

Trade Liberalisation and
Income Distribution:
A CGE Model for Jordan

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Objective of the research:

Assessing the effects on the Jordanian economy of the Association Agreement with the EU, with particular emphasis on welfare and on income distribution of heterogenous households.

In order to capture the dynamic effects of trade liberalisation, an intertemporal model with heterogenous consumers is specified for the Jordanian economy.

Euro-Mediterranean Association Agreement between the EU and Jordan:

- part of the Euro-Mediterranean Partnership, involving bilaterally the EU and 12 countries in the MENA region;
- signed in 1997, entered into force in May, 2002;
- progressive elimination of import tariffs on most industrial goods and limited trade openness for agricultural products;
- creation of a FTA for most industrial products within 12 years.

	Agric.	Mining	Food	Text.	Paper	Chem.	Miner.	Others
Pre-Agreement rates	17,0%	9,4%	29,2%	14,1%	13,2%	2,8%	12,2%	12,2%
Entry into force of the AA	17,0%	5,6%	29,2%	8,5%	7,9%	1,7%	7,3%	7,3%
One year after	17,0%	5,0%	29,2%	7,5%	7,0%	1,5%	6,5%	6,5%
Two years after	17,0%	4,4%	29,2%	6,6%	6,2%	1,3%	5,7%	5,7%
Three years after	17,0%	3,8%	29,2%	5,7%	5,3%	1,1%	4,9%	4,9%
Four years after	15,3%	2,8%	26,3%	4,2%	4,0%	0,8%	3,7%	3,7%
Five years after	13,6%	2,5%	23,4%	3,8%	3,5%	0,8%	3,3%	3,3%
Six years after	11,9%	2,2%	20,4%	3,3%	3,1%	0,7%	2,9%	2,9%
Seven years after	10,2%	1,9%	17,5%	2,8%	2,6%	0,6%	2,4%	2,4%
Eight years after	8,5%	1,6%	14,6%	2,4%	2,2%	0,5%	2,0%	2,0%
Nine years after	8,5%	1,3%	14,6%	1,9%	1,8%	0,4%	1,6%	1,6%
Ten years after	8,5%	0,9%	14,6%	1,4%	1,3%	0,3%	1,2%	1,2%
11 years after	8,5%	0,6%	14,6%	0,9%	0,9%	0,2%	0,8%	0,8%
12 years after	8,5%	0,0%	14,6%	0,0%	0,0%	0,0%	0,0%	0,0%

Tariff schedule reduction of the AA

- Together with expected benefits (i.e. lower domestic prices), trade liberalisation brings about a loss in government revenue.
- To counteract the fall in government revenue, appropriate fiscal measures should therefore accompany the trade liberalisation process.

Question:

How do trade liberalisation and policy responses affect income and welfare of heterogeneous households?

Previous studies on Jordan's trade liberalisation

- Hosoe (2001), two scenarios:

Uruguay Round implementation: 0.28% increase in Jordan's welfare; establishment of a FTA with the EU: further increase by 0.16%.

- D. Lucke (2001):

focus on fiscal effects of the EU-Jordanian AA, and on fiscal responses aiming at overcoming the loss in government revenue.

However, these models do not account for dynamic effects due to capital accumulation, and can not analyse poverty and income distribution effects.

THE MODEL

Intertemporal, multi-sector neo-classical model.

Economic Agents

- Consumers (six heterogenous groups)
- Government
- Firms (nine sectors)
- Foreign regions: the European Union and the rest of the world.

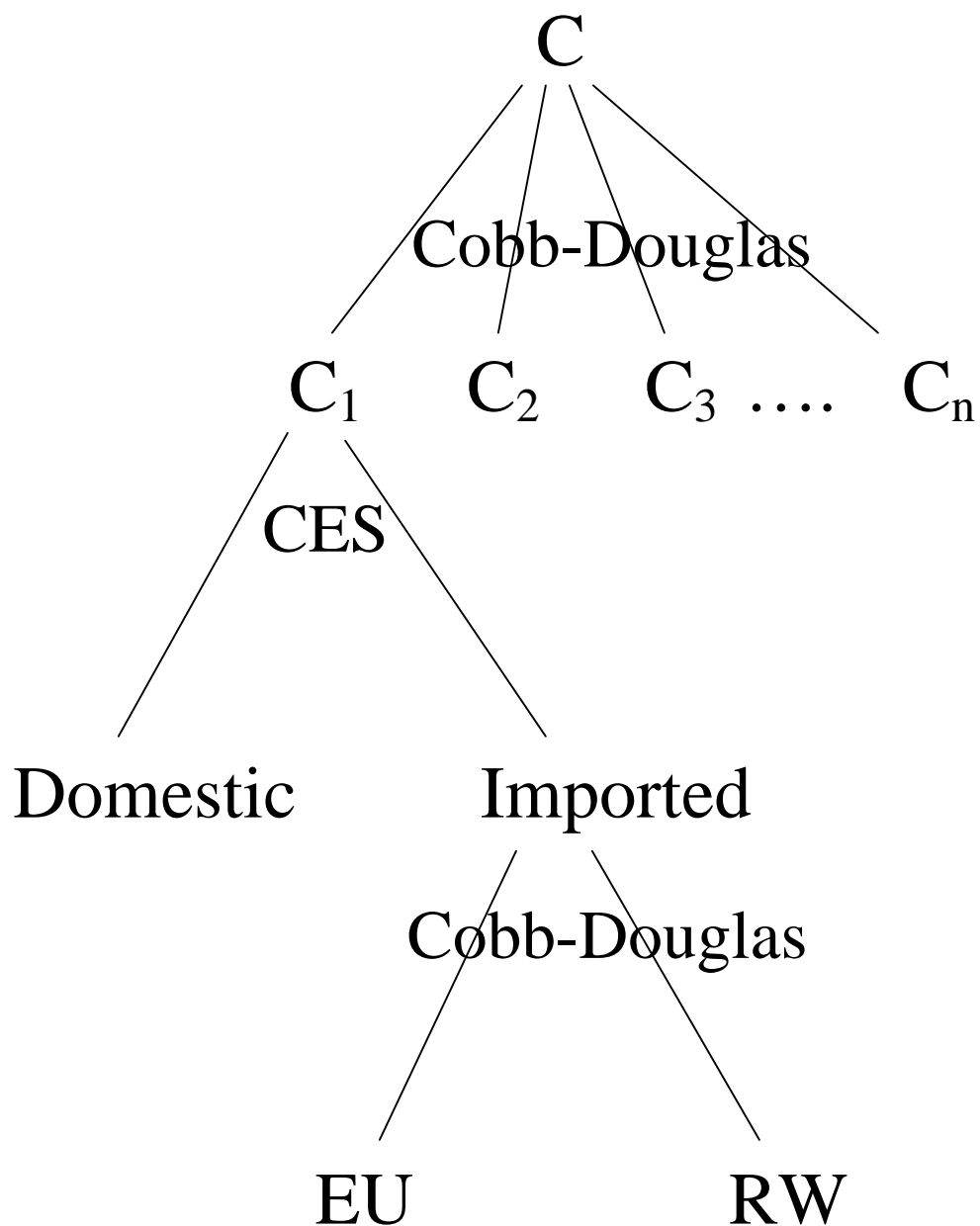
International trade

- Foreign trade is affected by the relative prices of domestic to foreign goods;
- international trade flows are characterised by imperfect substitution between domestic and foreign goods.

Consumers

- six different types
- have endowments of capital and labour,
- choose paths of future consumption and saving so as to maximise their discounted lifetime utility subject to the budget constraint,
- consumption is a basket of domestic and imported goods.

PRIVATE CONSUMPTION



The same applies to government consumption and investment

Introduction of heterogeneous households in a CGE framework: theoretical paper by Caselli and Ventura (2000)

- investigate under which conditions a representative agent approach yields the same outcome for aggregate variables as a disaggregated model
- households are allowed to differ with respect to skills, initial endowments of assets, transfers and tastes,
- however, they can not differ with respect to taxation of capital income or time preference.

CGE analysis applied to poverty and distribution issues: two main approaches

- CGE model with one single representative consumer: changes in commodity and factor prices generated by a trade liberalisation experiment are applied to household data to compute the impacts on poverty and income distribution.
- Embedding the household disaggregation within the CGE model, which has the advantage of being internally consistent; simulations help to identify the household classes that are vulnerable even when trade liberalisation is beneficial on average.

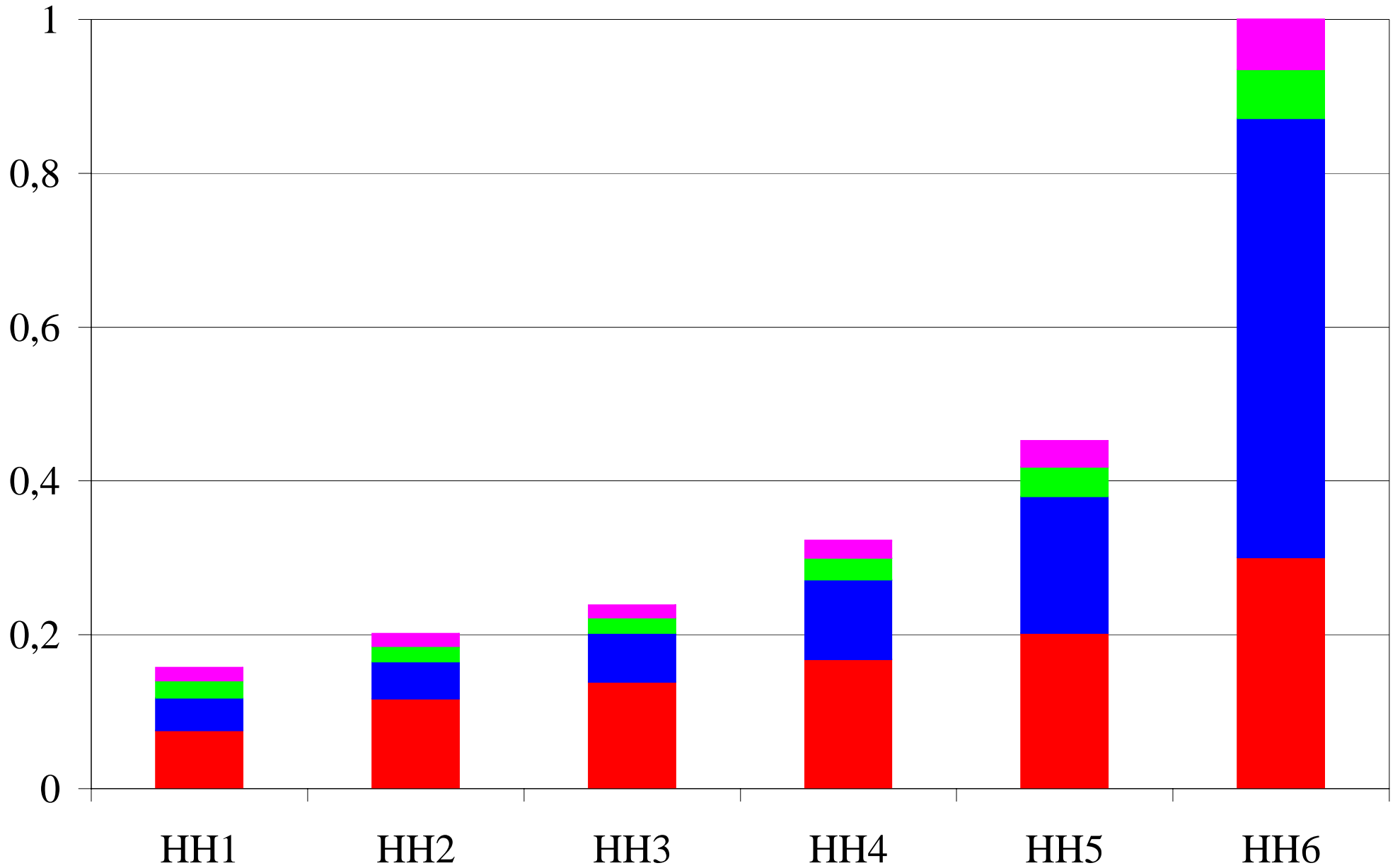
In this model:

- households differ with respect to initial endowments of assets, taxation, skills, transfers from government and from the RoW, and consumption preferences (calibrated from 2002 household survey);
- households have also different time preferences, which are calibrated from survey data by assuming that consumption levels of all households are stationary in the long-run.

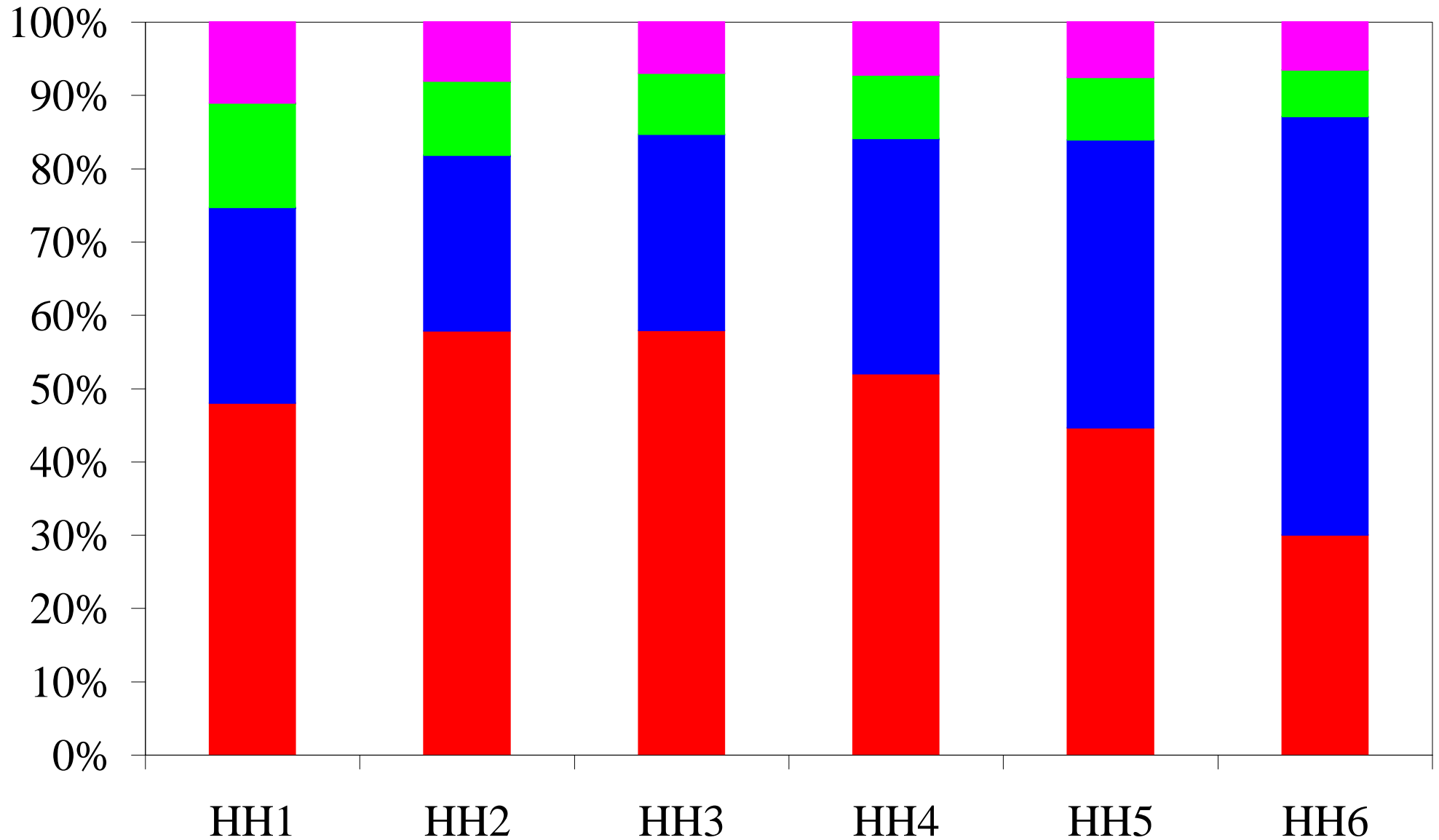
Class	Individuals	Labour	Capital	Gov. Transfer	Foreign remit.	Totals
HH1	81184	48%	27%	14%	11%	100%
HH2	583420	58%	24%	10%	8%	100%
HH3	970240	58%	27%	8%	7%	100%
HH4	1251301	52%	32%	9%	7%	100%
HH5	1224470	45%	39%	8%	8%	100%
HH6	939704	30%	57%	6%	7%	100%

Size and composition of household groups

Income per capita ■ labour income ■ capital income ■ transfer ■ foreign remittances



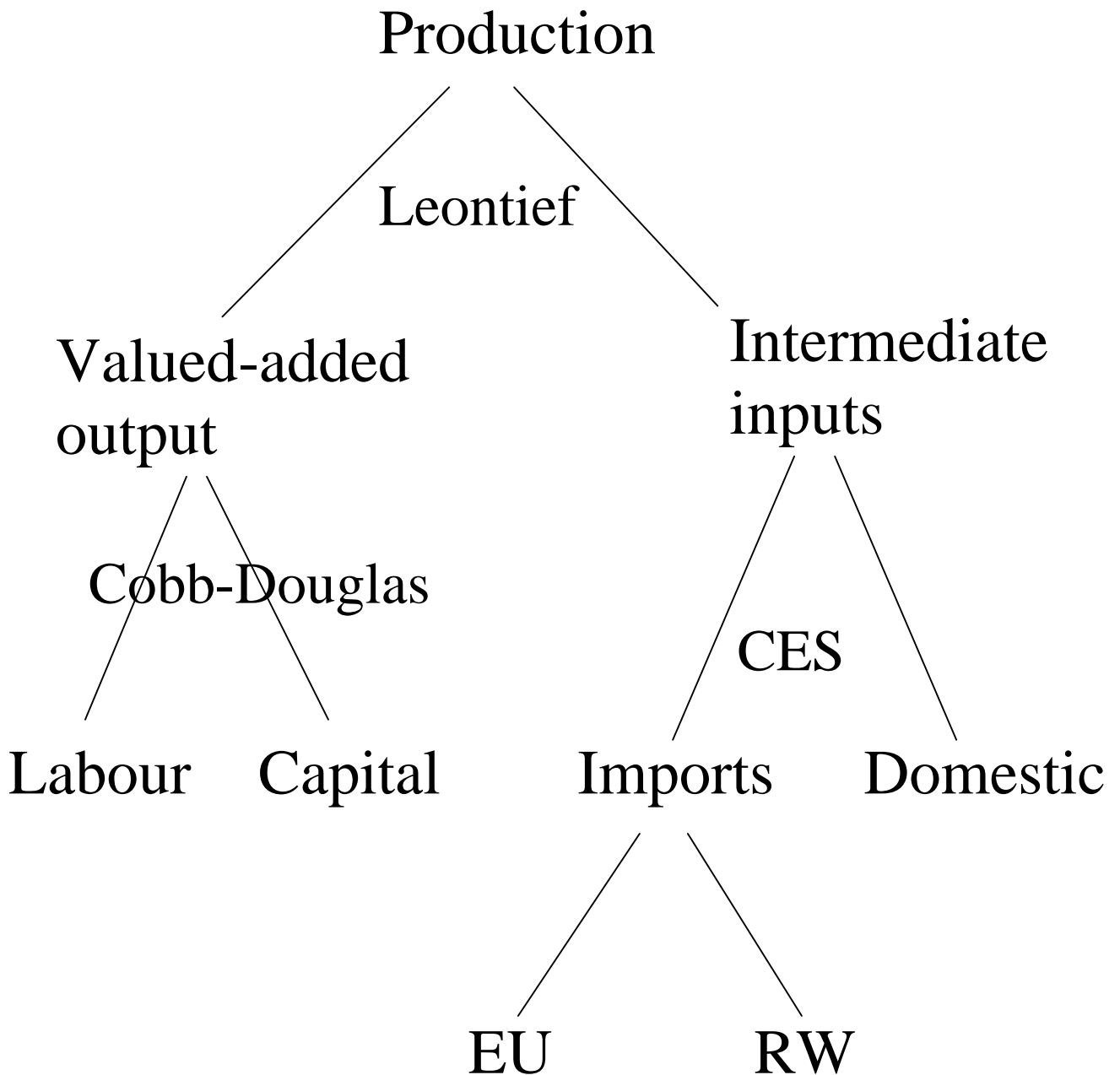
Income composition ■ Labour ■ Capital ■ Government transfer ■ Foreign remittances



Firms

- use capital, six different types of labour, and domestically-produced and imported intermediate inputs,
- produce goods in perfectly competitive markets, and
- can sell them in the domestic or in the foreign markets.

PRODUCTION TECHNOLOGY



OUTPUT

Production

CET

Domestic sales

Exports

CET

EU

RW

Government

- consumes an exogenous amount of good,
- collects taxes and tariffs,
- provides a transfer to the consumer,
- runs a balanced budget.

Government revenue comes from:

- Value Added Tax (VAT),
- income tax, that applies with different rates to the six household groups,
- import duties, that apply with two different rates to the EU and the rest of the world.

Expenditure is given by:

- transfer to household, and
- consumption of good.

Data and Calibration

- Dataset: based on the 2002 Social Accounting Matrix (SAM) constructed on data from the national accounts, foreign trade statistics, 2002 Household Survey, and the 1987 input-output table (updated to 2002 by B. Lucke and Feraboli).
- Parameters are then calibrated so that the model solution reproduces the initial dataset.
- The model is programmed in the mathematical software Gauss and solved with the relaxation algorithm proposed by Trimborn, Koch and Steger (2004).

Simulations

Each simulation has two policy components:

- Basic component, which is exogenous and common to all simulations: trade policy, i.e. the gradual reduction of tariff rates on EU import goods (provided by the EU-Jordan Agreement).
- Additional component, which is determined endogenously and is specific to each simulation: reform implemented by the Jordanian government to counterbalance fall in revenue.

Expected effects of opening up domestic trade

Fall in domestic prices due to reduction in import duties:

⇒ domestic demand rises, investment might go up and output might increase in the long-run,

⇒ loss in government revenue, which is partially offset by the expansion in the tax base;

⇒ government must compensate the fall in revenue by undertaking counteracting fiscal measures, such as a reduction in transfer to households or an increase in the domestic tax rates.

Impact on welfare

The impact on welfare might be ambiguous:

- lower domestic prices increase consumption and hence households' welfare,

- domestic complementary measures affect negatively disposable income of some household groups, who ceteris paribus reduce consumption; such an impact on welfare can be negative.

⇒ The overall impact on consumption and welfare of each household group depends therefore on the magnitude of the effects of lower consumption prices and lower disposable income.

Households are affected differently because they rely differently on income sources.

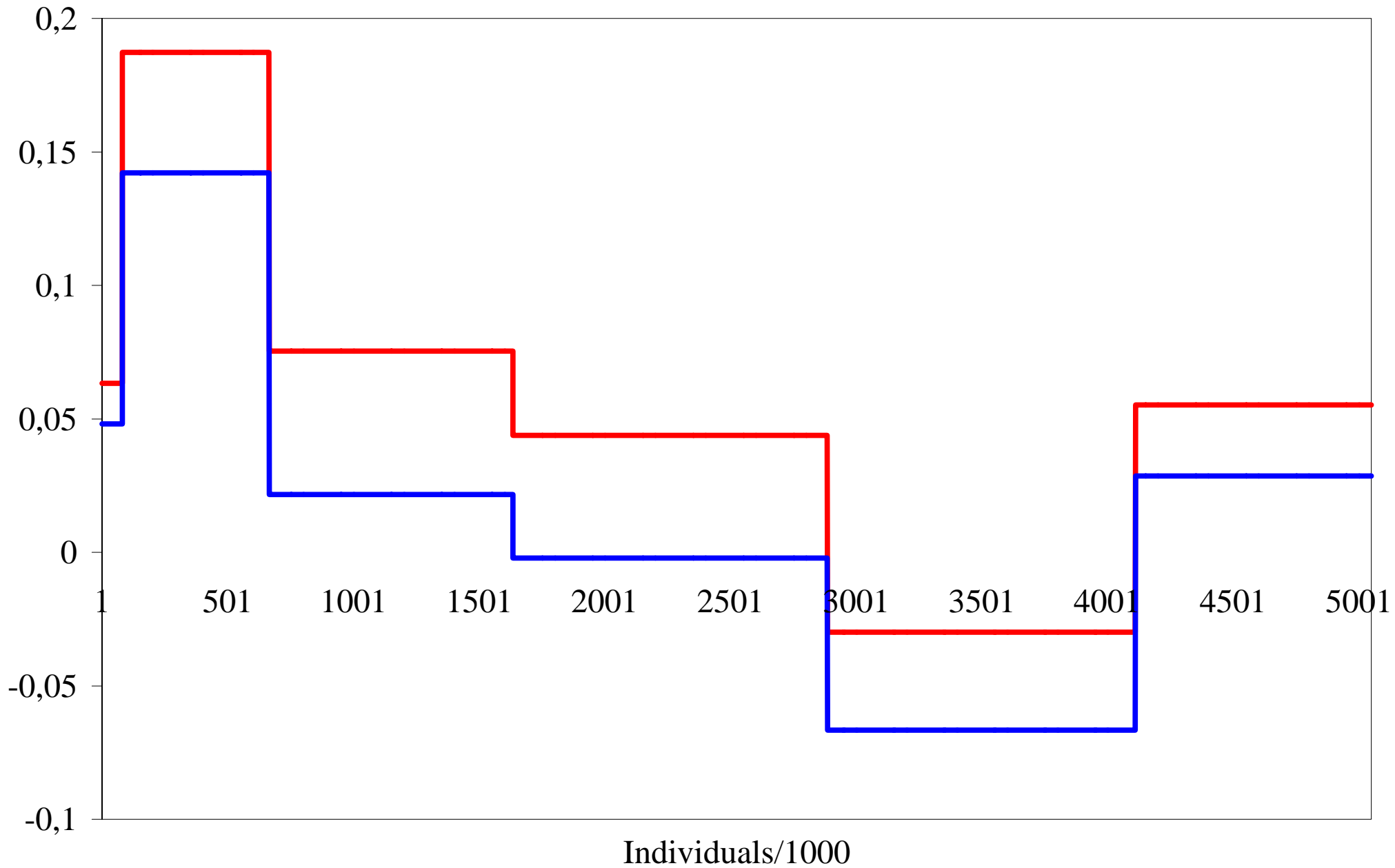
Scenario	Policy variables	HH1	HH2	HH3	HH4	HH5	HH6
1	Government transfers	0,06	0,19	0,08	0,04	-0,03	0,06
2	Government transfers; VAT 10% increase	0,05	0,14	0,02	0,00	-0,07	0,03

Welfare changes (percent)

Welfare changes %

— Scenario 1

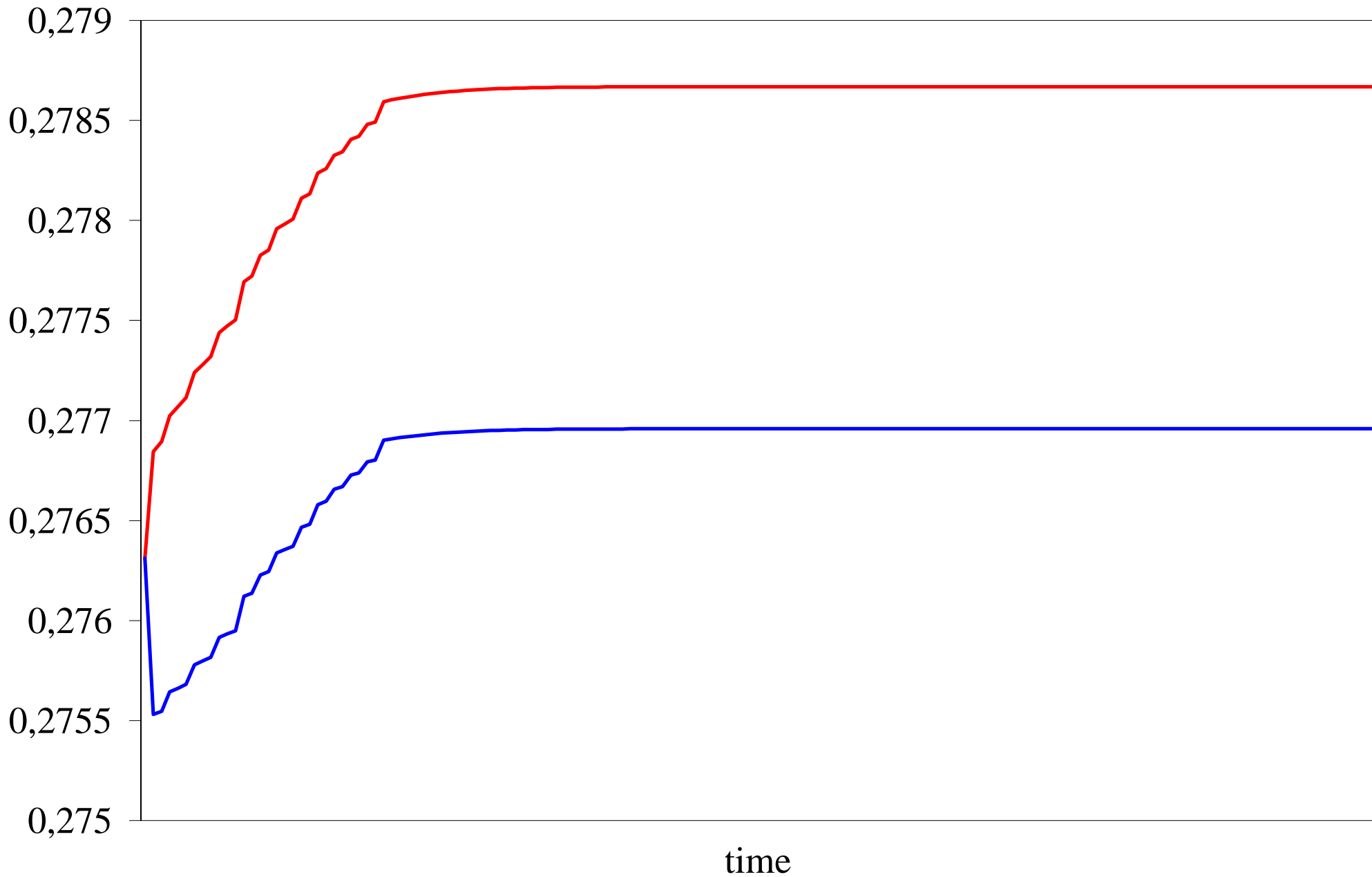
— Scenario 2



Gini coefficients

— Scenario 1

— Scenario 2



Consumption Scenario 1

— HH1

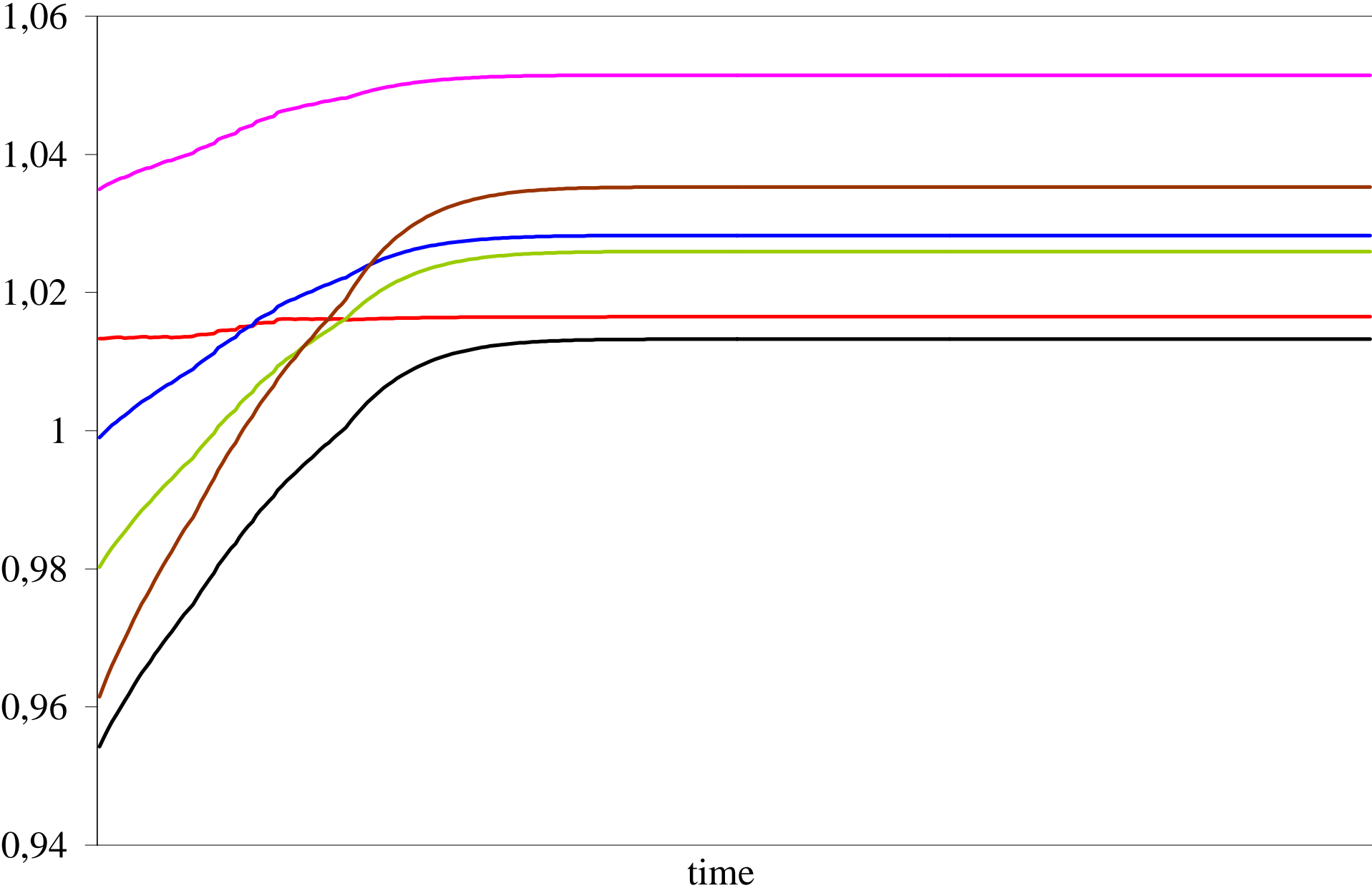
— HH2

— HH3

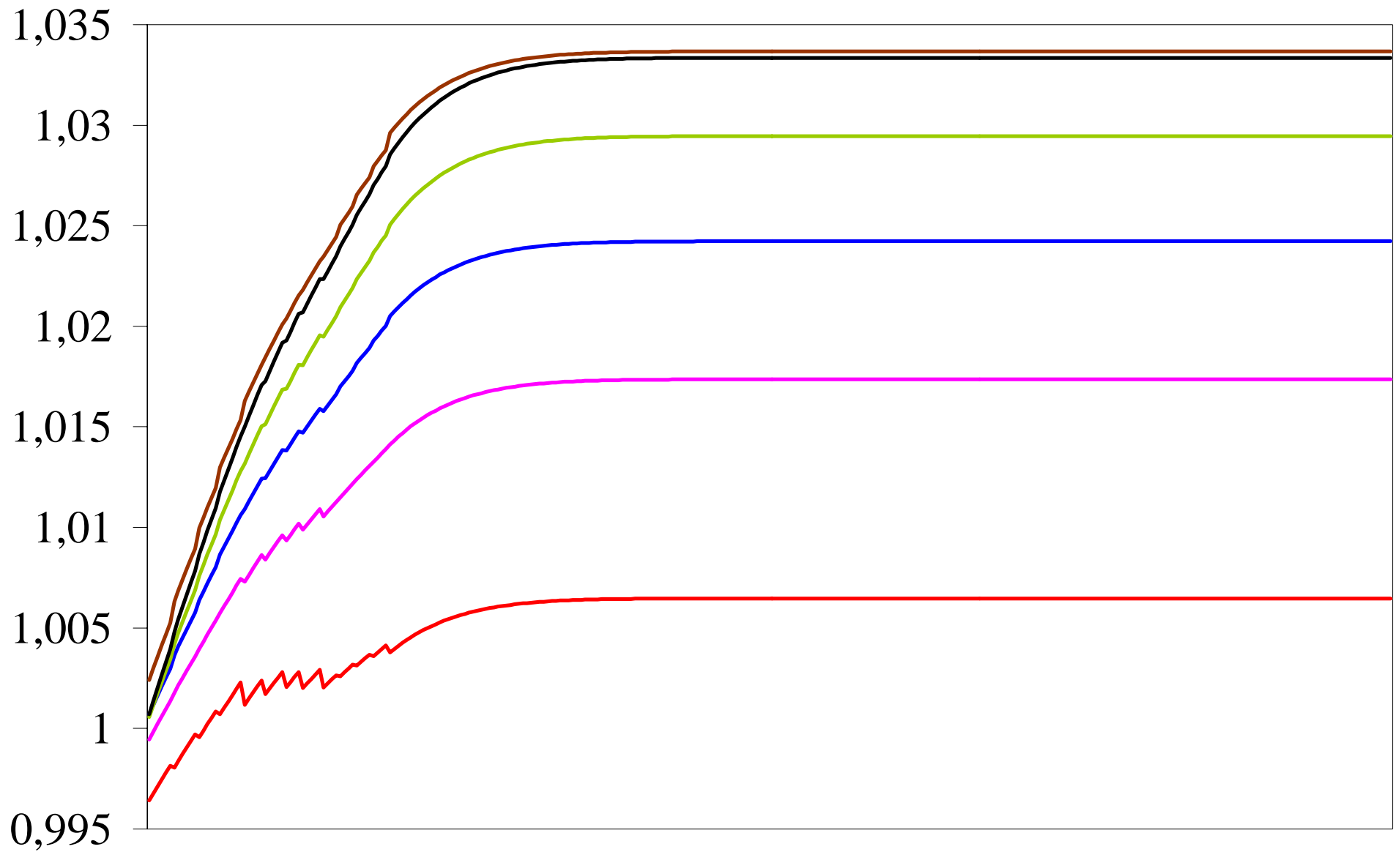
— HH4

— HH5

— HH6

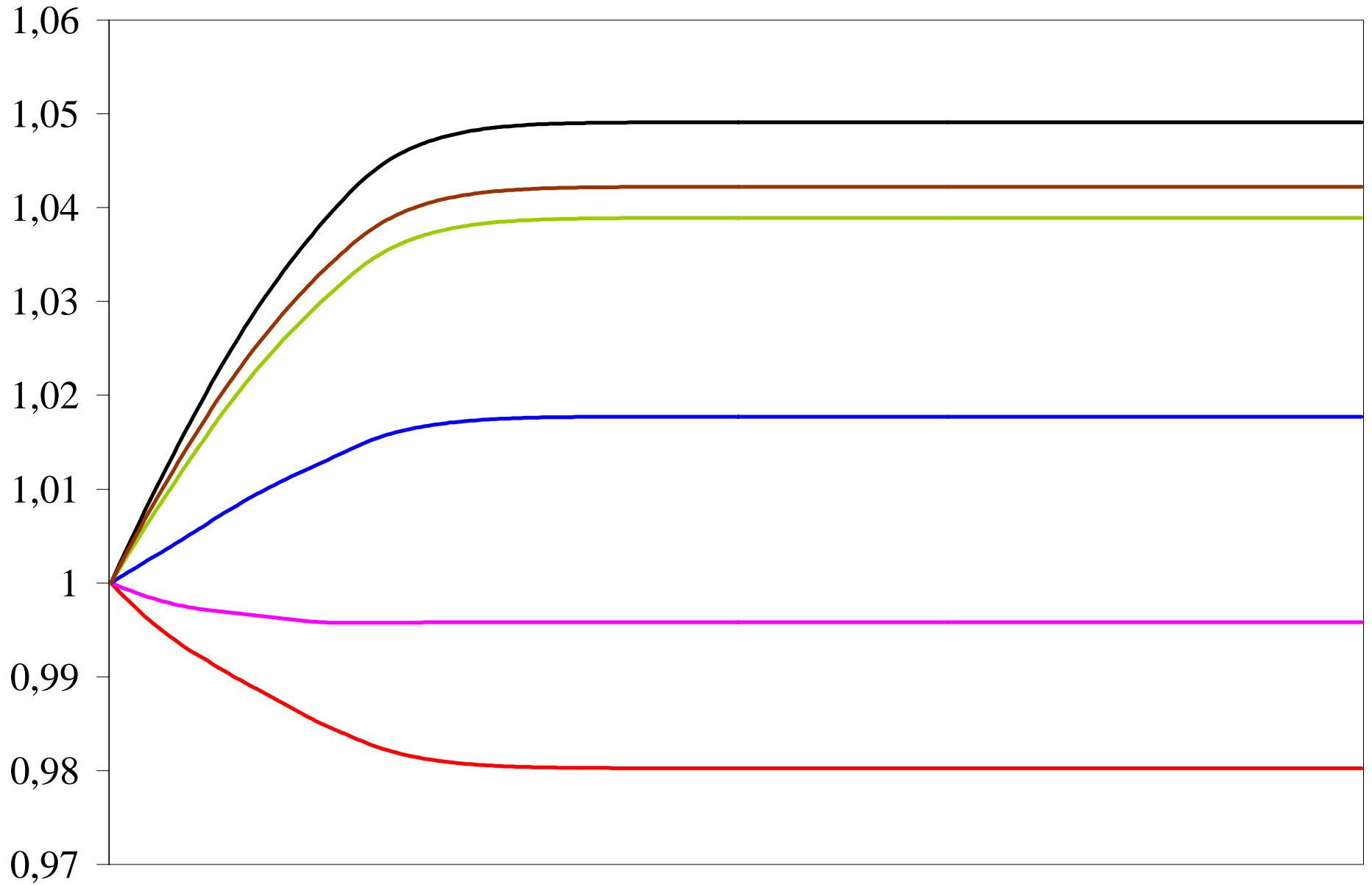


Income Scenario 1 — HH1 — HH2 — HH3 — HH4 — HH5 — HH6



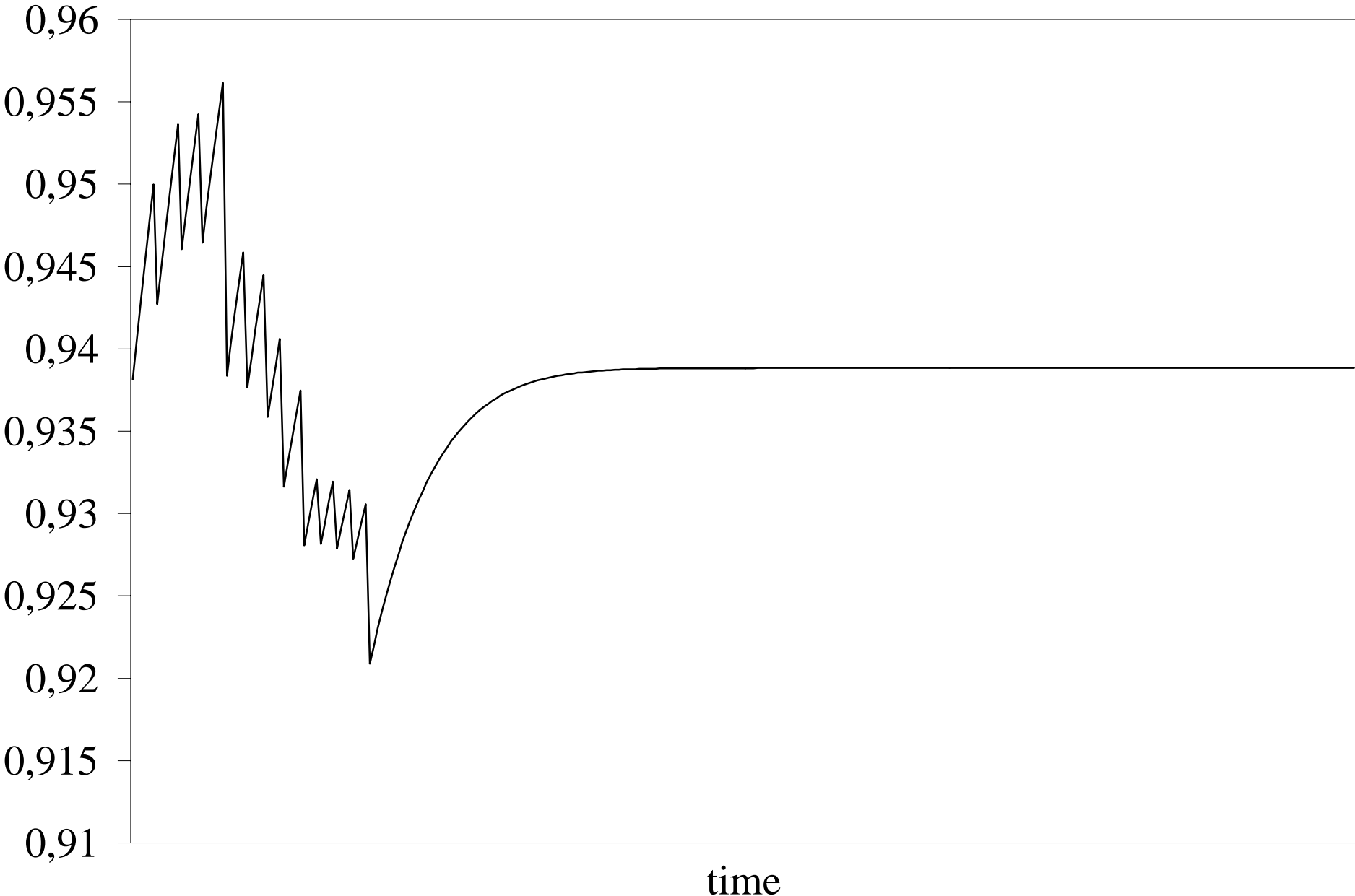
time

Capital Scenario 1 — HH1 — HH2 — HH3 — HH4 — HH5 — HH6

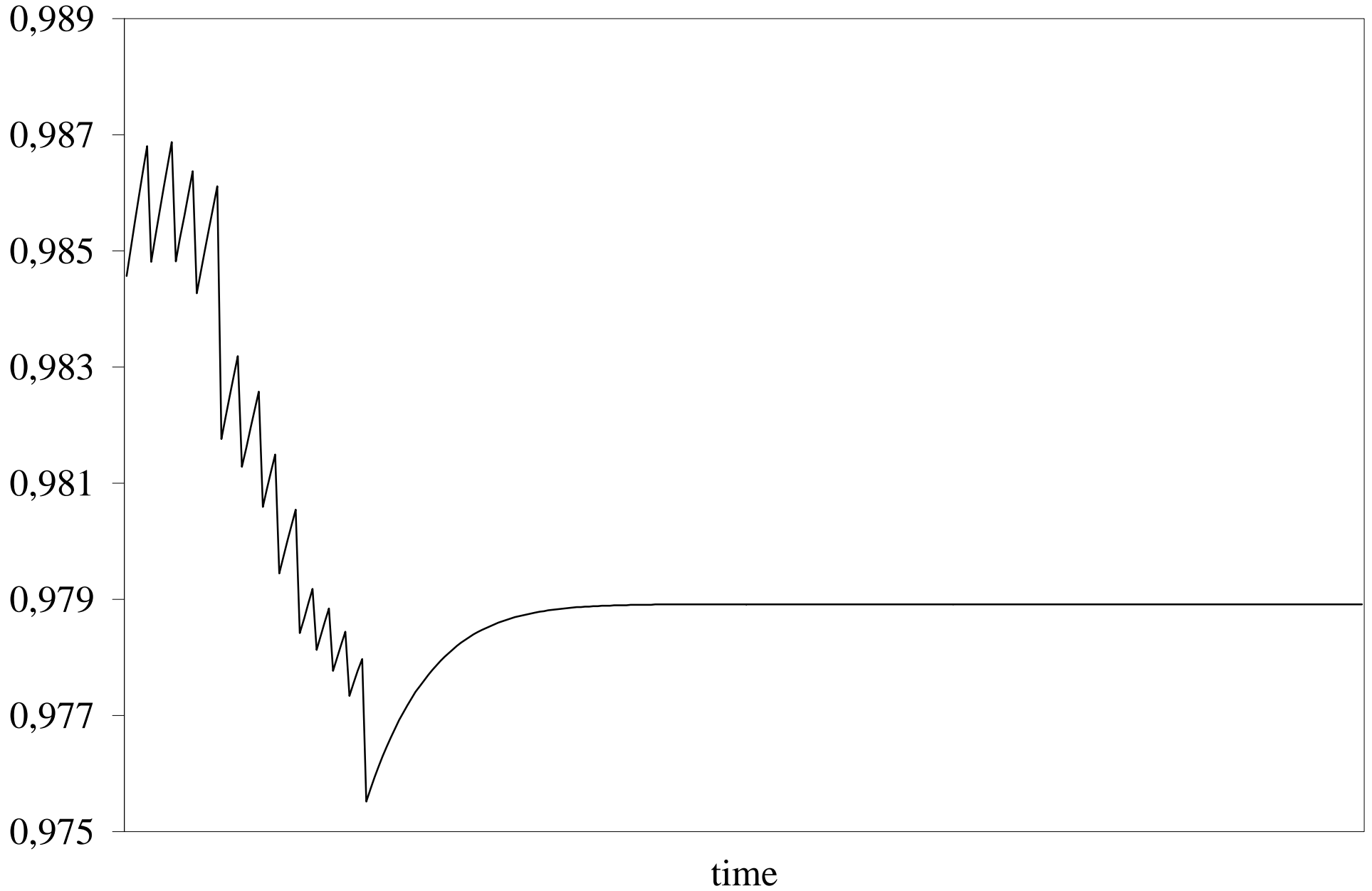


time

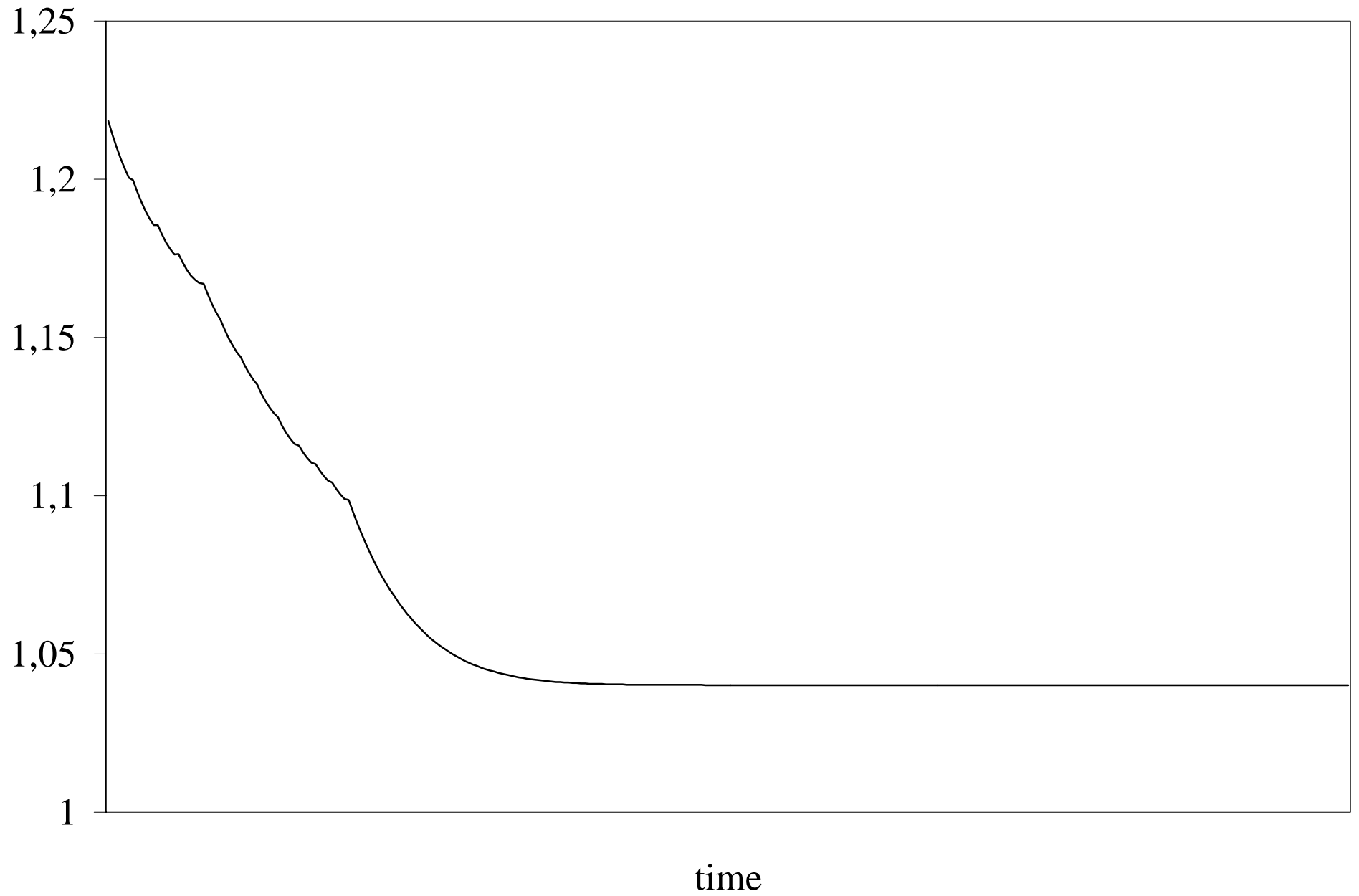
Government transfer Scenario 1



Government revenue Scenario 1



Investment Scenario 1



Aggregate Results

- Aggregate capital increases over time due to increased investment.
- Other aggregate variables are positively affected in the long-run (same behaviour as in the model with one representative household)

Effects on Heterogeneous Households

- As expected, trade liberalisation has different impacts across heterogeneous households
- Trade liberalisation alleviates poverty in the long-run
- Poor households in the economy are those who experience larger welfare gain
- Welfare increases for almost all groups

- One specific household group, the second richest one, is worse off under two scenarios. Therefore trade liberalisation is not always Pareto improving
- Inequality rises due to larger increases in capital income of richer households
- Poor households use their amount of capital assets to smooth consumption