

Supplementary material to "Pension Reform with Variable Retirement Age – A Simulation Analysis for Germany"

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In order to test the sensitivity of our results with respect to central assumptions of the model, we have simulated the initial equilibrium path and the pension reform 2007 with four different parameter configurations:

1. In order to generate an improved profile of the retirement pattern, we have reduced the standard deviation σ of mental benefits of retirement from $\sigma = 3 \times 10^{-4}$ to $\sigma = 3 \times 10^{-5}$ and adjusted the expectation value of the low skilled from $\mu_1 = 2.1 \times 10^{-2}$ to $\mu_1 = 4 \times 10^{-2}$;
2. In order to test the sensitivity of the skill-specific life expectancy, the model is also simulated without differences in life expectancies within cohorts (i.e. all skill classes have the life expectancy of the middle-skilled class);
3. In order to test the sensitivity of the results with respect to the declining productivity profile after age 60, we have also simulated the model with a much slower decline of productivity. In this case, low- and middle-skilled productivity decline to zero within fifteen years (instead of ten) and high-skilled productivity reaches zero at 80 years (instead of 75).
4. Finally, as suggested by a referee, we have simulated the model with a Stone-Geary utility function where the subsistence level amounts to 20 percent of median income.

Table 1 compares the initial benchmark equilibrium from Table 4 in the paper with the results when we simulate the model with the alternative assumptions described above. As one can see, differences in the macroeconomy are only minor, even the changes with Stone-Geary utility are fairly small.

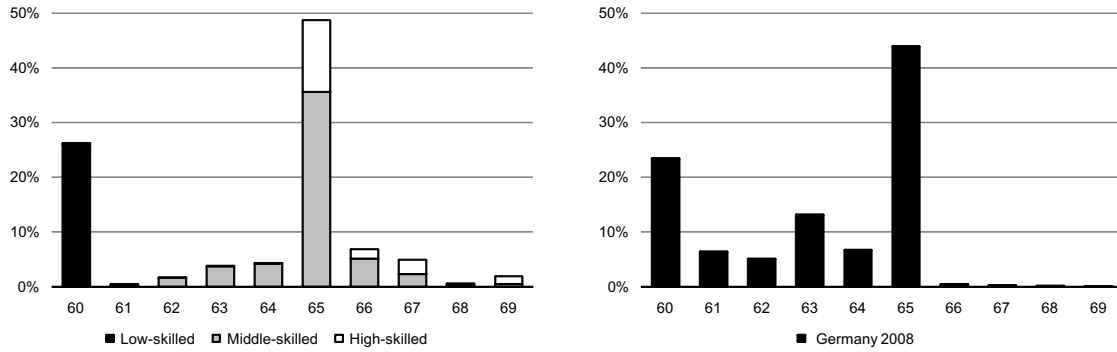
As shown in Figure 1 it is possible to generate the two peaks at age 60 and age 65 in the model by adjusting the variance of mental benefits and the expectation value of the low-skilled.

Nevertheless we decided not to apply this calibration since it implicitly fixes the retirement behavior of the low-skilled class. As shown in Figure 2, since the variance of mental benefits is so small, retirement age of low-skilled is nailed down to age 60 for the whole transition. Even with a higher adjustment factor low-skilled individuals do hardly change their retirement behavior.

Table 1: Sensitivity of the initial equilibrium

	Benchmark	mental benefits	life expectancy	productivity	utility function
Private consumption	62.5	62.7	62.5	62.6	64.0
Gov. consumption	18.5	18.6	18.5	18.5	18.8
Gross investment	19.0	18.7	19.1	18.9	17.2
Pension benefits (in %)	13.9	13.9	13.9	13.9	13.9
Tax revenues (in %)	20.4	20.5	20.4	20.4	21.5
Interest rate	4.6	4.7	4.7	4.7	5.9
Capital-output ratio	2.9	2.9	2.9	2.9	2.6
Retirement age					
Low-skilled	60.4	60.0	60.4	60.4	61.2
Middle-skilled	63.3	65.0	63.3	63.5	63.8
High-skilled	64.8	65.7	64.6	64.8	64.6

Figure 1: Adjusted Retirement behavior in the initial equilibrium



Consequently, with this parametrization mental benefits completely determine retirement of low-skilled. This contradicts the intention of our model and does (in our opinion) not reflect reality. As argued in our paper, the differences in retirement behavior are due to institutional details which are not considered in our simulation model. We therefore decided to accept the deviations from actual retirement behavior in our model.

The two other assumptions mentioned by the referee which might affect the pattern of retirement ages have only little impact. As shown in the left part of Figure 3, the pattern of retirement in the initial equilibrium remains almost unaffected if all skill types have the same life expectancy. The right part of Figure 3 shows that also a rise in old-age productivity has little impact. In both cases, the retirement pattern from Figure 3 of our paper is almost the same.

A different preference structure has a stronger impact on retirement. If we simulate the model with

Figure 2: Adjusted Retirement behavior in the baseline and pension reform 2007

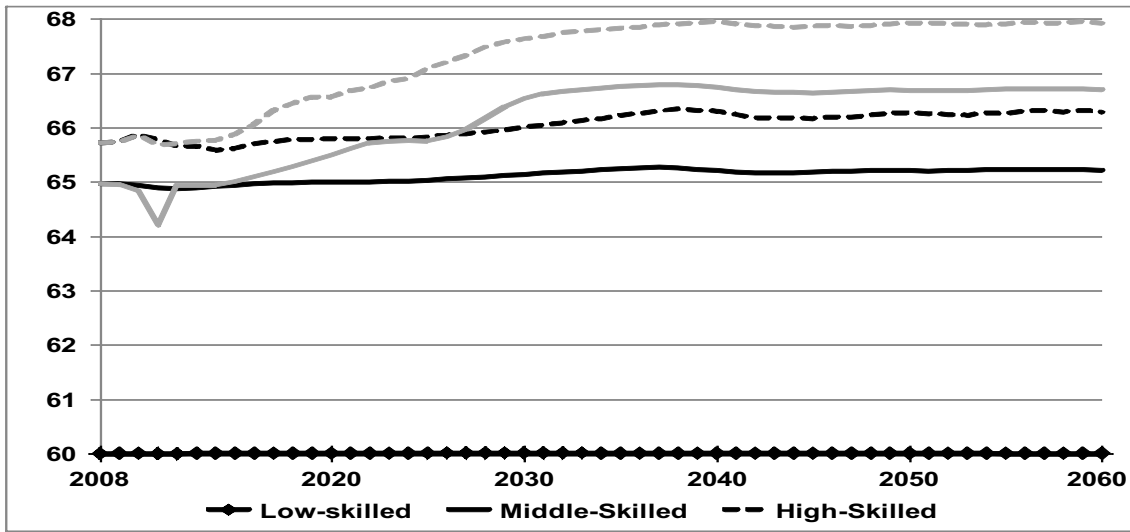
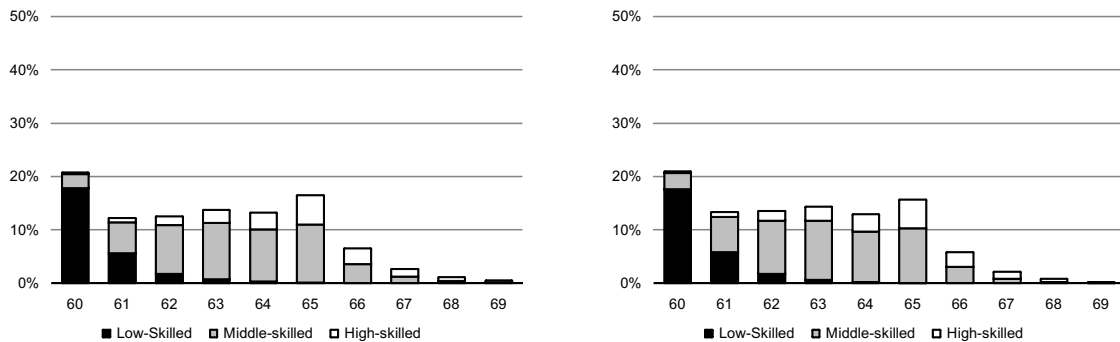


Figure 3: Impact of life expectancy and productivity on retirement behavior



Stone-Geary preferences, people retire later in the initial equilibrium. Note, however, that with non-homogenous utility we have to interpret the mental cost in a different way. Of course, the referee is right with respect to the development of the poverty rate with Stone-Geary preferences. The following Table 2 compares the development of the poverty rate on the baseline path (shown in Table 5 of the paper) and on a simulated path with Stone-Geary utility functions. As claimed by one of the referees, the development of the poverty rate is very sensitive to the choice of the utility function. With Stone-Geary utility, low-income households would increase their private savings much stronger when pension benefits decline in the future. As a consequence, poverty rates increase much less than before.

Keeping this qualification in mind we still think that it is useful to retain our preference structure. Welfare and efficiency consequences of our policy reforms have to be computed quite differently with Stone-Geary preferences. Since Stone-Geary preferences are hardly applied in numerical general equi-

Table 2: Poverty rates on baseline path

	2008	2020	2030	2040	2050	2060
Benchmark preferences	2.7	6.3	6.9	10.3	10.5	9.7
Stone-Geary preferences	2.3	2.6	4.4	4.6	4.9	4.7

librium models, it would be difficult to compare our welfare results with those of other studies.

Finally, we compare in Table 3 the sensitivity of the pension reform 2007 with respect to the specific parameter configurations described above. The left column again reports the numbers from the benchmark calibration in Table 6 of the paper. In our opinion, the impact of the reform on the mean retirement age is very robust. Consequently, even Stone-Geary preferences do not qualitatively change the results reported in the paper. One has to keep in mind, however, that in the second column (adjustment in the mental benefits) only middle- and high-skilled households change their retirement age after the reform.

Table 3: Macroeconomic effects of pension reform 2007

	Adjustment with respect to				
	Benchmark	mental benefits	life expectancy	productivity	utility function
Capital stock					
2020	-0.7	-0.4	-0.7	-1.0	-0.3
2040	1.1	1.4	1.0	0.6	0.8
2060	2.8	2.1	1.9	1.3	2.4
Employment					
2020	0.0	0.0	0.0	-0.1	0.3
2040	0.4	0.4	0.3	0.4	0.9
2060	0.4	0.4	0.3	0.5	1.1
Wage rate					
2020	-0.2	-0.1	-0.2	-0.2	-0.1
2040	0.1	0.2	0.1	0.0	-0.1
2060	0.3	0.4	0.3	0.2	0.2
Consumption tax rate					
2020	0.0	0.0	0.0	0.1	-0.1
2040	-0.3	-0.4	-0.3	-0.3	-0.5
2060	-0.4	-0.5	-0.4	-0.4	-0.7
Contribution rate					
2020	-0.6	-0.7	-0.6	-0.6	-0.7
2040	-1.4	-1.4	-1.4	-1.4	-1.3
2060	-1.5	-1.5	-1.5	-1.4	-1.3
Mean retirement age (in months)					
2020	4.8	6.0	4.8	4.8	6.0
2040	12.0	13.2	10.8	13.2	14.4
2060	12.0	13.2	10.8	12.0	13.2
Poverty Rate					
2020	-1.9	-0.4	-0.1	-0.1	0.2
2040	-1.2	0.2	-1.5	-1.5	0.6
2060	0.0	2.8	0.1	-0.2	2.1

*Changes compared to the baseline path.