# Appendix

CoR-Project Equity and Decoupling

Economic growth, social balance and resource depletion under

3 future scenarios (balance, neo-feudalization and collapse)

(FAW/n did a study with freely chosen parameters with its present system dynamics/economic model. This is based on an exchange with J. Yunker (Illinois). The aim is to give a feeling for the three cases/attractors of possible futures considered (balance = green, neo-feudalization = blue, and collapse = red). Economic growth is dealt with in fig. 1, social balance / equity in fig. 2, and depletion of the resource pool in fig. 3. These scenarios incorporate global population growth from 7 to 10 billion people until 2050.)

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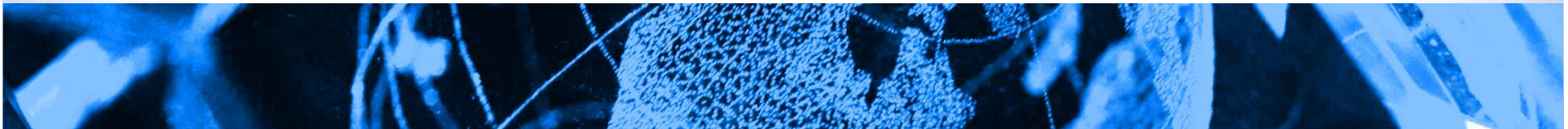
Model

Analysis is based on a combination of

✓ system dynamics and an

✓ economic model

as used by J. Yunker, Univ. of Western Illinois, in his book
"Global Marshall Plan: Theory and Evidence".

Sample model equation: Production is modeled by Cobb-Douglas function

$$Y_{i,t} = A_{i,t} \cdot K_{i,t}^{\alpha} P_{i,t}^{\beta}$$

A - Technological efficiency   K - Capital   P - Population

$\alpha > 0$ $\beta < 1$ i: nation t: year

Balance Scenario

For the balanced case (green coloured graphs), economic growth in fig. 1 over 40 years is on average 3.7%, while eco-efficiency improves by four percent a year.

This is a "dream" scenario. This scenario comes along with no further depletion of the global resource pool (see fig. 3). Social balance / equity improves from 0.4 to 0.5 (see fig. 2), which is more ore less the present European situation. This increase is a consequence of a reasonable global regulation (including taxation, transfers, co-funding of technological change) and resulting massive public and private investments into a **green and inclusive economy**, at the same time improving the job situation and consequently the level of income inequality.
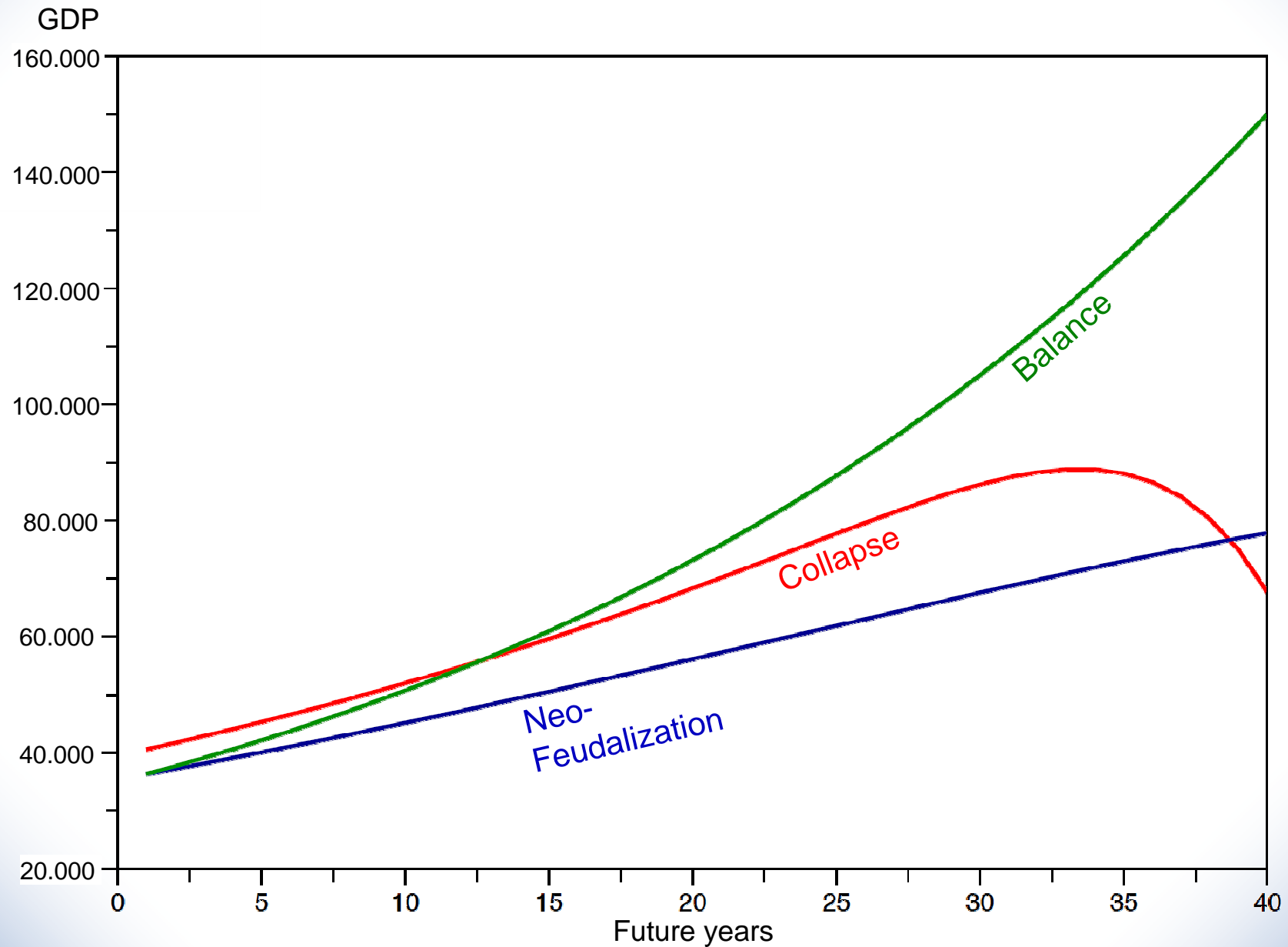
Neo-Feudalization Scenario

For the neo-feudal case (blue coloured graphs), economic growth in fig. 1 over 40 years is on average of 1.9%, while eco-efficiency improves by one percent a year. This scenario is ok from an ecological point of view, i.e. it comes along with no further depletion of the global resource pool (see fig. 3). Social balance / equity, however, deteriorates from 0.4 to 0.2 (among others, because of the slow growth), which is absolutely unacceptable and would be a high price to pay to protect the environment and resource base. Politically, it will mean tough times ahead. (Hint: an eco-efficiency increase of 1% is enough to allow 1.9% economic growth in this low-growth case (globally) without affecting the global resource pool, because of the parameter set in the underlying Cobb-Douglas function).

Note: Though economic growth is much lower in this case than in the case of balance, there is still an even absolute (not to speak of relative) increase in income for 5‰ of population (the winning elite). This is shown in fig. 4.

Collapse Scenario

For the collapse case (red coloured graphs), economic growth over 40 years is on average 1.3%. Actually, there is a higher growth than in the balance case in the beginning and in the neo-feudal case for about 35 years. Then, the collapse starts to evolve due to nearly full depletion of the resource pool (see fig. 3). It shrinks from 100% down to 10% over 40 years. Eco-efficiency does not improve in this case at all. Equity is kept constant (see red line in fig. 2). However, the price to pay in the end is to live with collapse.

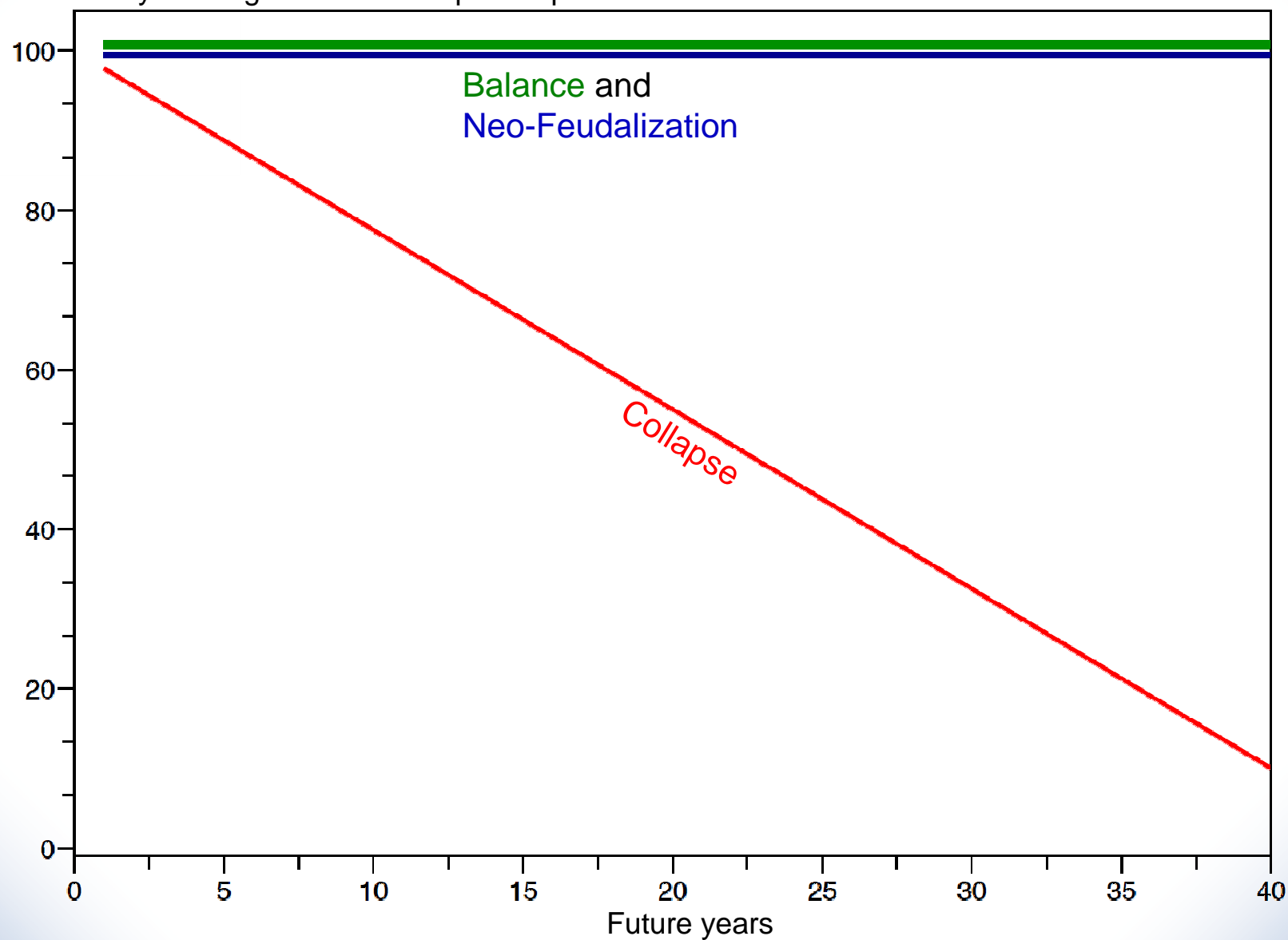Economic growth under 3 scenarios – Fig. 1

Social balance / equity under 3 scenarios – Fig. 2
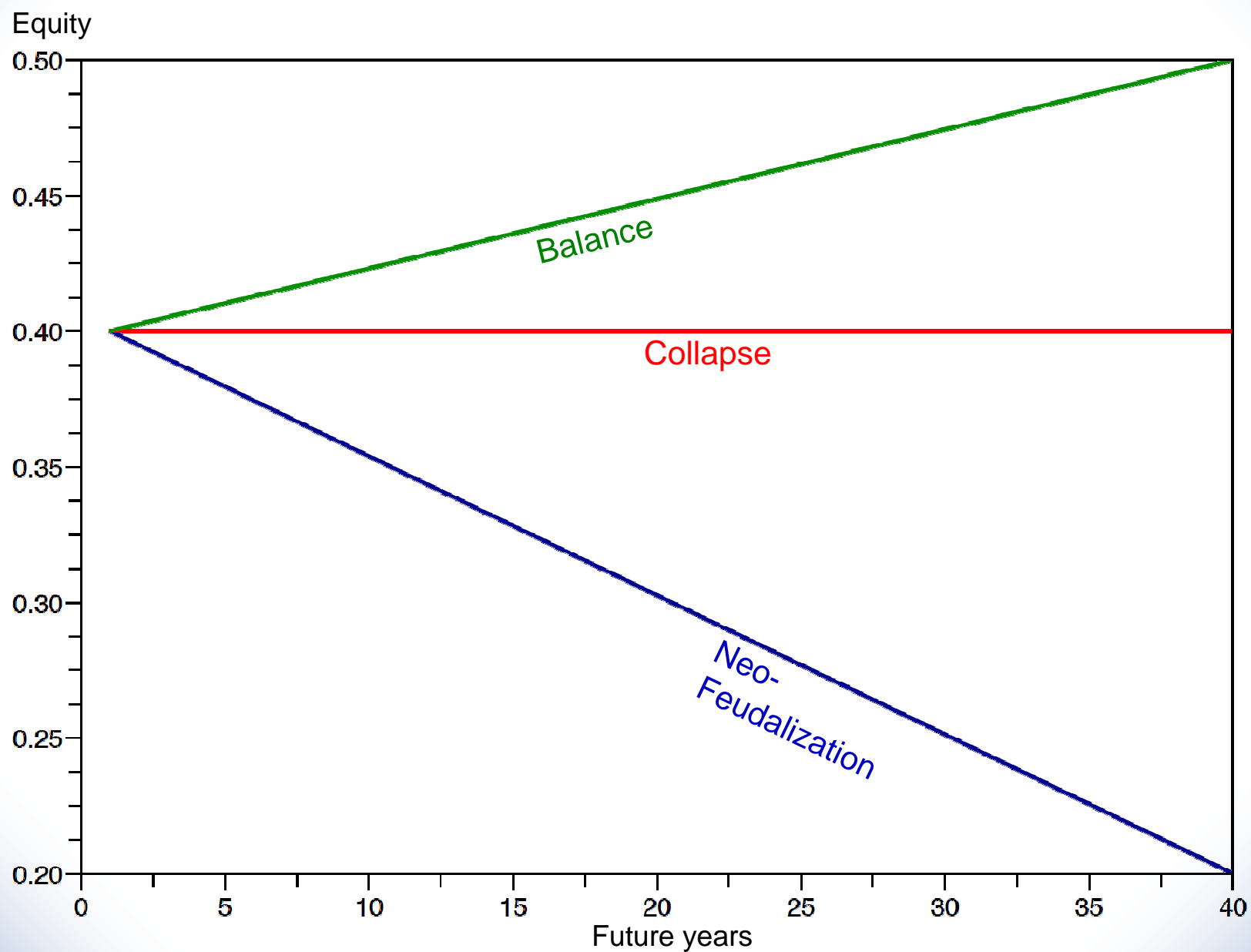
Resource depletion under 3 scenarios – Fig. 3

The absolute winner segment in case of neo-feudalization – Fig. 4

Income of absolute winners

Balance

Neo-Feudalization

‰ of Population