-ql}}$ is calculated using the **Beta Reputation**, i.e. ratio of positive feedback and total feedback.

Experiment (3)

Parameters

- Three Social Networks: SN_0 , SN_1 , SN_2
- **20 SWSs** each network
 - $SWS-uf = 5 \in SN_0$
 - $SWS-uf = 10 \in SN_1$
 - $SWS-uf = 15 \in SN_2$
- Each Simulation lasts 360 days;
- **Maintenance** cost and **membership** fee paid every 100 days;

Experiment (3)

Evaluation

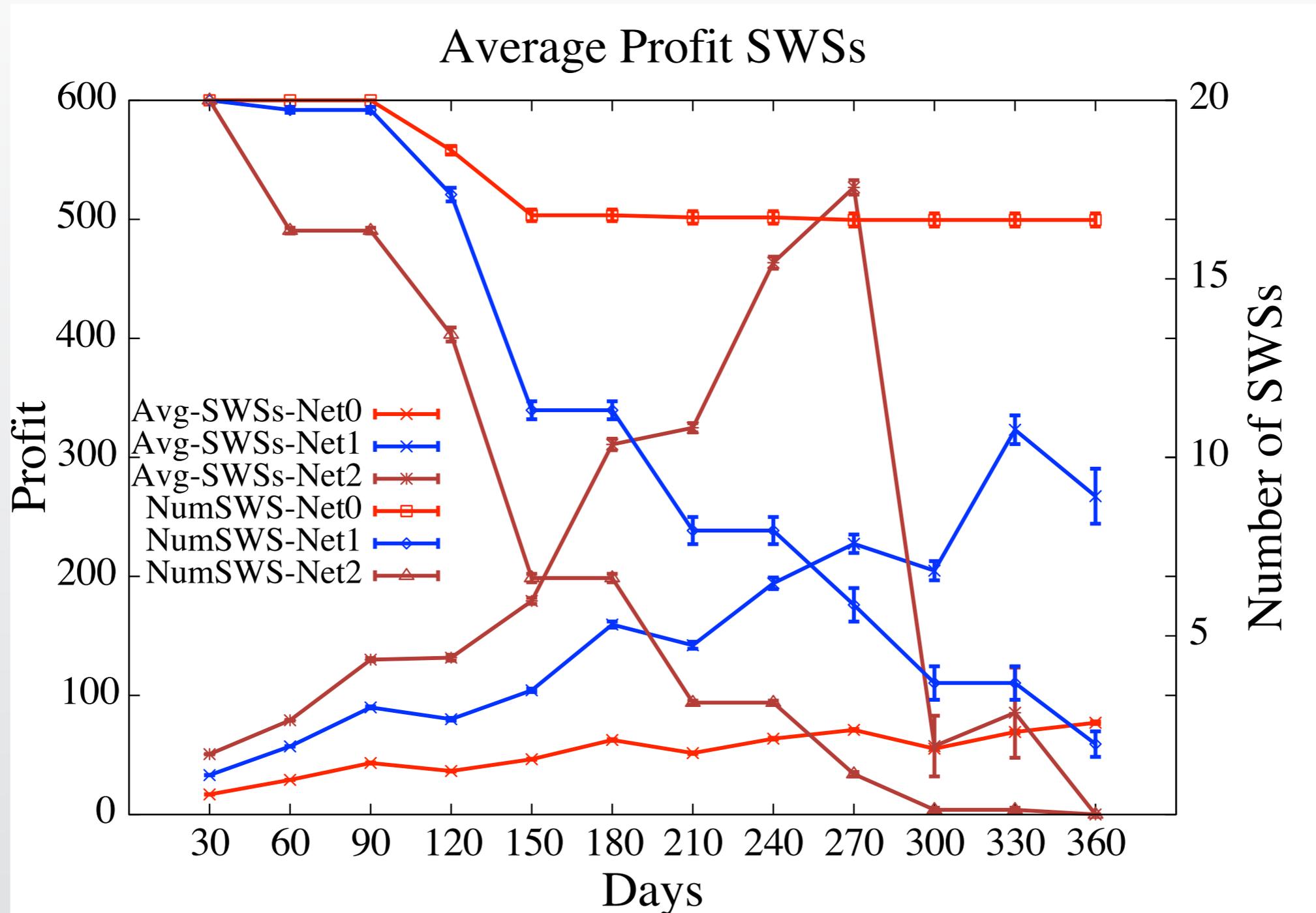
We evaluated in our Experiment:

- The $SWSs$ -profit;
- The SN_{auth} -profit;
- The $SN_{auth-ql}$;
- The number of $SWSs$ being in the SN .

SWS are kicked out when $SWSs-ql$ drops below $SN_{auth-minql_{sWS}}$

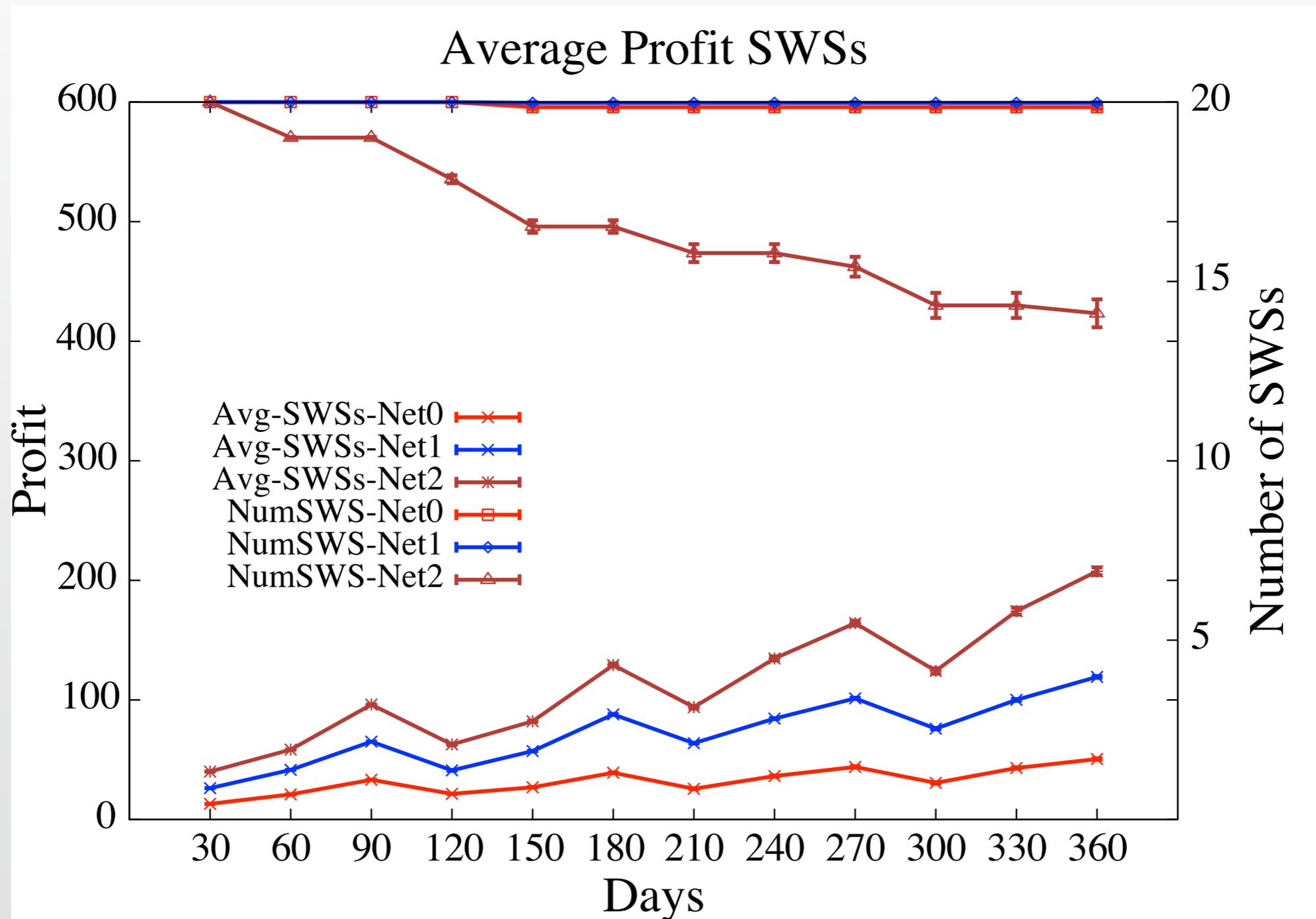
SWS Profit

Scenario A



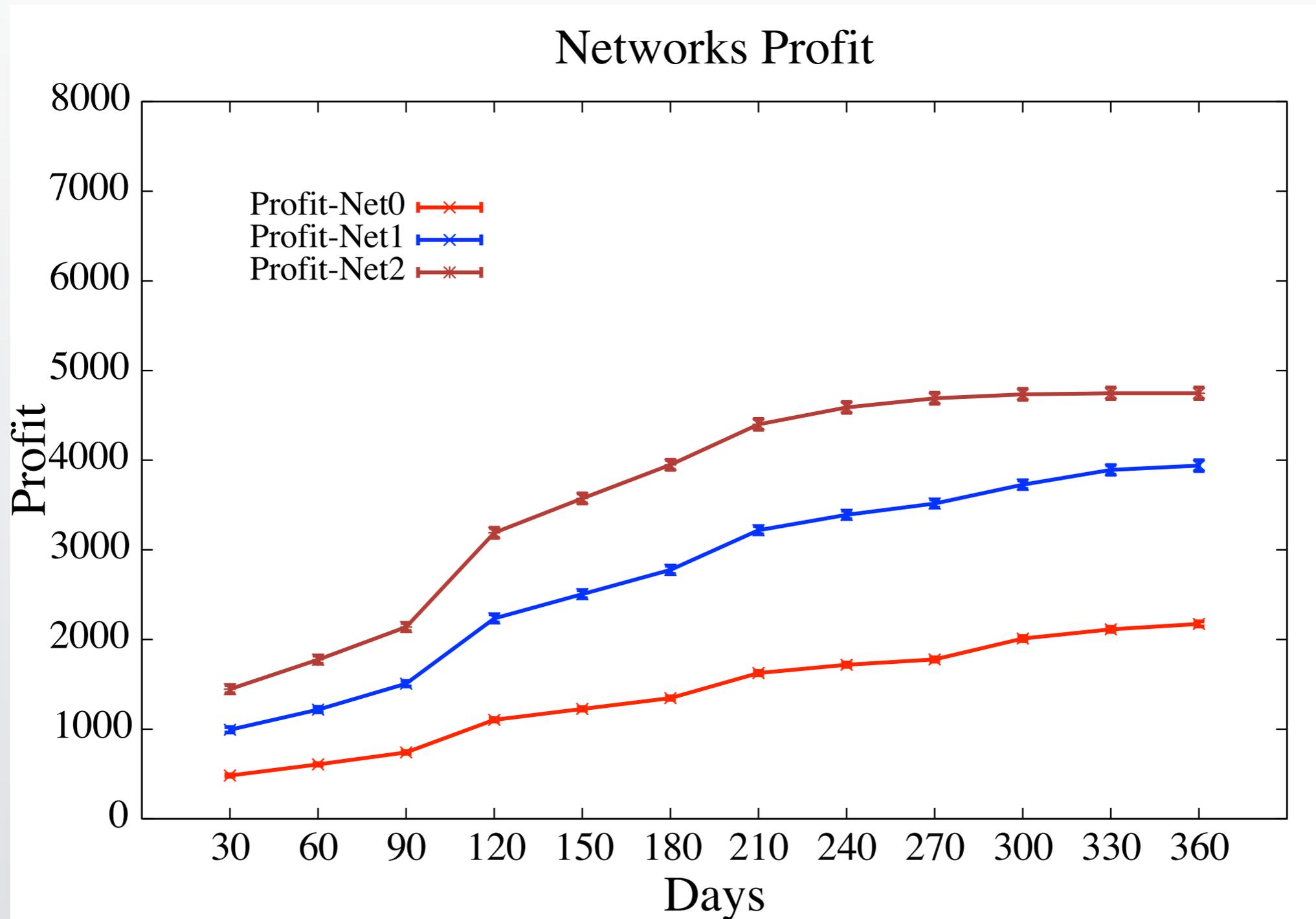
SWS Profit

Scenario B



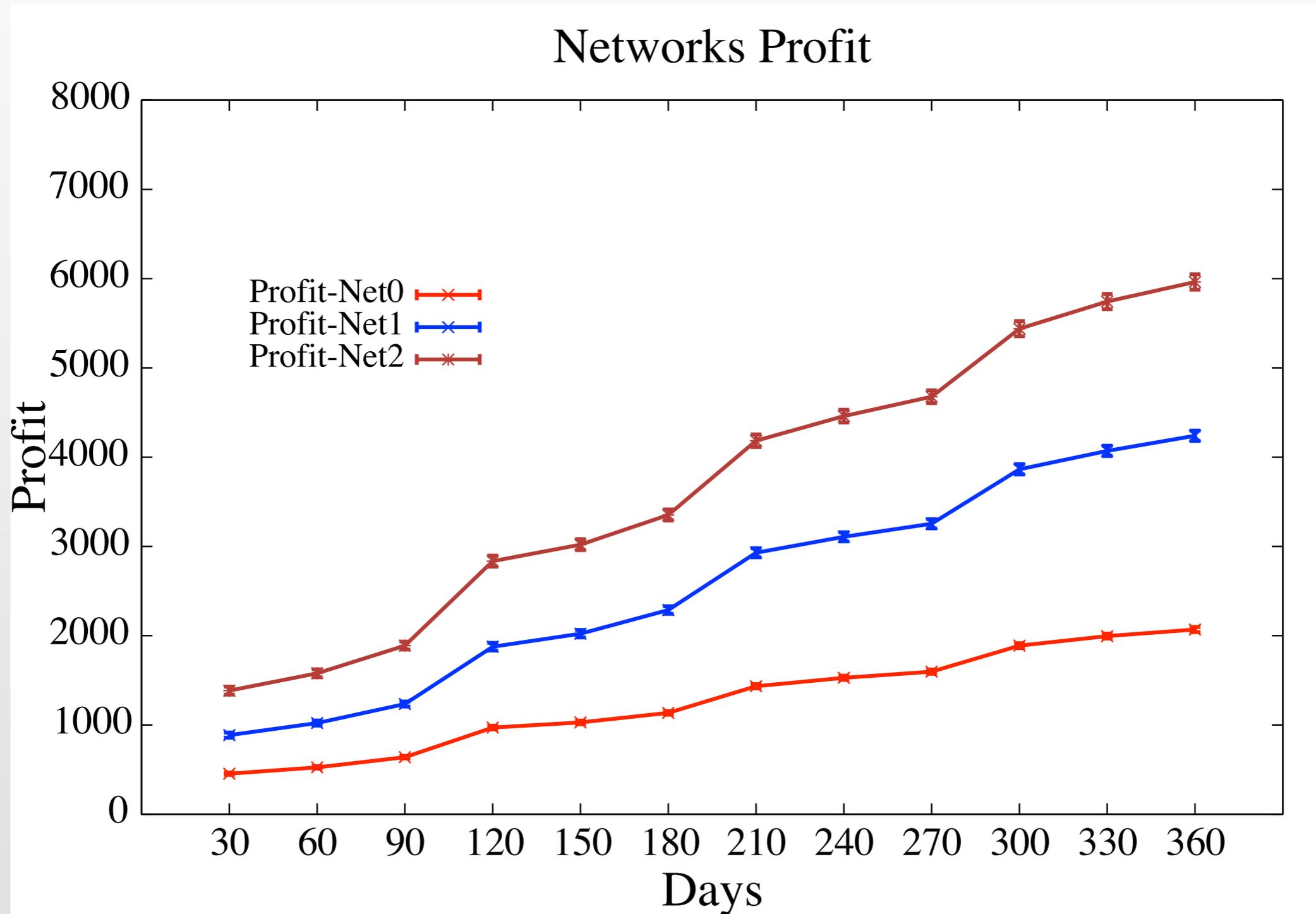
Network Profit

Scenario A



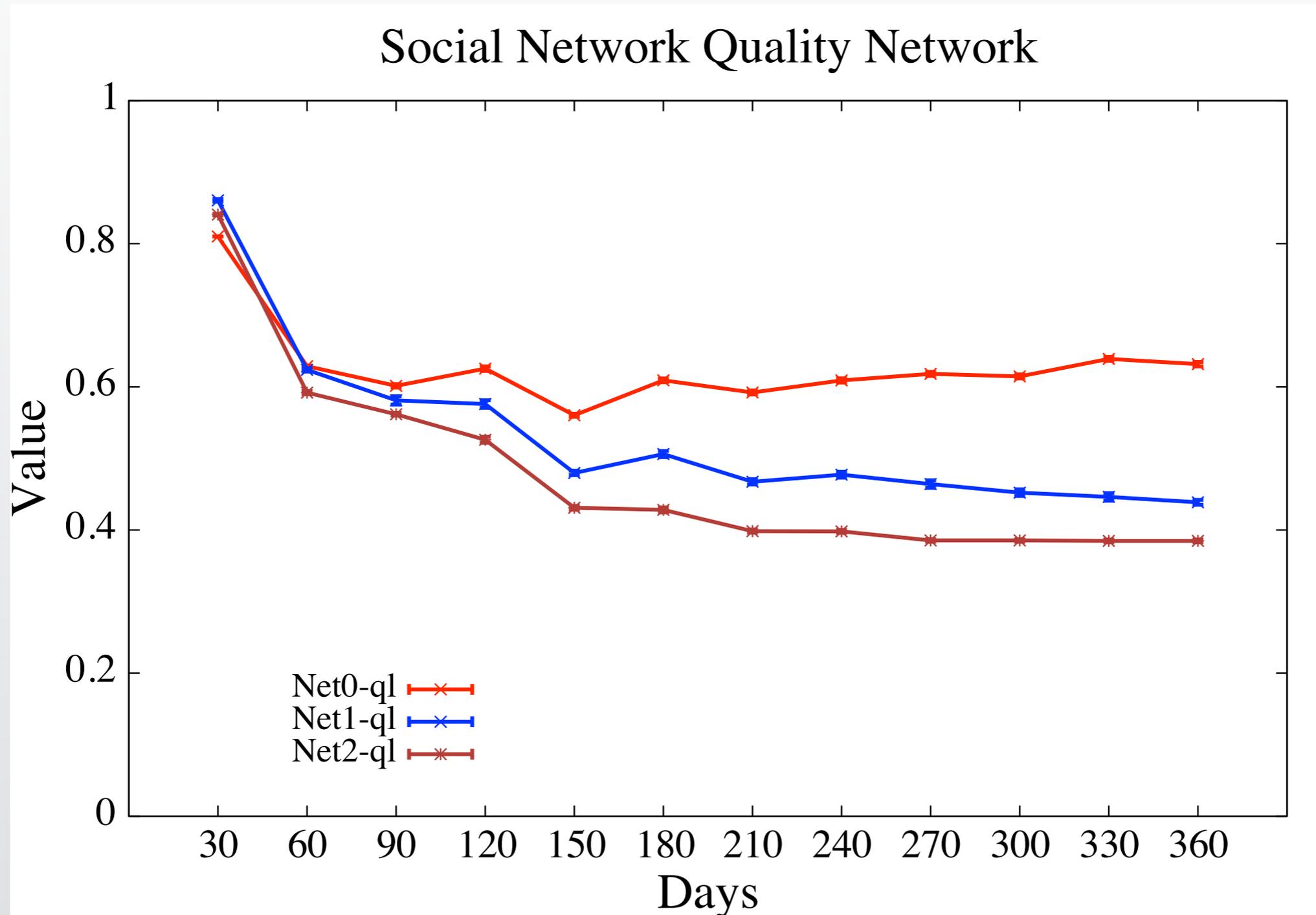
Network Profit

Scenario B



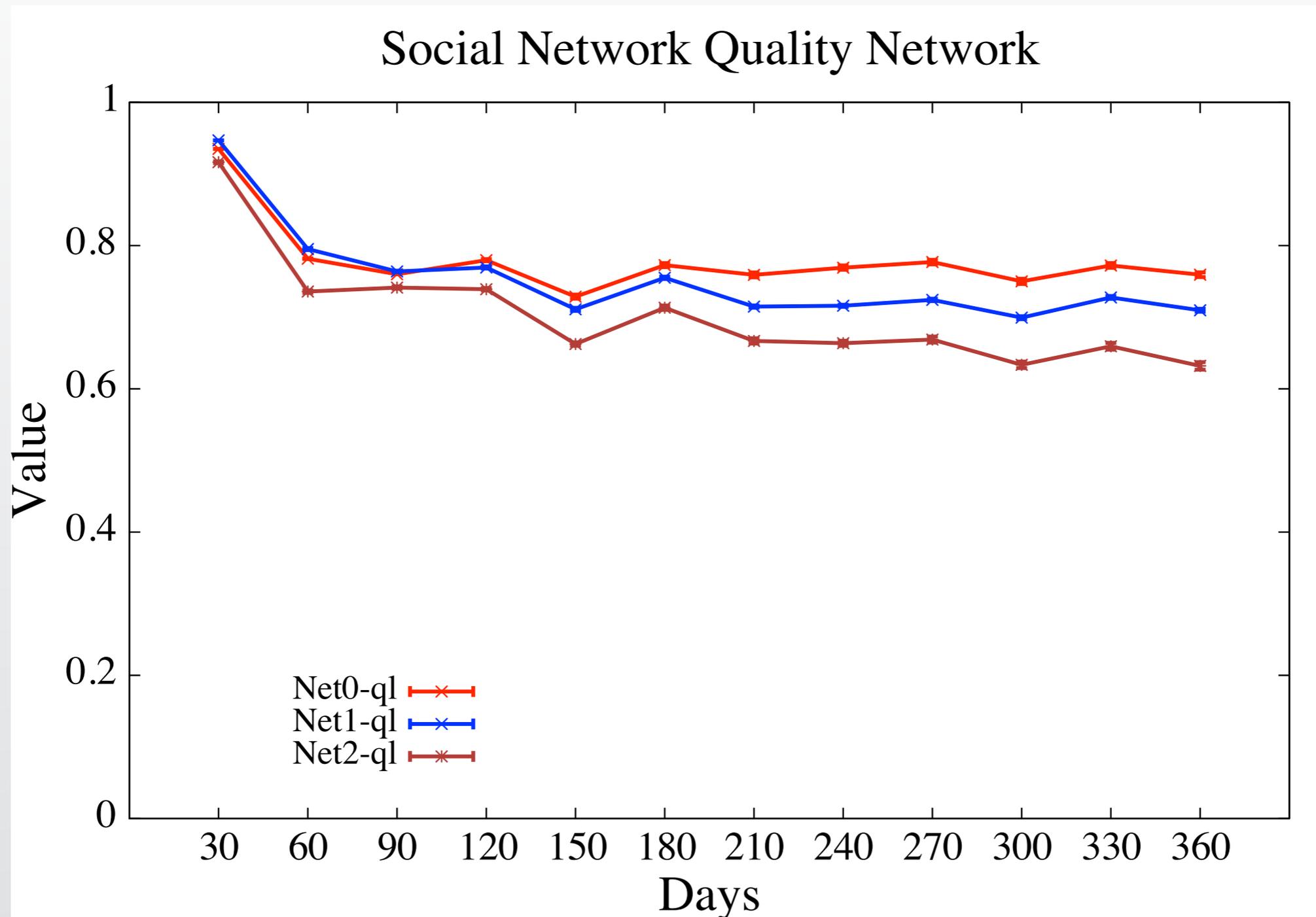
Network Quality Level

Scenario A



Network Quality Level

Scenario B



Conclusion

- In this work we compared SWSs honesty and dishonesty in terms of reputation and revenue;
- Findings say that honesty overtakes dishonesty in the Social Services environment;
- In term of future work, we would like to examine how the rewards can boost the competitiveness of networks.