



Balancing distributional equity and public budget constraints in the fossil fuel phase-out

Stefan Nabernegg¹, Teresa Lackner^{1,2}

¹ Wegener Center for Climate and Global Change, University of Graz, Austria

² Graz Schumpeter Centre, University of Graz, Austria

24.Klimatag, April 4, 2024



Motivation



- Large fossil fuel dependency of European countries (60% of EU final energy consumption) (*EuroStat, 2022*) including imports from geopolitically unstable regions
 - Heating as one driver of fossil fuel use and greenhouse gas emissions (17% of total energy related GHG emissions in EU) (*UNFCCC, 2023*)
- Green investment needs and public budget constraints
 - Strong increase in public deficits in the EU in recent years [4,9% p.a. 2020-2022 vs. 1,0% p.a. 2014-2019] (*Eurostat, 2023*)
 - (Underestimated) investment needs for carbon-neutral transition (*Kapeller et al., 2023; EC, 2020*)
- Policy ambition
 - Current political debate in Germany (Wärmewende) and Austria (Erneuerbare Wärme Gesetz, EWG)

Overview



- In this study, we
 - **estimate total investment** related to the fossil fuel phase-out in the residential housing sector for Austria based on micro-level household data
 - estimate necessary public funds of the current **subsidy program**, and analyse it with respect to **distributional equity**
 - derive **net investment** need across income groups (vertical equity)
 - and identify **determinants of horizontal equity**, i.e. drivers beyond income for adversely affects household groups

Method

Overview Microsimulation



- Starting point: every household will switch to a renewable heating system at some point during the transition phase (no endogenous investment decision)
- Investment costs depend on
 - Living area
 - Assumed heating system (transition matrix for building type and location)
 - Required thermal renovation

Method

Overview Microsimulation



- Subsidy scheme (based on communication of the ministry *(BMK, 2023)*)
 - Heating system
 - technology-specific flat-rate subsidies (Raus aus Öl und Gas)
 - full compensation for SFH home owner in lowest third of income distribution, up to a technology-specific threshold (Sauber Heizen für Alle, SHFA)
 - Thermal renovation: flat-rate subsidies (Sanierungsbonus)
- Database
 - Household budget survey (Konsumerhebung 2019/20 *(Statistik Austria, 2022)*)
 - 7,139 Household observations
 - Use of economic data, dwelling data, housing tenure, urban-rural typology
 - Assumption: investment costs for tenant-occupied dwellings are covered by landlords (based on distribution of residence real estate ECB HFCS *(Humer et al. 2015)*)

Results

Investment: Total



- Bottom-up estimate of total investment costs for heating fossil fuel phase-out (incl. necessary renovation)
 - € 67 bn over the transition period
 - Comparable range to top-down estimate
 - € 47-71 bn for total investment (public and private, renovation and heating systems, 2022-2030) *(Umweltbundesamt 2022)*
 - 28% of investment in tenant-occupied dwellings (importance of landlord-tenant relationships)

	Owner-occupied homes	Tenant-occupied homes
Heating system change	€ 14.5 bn	€ 3.6 bn
Required thermal renovation	€ 33.2 bn	€ 15.4 bn

Results

Subsidy program: total



- Support from the current subsidy program corresponds to estimated **€ 45.5 bn** over the phase-out period.
- Strongly increased estimate, compared to Austrian WEM scenario (subsidies for renovation and heating systems 2020-2050): **€ 13.1 bn** (*Umweltbundesamt 2022*)

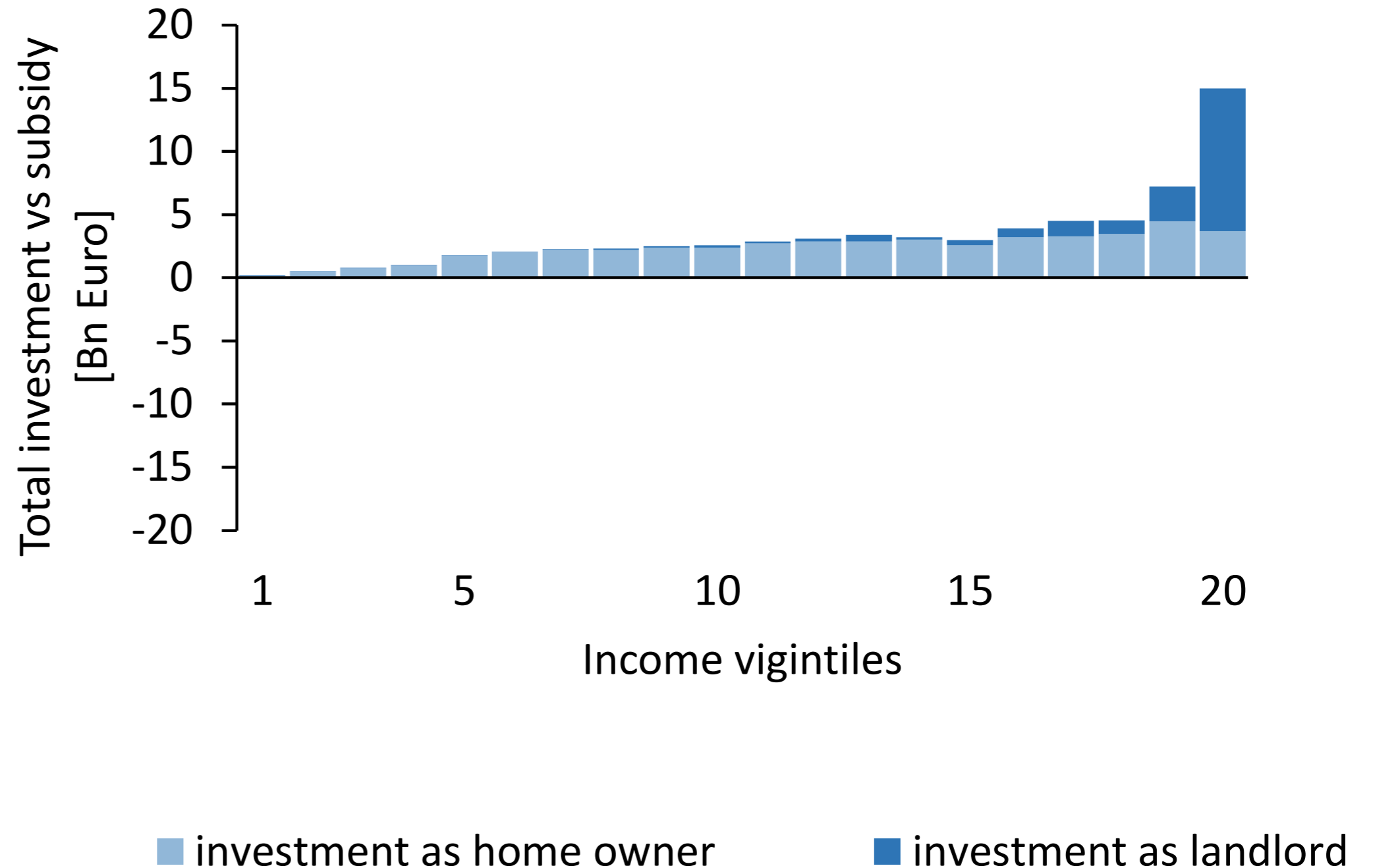
	Owner-occupied homes	Tenant-occupied homes	Total
Investment	€ 47.6 bn	€ 18.9 bn	€ 66.5 bn
Subsidies	€ 31.4 bn	€ 14.1 bn	€ 45.5 bn
Net investment	€ 16.2 bn	€ 4.8 bn	€ 21.0 bn

Results

Investment: distribution



- If landlords have to finance the phase-out in rented dwellings, 53% of the total investment need is attributed to high-income households [V16-20] (33% to V19-20 alone).
- Investment need for tenant-occupied dwellings is much stronger distributed towards high-income households than investment need for home owners

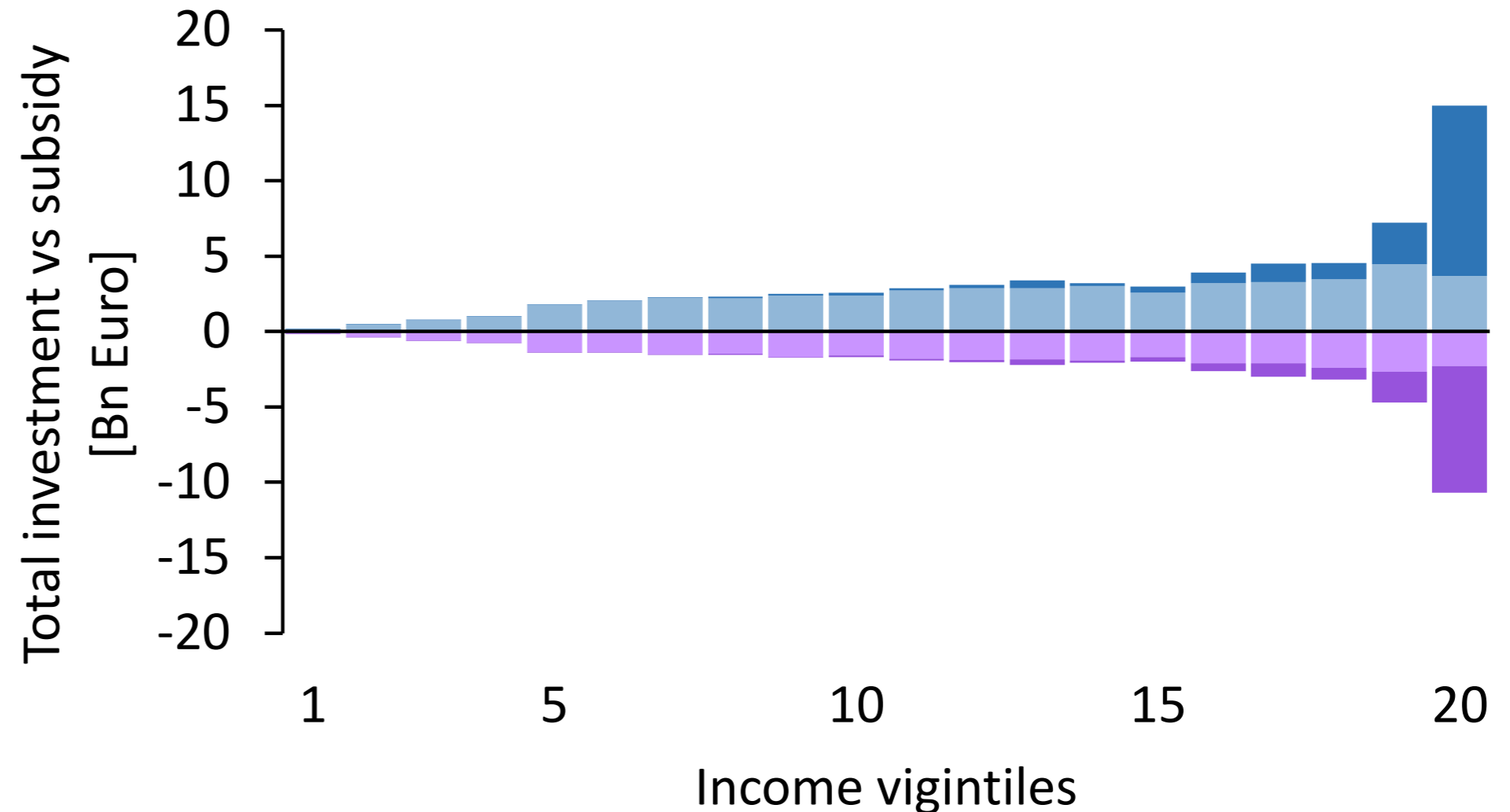


Results

Subsidy program: distribution



- Assuming that home owners and landlords finance investment and followingly receive subsidies, the subsidy scheme is progressive across income groups but high-income households [V16-20] receive 53% of government support.



■ investment as home owner

■ investment as landlord

■ subsidy for home owner

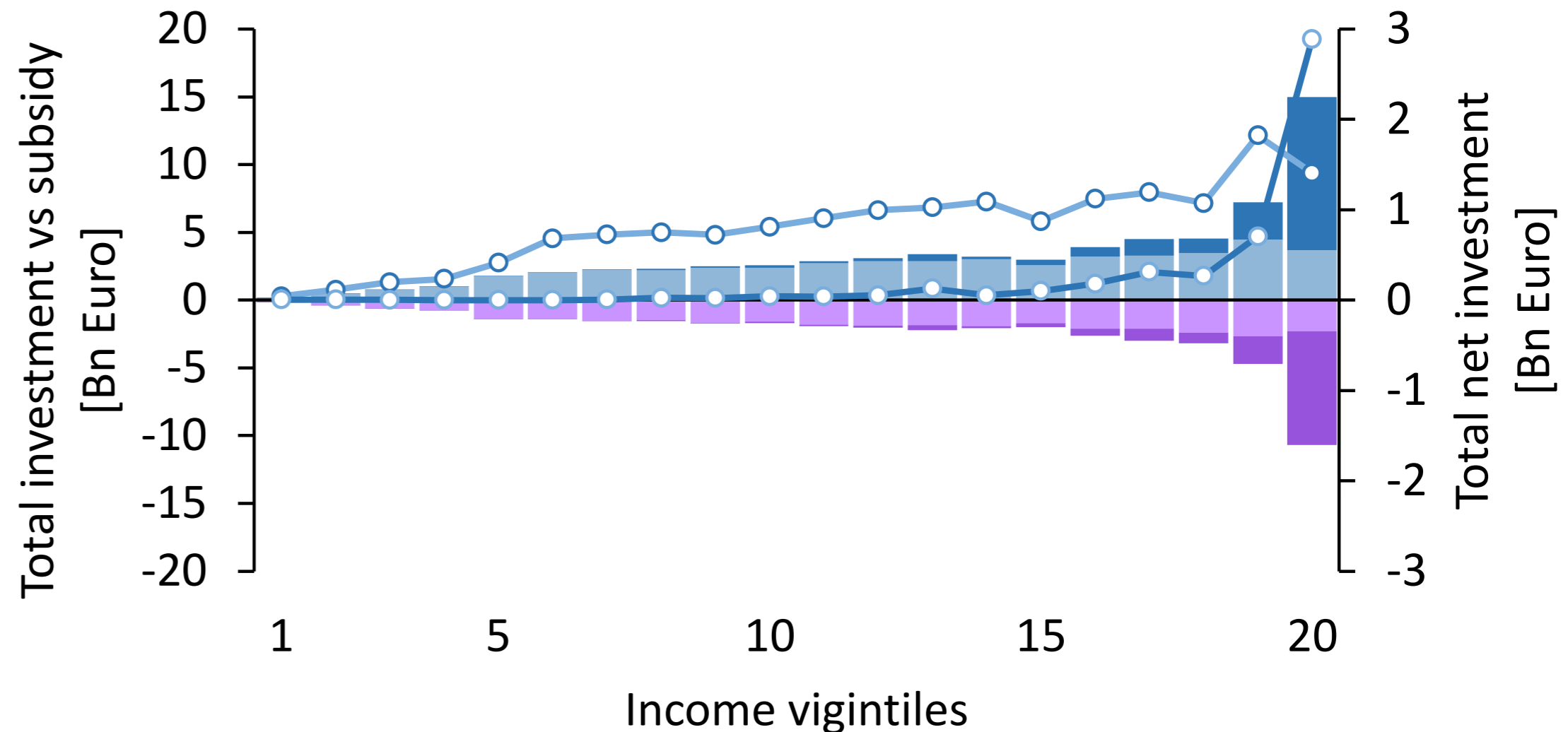
■ subsidy for landlord

Results

Net investment: distribution



○ progressive (vertical) distribution of net investment for home owners and especially landlords



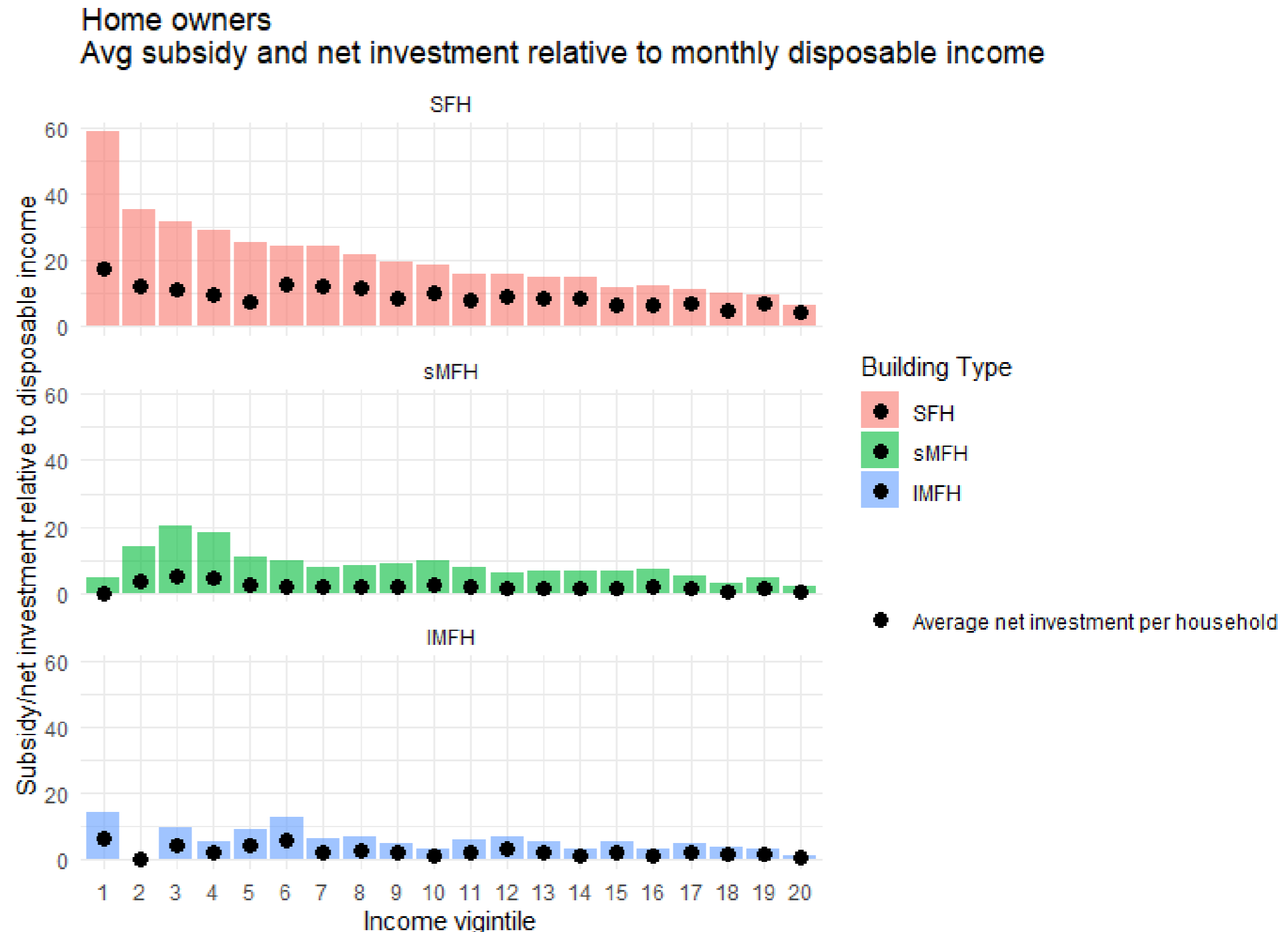
- subsidy for landlord
- subsidy for home owner
- investment as landlord
- investment as home owner
- net investment as home owner
- net investment as landlord

Results

Net investment: Home owners



- The specific subsidy program for low-income households (SHFA) makes the subsidy scheme progressive.
- However, SHFA does not address home owners in MFHs and thermal renovation investment.
- The largest financial burden in terms of net investment remains on lowest-income home owners.



Summary



- Investment need of € 67 bn over the transition period, corresponding to ~2,5% annual national investment (until 2040)
- More than two thirds financed by public subsidies of € 46 bn, corresponding to 40% of pre-COVID total annual public subsidies (until 2040)
- More than halve of these subsidies go to the high-income households

Policy conclusions



- The subsidy scheme is compensating for higher relative investment needs of (most) low-income households (i.e. progressive)
- However it is not compensating the high relatively investment need of low-income home owners in MFHs and cooperative housing and for renovation investments in general
- A mandated phase-out with an income-based cap on subsidies for the highest income deciles could address public budget constraints without compromising equity considerations.



Thanks!

Stefan Nabernegg¹, Teresa Lackner^{1,2}

¹ Wegener Center for Climate and Global Change, University of Graz, Austria

² Graz Schumpeter Centre, University of Graz, Austria

stefan.nabernegg@uni-graz.at

24.Klimatag, April 4, 2024