Beregninger til Arbejdsmarkedsrapport 2013.

- Changing Employment with a constant Budget.

October 2013

Indledning

The following three experiments are performed. All of them aim to increase effective full time employment by ten thousand workers. This quantity is the product of four factors: population size, labor force participation rates, individual labor supply quantities (they are age dependent among other factors), and regulatory standard full employment working hours.

The first experiment moves people out of cash assistance (Kontant Hjælp) and into full time employment. This is an exogenous shift of population across subgroups and increases the total labor force. This increase in the labor force is almost entirely absorbed by employment.

The second experiment moves people out of unemployment (Dagpenge) and into full time employment. Here the labor force is unchanged and unemployment falls as employment increases.

The third experiment increases working hours for all employed population. This calibrates the number of hours per day a full time employed worker is expected to work. The labor force remains unchanged. Employment rises marginally.[1] This last experiment has one particular characteristic. Unlike the other two experiments it freezes wage indexation at the baseline level as changing hours affects wage indexation. Without this additional twist employment would fall marginally.

The different experiments have different assumptions regarding the productivity of entrants into employment. New full time workers coming from cash assistance have a different productivity than those already employed, and different from new workers coming from unemployment. This difference in productivity is assumed to be permanent.

All three experiments have the following in common: they all target the same increase in the number of final effective employment, they all keep the primary government budget fixed at the baseline scenario, they all compensate for a fixed baseline budget with an increase in the effective earned income tax credit rate (Beskæftigelsesfradrag), and they all phase in linearly the changes from an initial period in 2014 up to a final state six years later in 2020.

Because of the existence of small variations in the impact on the labor force across time and across experiments, we set all experiments such that the average labor force impact over the last 100 years of the sample yields exactly 10.000.

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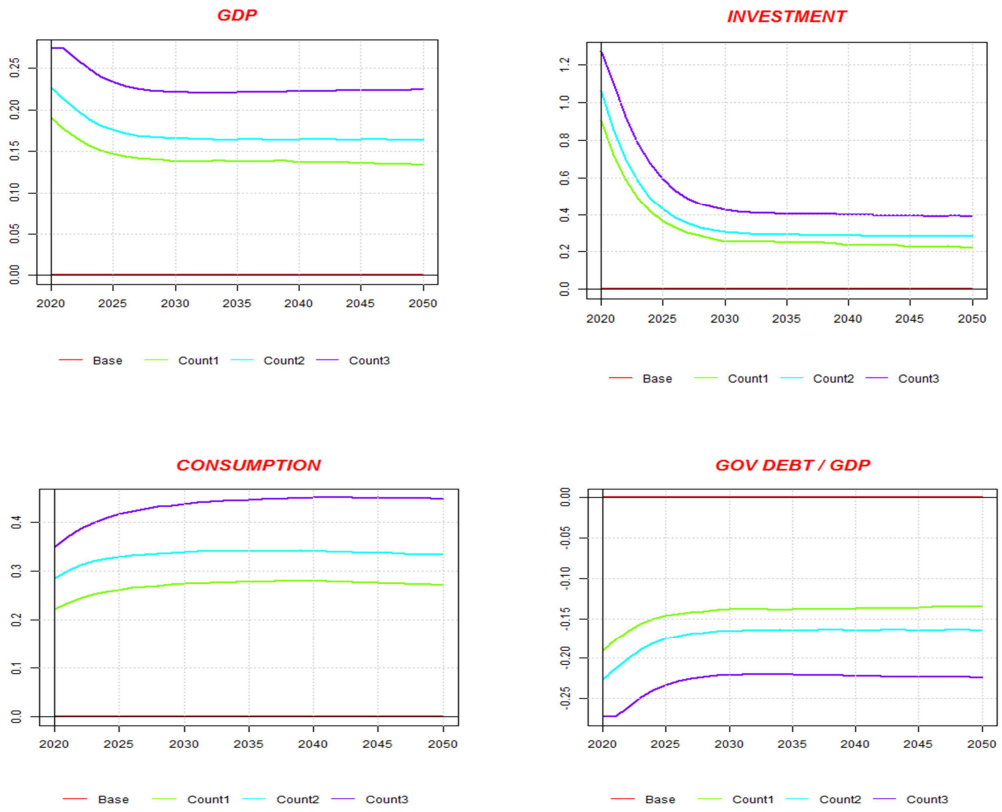
[1] In all cases wages are responsible for the bulk of the adjustment in order for the market to clear. There is some endogenous variation in the number of employed and unemployed people, but it is of small magnitude.

Makroøkonomisk virkning[2]

In what follows we detail differences between the experiment scenarios and the baseline scenario. Details of the baseline run can be obtained in a related report.[3]

All three experiments have similar qualitative macroeconomic impact. Output and consumption increase, and, since we hold the government's primary budget fixed at the baseline path, government debt as a fraction of GDP falls. These effects amount to an increase of around 0.2% of GDP in the strongest of cases which is that of increasing hours worked. Investment also shows a predictable effect. The percentage increase in investment is greater in the medium than in the long run since the initial increase in the labor force raises the marginal product of capital which triggers investment. As the level of capital increases the marginal product falls and the incentive to continue investing falls too, approaching a slightly higher long run value that accommodates depreciation on a higher capital stock. The following graphs show percentage changes[4] relative to the baseline for all four variables:



Regarding the external balance, the current account and net foreign asset position deteriorate. Given that income increases imports increase, but given that wages fall (see below) exports become slightly more competitive and increase also. The net effect is therefore moderate. Around 2050 this amounts to around one percent deterioration in the current account and two percent deterioration in the net foreign asset position. At that point in

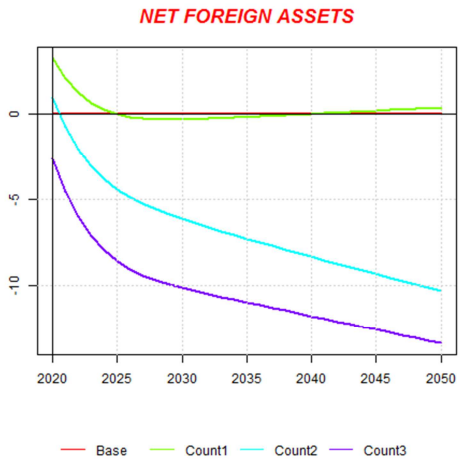
[2] The appendix contains tables with further detail on both macroeconomic and public finance variables.

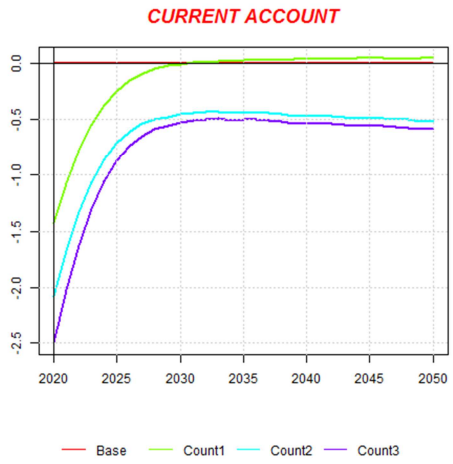
[3] "Beregninger til Arbejdsmarkedsrapport 2013. Balanceregel for den offentlige saldo."

[4] 100x(counterfactual/baseline-one)

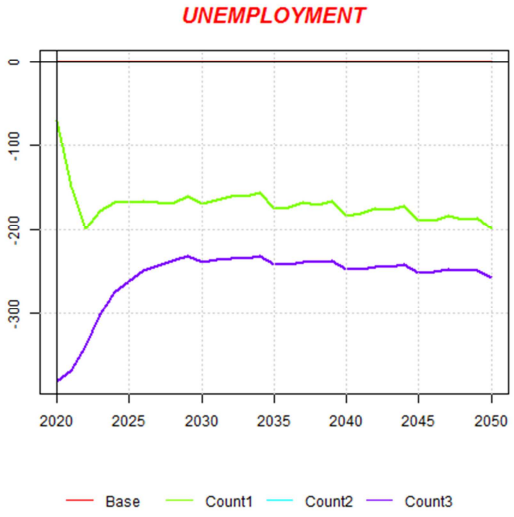
time the projected baseline net foreign asset position is negative at around 30 percent of GDP.

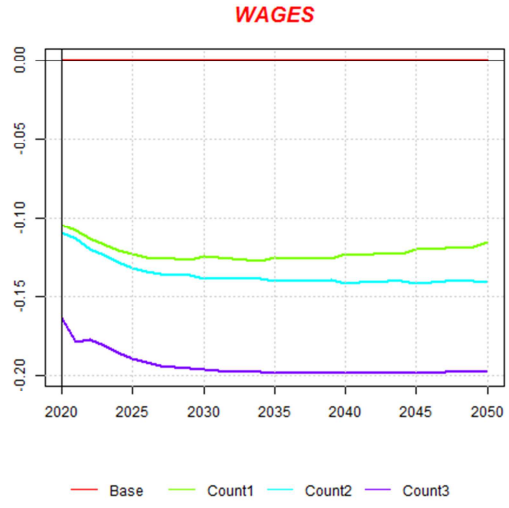
The following graphs show absolute differences (counterfactual minus baseline) in Net Foreign Assets and in the Current Account:[5]





In terms of the labor market, we increase effective labor supply in all experiments. The right hand side figure below shows percentage changes in wages relative to the baseline. Wages fall initially and then stabilize as capital accumulates. Since the increase in the labor supply is small in aggregate terms, the effect on the endogenous unemployment *rate* is also small. However, we can count the change in the number of unemployed people relative to the baseline. As shown in the graph below in counterfactual 1 (moving people out of cash assistance) the long run number of unemployed people falls by around 200, while in counterfactual 3 (increasing hours worked) this number falls by around 250.[6]

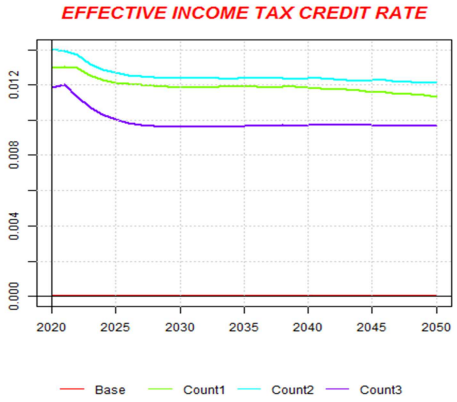


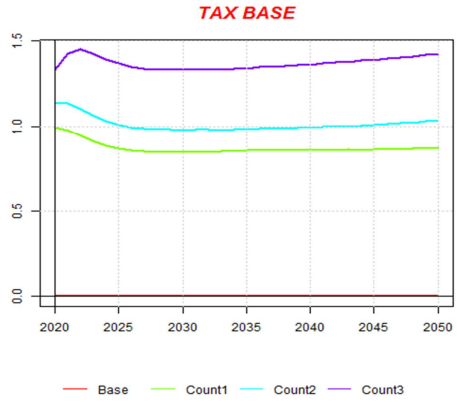


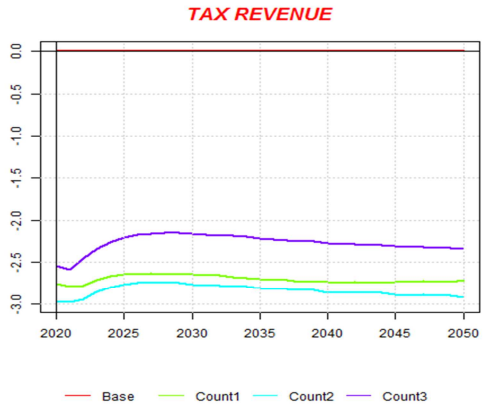
[5] Absolute differences change sign, so they are easier to interpret than percentage changes.

[6] In counterfactual 2 we target directly the number of unemployed which falls by around 10.000. This is not visible in the figure because the magnitudes are too different relative to counterfactuals 1 and 3. In counterfactual 3, if we do not freeze wage indexation unemployment increases by around 80 workers.

Finally, in terms of the tax adjustment made to keep the primary budget constant while the labor force is increased, we show the changes in the effective income tax credit rate, and the respective tax base and "revenue". All three figures below report absolute differences between the counterfactual and the baseline.







Tax credit rates are able to increase and apply to an increased tax base, so their total (negative) "revenue" increases as the increase in the labor force allows other taxes to endogenously finance the government budget.

Main Differences across the three scenarios

Since qualitatively there is little to separate the three experiments, it is interesting to examine their quantitative differences. They are largely due to the assumptions regarding the productivity of newcomers into the labor market.

The first experiment moves 10.810 people out of cash assistance (Kontant hjælp) and into full time employment. This is an increase in the labor force. It is assumed that these workers enter the labor force with a productivity of 60% of the ones already employed.

This experiment has the smallest impact on output and other macroeconomic variables. Surprisingly, given the increase in the labor force and the decrease in wages, it induces a small decrease in the number of unemployed people (200 workers).

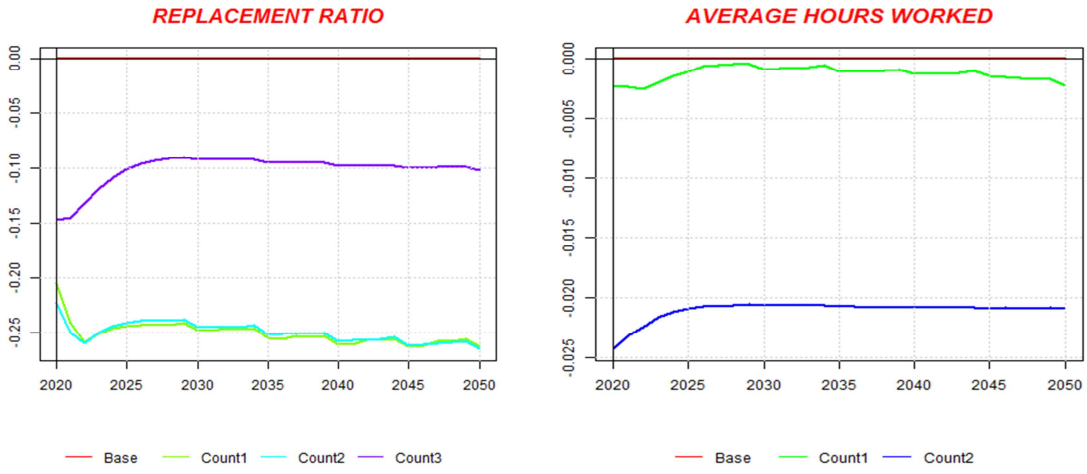
The second experiment results in a reduction in the number of unemployed of about 9 thousand in 2020, and about 12 thousand in the very long run. Apart from this its impact is relatively close to experiment one. It is assumed that the unemployed who are moved into work do so with a productivity level of 0.72 times the productivity of previously employed

workers. This assumption underlies the slightly higher increase in output relative to experiment one.

The third experiment increases hours worked per person. It is the experiment with the largest impact on macroeconomic variables (except for unemployment). This is due to the fact that all workers that increase hours have a productivity factor of 1.

It is worth adding that if in experiments 1 and 2 we had set the productivity factor equal to 1, we would have obtained stronger effects on output than those of experiment 3. The reason is that experiments 1 and 2 carry the additional benefit of eliminating expenditure on cash assistance and unemployment benefits which then are rebated via the increase in tax credit.

The impact on unemployment in experiments 1 and 3 is small because the unemployment rate in DREAM is "semi-endogenous". The labor market in DREAM works in the following way: there is a labor supply function derived from individual preferences which depends on the real wage, and a labor demand function from firms which depends also on the real wage, and finally there is a reduced form relationship between unemployment and real wages which includes a number of factors such as the replacement ratio.[7] This relationship is a simplification of theoretical structural relationships such as union bargaining models and search models, and determines the equilibrium unemployment rate.[8] The (small) endogenous variations in unemployment result from the fact that in all experiments the replacement ratio, which is the incentive into and out of employment, varies relative to the baseline.[9] The following figure shows the percentage difference in this variable relative to the baseline. In counterfactual 3 (increase in hours worked) this variable falls the least.[10]



The right hand side picture shows percentage differences in average working hours relative to the baseline. Experiment 3 is omitted as there average working hours *increase* by a factor of about 0.003, which is an order of magnitude higher than in experiments 1 and 2 (it would appear in the graph as positive 0.3).

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[7] Note that the unemployment rate is always defined as one minus labor demand over labor supply.

[8] In the second counterfactual experiment we change a level parameter in this relationship, thereby changing the equilibrium unemployment rate.

[9] The replacement ratio variable contains a large number of endogenous and exogenous components.

[10] If we do not freeze wage indexation this variable actually increases, generating a slight increase in the number of unemployed.

Appendix: Tables

Tabel 1.1 – Effect on Main macro variables

	2008	2020	2025	2030	2040	2050
BNP	**100.0**	**100.2**	**100.2**	**100.2**	**100.2**	**100.2**
Privat forbrug	**100.0**	**100.2**	**100.3**	**100.3**	**100.3**	**100.3**
Offentligt forbrug	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
- Individuelt offentligt forbrug	100.0	100.0	100.0	100.0	100.0	100.0
- Kollektivt offentligt forbrug	100.0	100.0	100.0	100.0	100.0	100.0
Netto eksport	**100.0**	**98.0**	**100.8**	**101.8**	**104.2**	**105.3**
- Eksport	100.0	100.1	100.2	100.3	100.3	100.2
- Import	100.0	100.2	100.2	100.2	100.2	100.2
Investeringer	**100.0**	**100.9**	**100.4**	**100.3**	**100.2**	**100.2**
Beskæftigelse, 1000 pers.	**100.0**	**100.4**	**100.4**	**100.4**	**100.4**	**100.4**
- Private sektorer	100.0	100.5	100.5	100.5	100.5	100.4
- Offentlige sektor	100.0	100.2	100.2	100.2	100.2	100.2
Arbejdsløshed, procent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Offentlige budget overskud, pct. af BNP	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
- Offentlige primære budget overskud	0.0	0.0	0.0	0.0	0.0	0.0
- Offentlige netto rente udgifter	0.0	0.0	0.0	0.0	0.0	0.0

Counterfactual 1 (moving people out of kontant hjælp)

Kilde: Egne beregninger

Tabel 2.1: Effects on public finances*

	2008	2020	2025	2030	2040	2050
		----- *Index, baseline = 100* -----				
Offentlige indtægter	**100.0**	**99.6**	**99.6**	**99.6**	**99.6**	**99.6**
- Direkte skatter	100.0	99.3	99.3	99.3	99.3	99.3
- Kildeskatter	100.0	98.9	99.0	99.0	99.0	99.0
- Selskabsskatter	100.0	100.2	100.0	100.0	100.0	100.0
- Andre direkte skatter	100.0	99.9	100.0	100.0	100.0	100.0
- Indirekte skatter	100.0	100.1	100.1	100.1	100.1	100.1
- Moms	100.0	100.2	100.1	100.0	100.0	100.0
- Punktafgifter	100.0	100.0	100.1	100.1	100.1	100.1
- Ejendomsskatter	100.0	100.2	100.3	100.3	100.3	100.3
- Andre indirekte skatter	100.0	100.2	100.2	100.2	100.2	100.2
- Anden indkomst	100.0	99.7	99.7	99.8	99.8	99.8
Offentlige udgifter	**100.0**	**99.6**	**99.6**	**99.6**	**99.6**	**99.7**
- Offentlige kollektive forbrug	100.0	99.7	99.8	99.8	99.8	99.8
- Offentligt individuelt forbrug	100.0	99.7	99.8	99.8	99.8	99.8
- Sundhedsudgifter	100.0	99.7	99.8	99.8	99.8	99.8
- Udgifter til uddannelse	100.0	99.7	99.8	99.8	99.8	99.8
- Socialomsorg	100.0	99.7	99.8	99.8	99.8	99.8
- Andet individuelt forbrug	100.0	99.7	99.8	99.8	99.8	99.8
- Offentlige indkomstoverførsl	100.0	99.3	99.2	99.2	99.2	99.2
- Folkepension	100.0	99.6	99.6	99.6	99.6	99.6
- Efterløn	100.0	99.6	99.6	99.6	99.6	99.6
- Førtidspension	100.0	99.6	99.6	99.6	99.6	99.6
- Dagpenge	100.0	99.5	99.3	99.3	99.3	99.3
- Kontanthjælp	100.0	87.4	87.8	88.1	88.3	88.7
- Barselsdagpenge	100.0	99.6	99.6	99.6	99.6	99.6
- SU	100.0	99.6	99.6	99.6	99.6	99.6
- Andre indkomst overførsler	100.0	99.7	99.7	99.7	99.7	99.7
- Offentlige investeringer	100.0	99.9	99.8	99.8	99.8	99.8
- Andre udgifter	100.0	100.0	100.0	100.0	100.0	100.0

Counterfactual 1 (moving people out of Kontant Hjælp)

** Relative change, share of GDP, market prices, growth corrected. Kilde: Egne beregninger*

Tabel 1.2 – Effect on Main macro variables

	2008	2020	2025	2030	2040	2050
BNP	**100.0**	**100.2**	**100.3**	**100.3**	**100.3**	**100.3**
Privat forbrug	**100.0**	**100.3**	**100.3**	**100.3**	**100.3**	**100.3**
Offentligt forbrug	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
- Individuelt offentligt forbrug	100.0	100.0	100.0	100.0	100.0	100.0
- Kollektivt offentligt forbrug	100.0	100.0	100.0	100.0	100.0	100.0
Netto eksport	**100.0**	**97.2**	**100.3**	**101.5**	**104.0**	**105.9**
- Eksport	100.0	100.1	100.2	100.3	100.3	100.3
- Import	100.0	100.2	100.2	100.2	100.2	100.2
Investeringer	**100.0**	**101.1**	**100.4**	**100.3**	**100.3**	**100.3**
Beskæftigelse, 1000 pers.	**100.0**	**100.3**	**100.3**	**100.4**	**100.4**	**100.4**
- Private sektorer	100.0	100.4	100.4	100.4	100.4	100.4
- Offentlige sektor	100.0	100.2	100.2	100.2	100.2	100.2
Arbejdsløshed, procent	**0.0**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**
Offentlige budget overskud, pct. af BNP	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
- Offentlige primære budget overskud	0.0	0.0	0.0	0.0	0.0	0.0
- Offentlige netto rente udgifter	0.0	0.0	0.0	0.0	0.0	0.0

Counterfactual 2 (moving people out of Unemployment)

Kilde: Egne beregninger

Table 2.2: Effects on public finances*

	2008	2020	2025	2030	2040	2050
	----- *Index, baseline = 100* -----					
Offentlige indtægter	**100.0**	**99.6**	**99.6**	**99.6**	**99.6**	**99.6**
- Direkte skatter	100.0	99.2	99.3	99.3	99.3	99.2
- Kildeskatter	100.0	98.8	98.9	98.9	98.9	98.9
- Selskabsskatter	100.0	100.3	100.0	100.0	100.0	100.1
- Andre direkte skatter	100.0	99.9	99.9	99.9	99.9	99.9
- Indirekte skatter	100.0	100.2	100.1	100.1	100.1	100.1
- Moms	100.0	100.2	100.1	100.1	100.0	100.0
- Punktafgifter	100.0	100.1	100.1	100.1	100.1	100.1
- Ejendomsskatter	100.0	100.2	100.4	100.4	100.4	100.5
- Andre indirekte skatter	100.0	100.2	100.2	100.2	100.2	100.2
- Anden indkomst	100.0	99.7	99.7	99.7	99.8	99.8
Offentlige udgifter	**100.0**	**99.6**	**99.6**	**99.6**	**99.6**	**99.6**
- Offentlige kollektive forbrug	100.0	99.7	99.7	99.7	99.7	99.7
- Offentligt individuelt forbrug	100.0	99.7	99.7	99.7	99.7	99.7
- Sundhedsudgifter	100.0	99.7	99.7	99.7	99.7	99.7
- Udgifter til uddannelse	100.0	99.7	99.7	99.7	99.7	99.7
- Socialomsorg	100.0	99.7	99.7	99.7	99.7	99.7
- Andet individuelt forbrug	100.0	99.7	99.7	99.7	99.7	99.7
- Offentlige indkomstoverførsler	100.0	99.2	99.2	99.2	99.2	99.1
- Folkepension	100.0	99.7	99.6	99.6	99.6	99.6
- Efterløn	100.0	99.7	99.6	99.6	99.6	99.6
- Førtidspension	100.0	99.7	99.6	99.6	99.6	99.6
- Dagpenge	100.0	88.2	88.0	88.1	88.2	88.3
- Kontanthjælp	100.0	97.8	97.8	97.8	97.8	97.8
- Barlselsdagpenge	100.0	99.7	99.6	99.6	99.6	99.6
- SU	100.0	99.7	99.6	99.6	99.6	99.6
- Andre indkomst overførsler	100.0	99.7	99.7	99.7	99.7	99.7
- Offentlige investeringer	100.0	99.9	99.8	99.8	99.8	99.8
- Andre udgifter	100.0	100.0	100.0	100.0	100.0	100.0

Counterfactual 2 (moving people out of Unemployment)

** Relative change, share of GDP, market prices, growth corrected. Kilde: Egne beregninger*

Tabel 1.3 – Effect on Main macro variables

	2008	2020	2025	2030	2040	2050
BNP	**100.0**	**100.3**	**100.4**	**100.4**	**100.4**	**100.4**
Privat forbrug	**100.0**	**100.4**	**100.4**	**100.4**	**100.5**	**100.4**
Offentligt forbrug	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
- Individuelt offentligt forbrug	100.0	100.0	100.0	100.0	100.0	100.0
- Kollektivt offentligt forbrug	100.0	100.0	100.0	100.0	100.0	100.0
Netto eksport	**100.0**	**97.0**	**101.0**	**102.6**	**106.4**	**108.9**
- Eksport	100.0	100.1	100.3	100.4	100.4	100.4
- Import	100.0	100.3	100.3	100.3	100.3	100.3
Investeringer	**100.0**	**101.3**	**100.6**	**100.4**	**100.4**	**100.4**
Beskæftigelse	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
- Private sektorer	100.0	100.1	100.1	100.1	100.1	100.1
- Offentlige sektor	100.0	99.8	99.7	99.7	99.7	99.7
Arbejdsløshed, procent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Offentlige budget overskud, pct. af BNP	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
- Offentlige primære budget overskud	0.0	0.0	0.0	0.0	0.0	0.0
- Offentlige netto rente udgifter	0.0	0.0	0.0	0.0	0.0	0.0

Counterfactual 3: Increasing Working Hours (keeping indexation fixed at the baseline path)
Fixed prices, growth included. Kilde: Egne beregninger

Table 2.3: Effects on public finances*

	2008	2020	2025	2030	2040	2050
	----- *Index, baseline = 100* -----					
Offentlige indtægter	**100.0**	**99.7**	**99.7**	**99.7**	**99.7**	**99.7**
- Direkte skatter	100.0	99.4	99.4	99.5	99.4	99.4
- Kildeskatter	100.0	99.1	99.2	99.2	99.2	99.2
- Selskabsskatter	100.0	100.3	100.0	100.0	100.0	100.1
- Andre direkte skatter	100.0	99.9	99.9	99.9	99.9	99.9
- Indirekte skatter	100.0	100.2	100.1	100.1	100.1	100.1
- Moms	100.0	100.2	100.1	100.1	100.1	100.1
- Punktafgifter	100.0	100.1	100.1	100.1	100.1	100.1
- Ejendomsskatter	100.0	100.4	100.5	100.6	100.6	100.6
- Andre indirekte skatter	100.0	100.4	100.3	100.3	100.3	100.3
- Anden indkomst	100.0	99.6	99.7	99.7	99.7	99.7
Offentlige udgifter	**100.0**	**99.7**	**99.7**	**99.7**	**99.7**	**99.7**
- Offentlige kollektive forbrug	100.0	99.6	99.6	99.6	99.6	99.6
- Offentligt individuelt forbrug	100.0	99.6	99.6	99.6	99.6	99.6
- Sundhedsudgifter	100.0	99.6	99.6	99.6	99.6	99.6
- Udgifter til uddannelse	100.0	99.6	99.6	99.6	99.6	99.6
- Socialomsorg	100.0	99.6	99.6	99.6	99.6	99.6
- Andet individuelt forbrug	100.0	99.6	99.6	99.6	99.6	99.6
- Offentlige indkomstoverførsler	100.0	99.7	99.8	99.8	99.8	99.8
- Folkepension	100.0	99.7	99.8	99.8	99.8	99.8
- Efterløn	100.0	99.7	99.8	99.8	99.8	99.8
- Førtidspension	100.0	99.7	99.8	99.8	99.8	99.8
- Dagpenge	100.0	99.5	99.8	99.8	99.8	99.8
- Kontanthjælp	100.0	99.7	99.8	99.8	99.8	99.8
- Barlselsdagpenge	100.0	99.7	99.8	99.8	99.8	99.8
- SU	100.0	99.7	99.8	99.8	99.8	99.8
- Andre indkomst overførsler	100.0	99.7	99.7	99.7	99.7	99.8
- Offentlige investeringer	100.0	99.9	99.7	99.7	99.7	99.7
- Andre udgifter	100.0	100.0	100.0	100.0	100.0	100.0

Counterfactual 3: Increasing Working Hours (keeping indexation fixed at the baseline path)
Relative change, share of GDP, market prices. Kilde: Egne beregninger

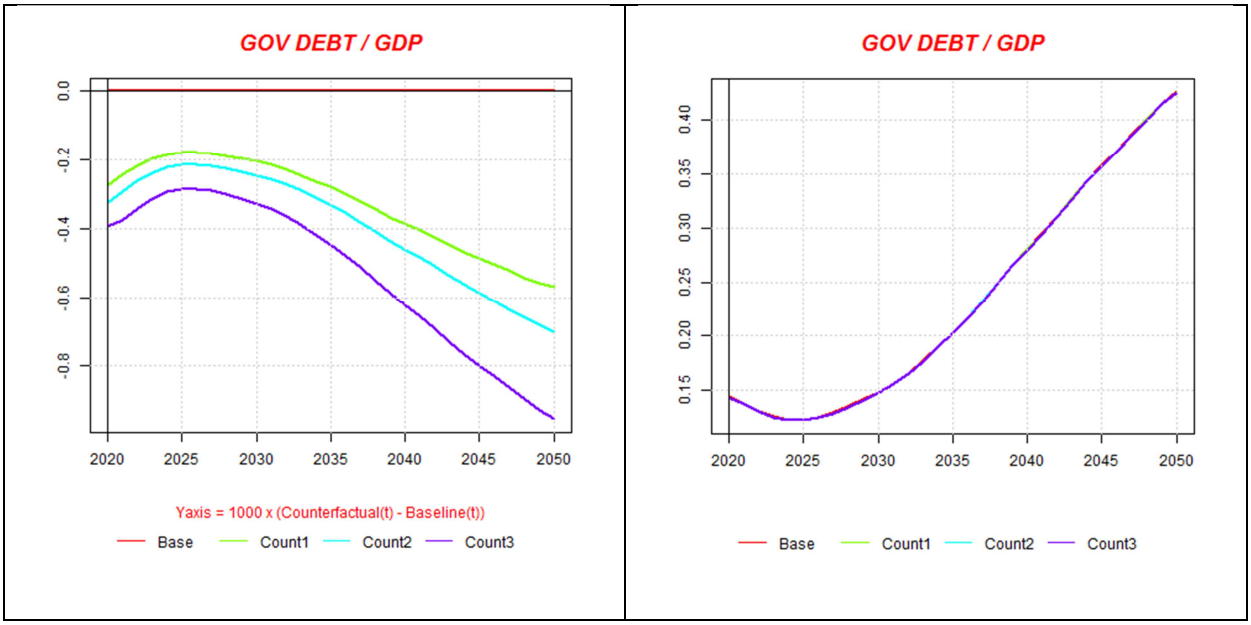
Tabel 3 – Tax Changes

Effective Earned Income tax credit

Direct Tax Rates (percent)	2008	2020	2030	2040	2050
	per cent				
Baseline	-1.12%	-2.20%	-2.23%	-2.23%	-2.23%
Experiment 1	-1.12%	-2.53%	-2.53%	-2.53%	-2.52%
Experiment 2	-1.12%	-2.56%	-2.55%	-2.55%	-2.54%
Experiment 3	-1.12%	-2.20%	-2.49%	-2.48%	-2.48%

Kilde: Egne beregninger

Additional Graphs



Additional Graphs, DA experiment 3. November 20, 2013

This graph was produced in response to a subsequent question from the client.

Here we show results for experiment 3 both when we fix wage indexation so that it is kept at the baseline path, and when we do not do it. This is the resulting replacement ratio percentage difference to the baseline. The curve with frozen indexation is labelled “count3.2” and compares with the one with indexation effects labelled “count3.1”.