Demographic Change and Tax Revenues – Results from a Large Microsimulation Model for Germany Lena Calahorrano, Luca Rebeggiani, Sven Stöwhase and Martin Teuber

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Overview

- What are the tax revenue effects of demographic change?
- Micro simulation of long-term changes (2015-2060) in tax revenue induced by a shrinking workforce
- Overall a negative impact on income and sales tax revenue
 - Increased deductibility of old-age and health insurance provisions
 - Smaller and older population consumes less overall and more goods exempt from sales tax
- Precise results depend on assumptions regarding labor demand, size of net migration and tax tariff adjustments
- Expected economic growth increases absolute tax revenue but comparison to a scenario without demographic change shows the relative losses

Relation to the Literature and Data Used

- One of the first attempts to estimate effects of demographic change on tax revenue, as compared to government spending (social security)
 - 'Tragfähigkeitsbericht' regularly edited by the German Ministry of Finance
- Microsimulation approach by Flory & Stöwhase (2012), incorporating techniques developed by Merz (1994) and Quinke (2001)
 - Mapping the German income tax code into computer code
- Data: Anonymous micro-level tax data (FAST) from the German statistics office, based on a stratified 10 percent sample (3.9m tax payers), 2007 as latest year available
- Calculated income and taxes deviate only by 1% from official aggregate statistics

What will the future Tax Payer Population look like?

• The reference scenario consists of a constant population (Scenario 2), Scenario 3 implies an older and Scenario 6 a younger population

Assumptions of the population scenarios

	scenario 2	scenario 3	scenario 6
Fertility (children per woman)	1.4	1,4	1.6
Life expectancy at birth for boys (years)	84.8	86.7	84.8
Life expectancy at birth for girls (years)	88.8	90.4	88.8
Long-term migration balance (persons per year)	200,000	100,000	200,000

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Model Assumptions

- Determine labor force participation rates based on age, gender and employment status with the help of two interconnected macro models (by Prognos)
- Retirement starting at 65 in 2015 and at 67 from 2030 onwards
- Increase in life expectancy leads to lower pension values
- Assume the share of married people as well as single mothers to be constant
- Simulations based on tax regulations of the year 2015

	2015	2030	2045	2060
scenario o	40.9	41.7	42.0	42.1
scenario 2	41.2	41.5	39.0	36.4
scenario 3	41.2	40.7	37-4	33.9
scenario 6	41.2	41.7	39.8	38.1

Number of tax payers

Income Tax Revenue Projections

- Stretch the future income tax tariffs by multiplying all tax brackets with a year-specific factor
 - This keeps a constant ratio of income tax revenues to GDP
- Note that economic and income growth increase absolute income tax revenues

	2015	2030	2045	2060
scenario o	290	355	420	495
scenario 2	290	350	380	415
scenario 3	290	345	370	390
scenario 6	290	350	385	435
scenario 2 with a	200	105	r60	760
constant tax tariff	290	405	200	700

Income tax revenues in absolute terms

In billion real 2015 euros.

Revenues from Income Tax compared to the Scenario without Demographic Change



Income Tax Revenue Components

- High impact of increased deductibility of pension contributions on income tax revenue
 - Particularly in demographic change scenarios (high contribution rates if few contributors)
- Tax deductibility of old-age and health insurance provisions also plays an important role
- Transition to full taxation of pension income increases tax revenue
 - But mean pensions are lower
- \Rightarrow Deferred taxation of pensions has a negative balance

Sales Tax Revenue Modeling

- Aging population has a higher propensity to consume...
- ... but also lower income and spends more on VAT exempted items such as healthcare
- Engel-Curve-Model based on EVS (Einkommens- und Verbrauchsstichprobe) comprising nearly 60,000 households
- Assume constant relative prices and constant preferences

Consumption Structure by Age in 2008



Comparison to the Scenario without Demographic Change

- Take into account economic growth \Rightarrow Higher sales tax revenues in absolute terms
- Accounting for changing consumption patters over age groups, sales tax revenue decreases relative to base



Conclusion

- Severe impact of demographic change on tax revenue
- In 2060, compared to the case without demographic change
 - income tax revenue could drop by up to one fifth
 - sales tax revenue could drop by up to one fourth
- The paper complements the literature on the public spending side effects of demographic change by highlighting the effects on the revenue side

Major Points

- There are three major sources of uncertainty in the simulation: 1) the payers, 2) the tax code, and 3) tax payer income and its distribution. Paper mainly tackles 1) and, to a lesser extent, 2) but is basically silent on 3).
- Paper could benefit from a better description of some of the key inputs, e.g. consumption/ income growth, LFP across age groups, or income inequality (old age poverty with replacement rates below 45%).
- Focus on absolute numbers is not very tangible, even if put in relation to baseline scenario. Couldn't many figures be better expressed as ratios of GDP or ratios of all tax revenue?
- Consider playing through a few radical scenarios to raise policy relevance? More immigration? Changes in the tax code? Retirement at 69 progressively introduced form 2030 onward?

Input assumptions

- Interrelation between public spending and tax revenue generation? Does the budget always balance? Maybe other effects from the shifts in higher spending which affect tax revenue, e.g. health care?
- What are the assumptions concerning the immigrants in the model (100,000 vs 200,000)? Same median age as the native population, same jobs and wages? What about a high immigration scenario?
- Are there any aggregate demand responses to aging in terms of consumption growth? Could aging alter (depress) the interest rate environment permanently? What about continued negative real interest rates?

Employment and income distribution

- Assumption of distribution-neutral economic growth is very strong. Maybe look at a scenario where the rich benefit more than the poor and what this means for their spending patterns in 2060?
- Assumption of constant employment patterns now and in 2060 is strong. What about skill-biased technological change?
- People keep on performing high-skilled task beyond retirement age (and earn more), others in jobs with more physical components do not and can't retire so late.

Wish-list/ recommendations

- Better display of the population structure going forward. Working age people on top of tax payers. Share of tax payers of total pop. LFP rates maybe even by age groups.
- Time series graphs of GDP (aggregate) and GDP per capita/ income, definitely aggregate and per capita consumption, total population by groups, etc. What is the ratio of income to GDP per capita growth?
- Succinct but clear description of the VIEW and OCCUR models by Prognos. Black boxes in this paper.
- Diminishing aggregate income (page 21)?