Medium and long-term outlook for the Swiss Confederation's debt: when are adjustments needed, and by how much?

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Abstract

Swiss public finances are faced with long term challenges, stemming primarily from population ageing. We consider a series of scenarios for future debt dynamics, taking as our starting point the recent report by the Federal Department of Finance FDF (2021), as updated with recent data. We focus on the long-term impact of different assumptions on interest rate levels. If we consider a lower level than that of the optimistic scenario of FDF (2021), a very plausible assumption based on the scientific literature, the Confederation's finances will be able to absorb the challenge of ageing with a moderate adjustment starting in about twenty years. Until then, public finances retain considerable room for manoeuvre, while still being in line with the constitutional debt brake mandate, with a steady debt-to-GDP ratio.

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1. Introduction

Swiss public finances played a substantial part in the response to the COVID-related economic crisis since 2020. Once this unusual but temporary situation is over, it is important to consider long-term financial planning by public authorities, especially in order to take into account the major challenges of population ageing and climate change. Such an analysis paves the way, among other things, for projections regarding the evolution of the public debt, and for determining whether they are in line with the constitutional debt brake mandate.

The FDF (2021) study presents an analysis of the evolution of public finances in Switzerland covering the Confederation, cantons, communes and social insurances funds. The report considers an optimistic scenario, which is our starting point, and a pessimistic scenario. It points out that projected expenditures exceed projected revenues, and that a correction will therefore be necessary from 2025 onwards, either in the form of expenditure moderation or revenue increases.

A central element of any scenario is the interest rate paid by the government on its debt. The higher the interest rate, the more exponential the debt growth will tend to be, and the more substantial the adjustment required. The FDF (2021) projections are that by 2031, interest rates will rise to 2.6% for 10-year federal bonds and to 1.6% for 3-month bonds. Such a level is, however, open to debate, considering that a major development in the advanced countries since the 1980s has been the decline in yields on government bonds. This decline is also observed in real (inflation-adjusted) terms. Economic research has identified several structural factors leading to this decline, including population ageing, strong demand for risk-free investments, and – in Anglo-Saxon countries – worsening inequality. The decline in returns is also observed in Switzerland, as analyzed in the series of studies recently commissioned by SECO (2021).

The present analysis considers how different scenarios for the evolution of interest rates affect the projections of FDF (2021), focusing on the finances of the Confederation (national level of government). We first update the data for the different variables and then consider different scenarios. Specifically, the first scenario uses the real interest rate assumptions of the optimistic FDF (2021) scenario. The second scenario considers values based on recent studies for Switzerland (Bacchetta, Benhima and Renne 2021, Hauzenberger et al. 2021), and a final scenario presents an intermediate situation.

The analysis leads to five conclusions. First, as identified by FDF (2021), stabilizing the debt-to-GDP ratio[2] requires a future adjustment to reduce the gap between expenditures and revenues. Second, this adjustment remains moderate, being less than 0.1% of GDP in 2050. Third, a lower interest rate level delays the horizon of this adjustment from 2035 to 2045. Fourth, during the next ten years, the debt dynamics are favourable, which makes possible – temporarily – an increase in the deficit without destabilizing the debt-to-GDP ratio. Finally,

[2] We consider stabilization at the 2025 level, i. e., 14.3% of GDP.

accepting a stabilization of the debt-to-GDP ratio at a somewhat higher level frees up substantial room for manoeuvre.[3]

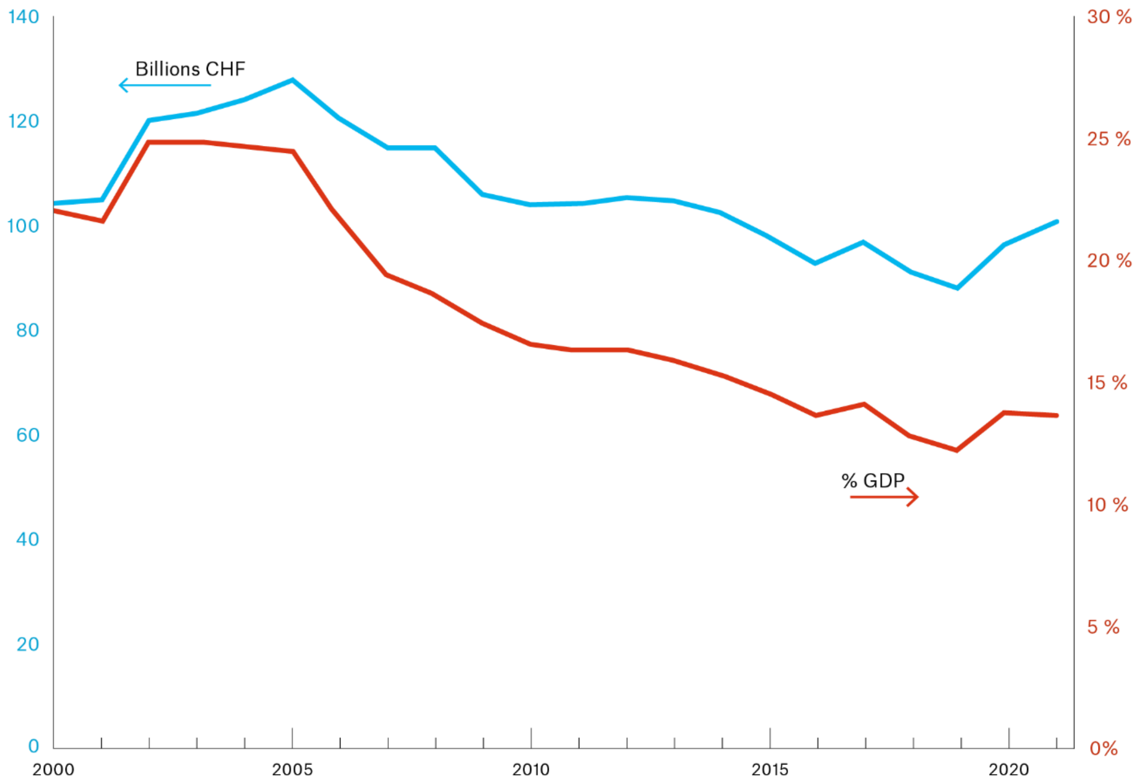
The analysis is structured as follows. Section 2 describes the evolution of the federal debt since 2000, and provides a summary of recent economic research on debt dynamics in a low interest rate environment. The data used are presented in section 3. Section 4 lays out the different scenarios and their impact on the debt outlook. The last section offers some ideas for structuring the future debate on the evolution of public finances.

2. Past evolution of debt, and analytical framework

2.1. The steady decrease in debt

The figure below shows the evolution of the Confederation's debt since 2000, in absolute value (blue line), and in relation to GDP (red line, right-hand scale).[4]

Figure 1: Swiss Federal government debt



[3] By "higher level" we mean an increase in the debt-to-GDP ratio to 16% by 2040, which corresponds to the debt ratio of 2013.

[4] The figures are taken from the statistical portal of the Swiss National Bank https://data.snb.ch/en/topics/uvo/cube/pubfin?fromDate=1999&toDate=2026&dimSel=D0(B),D1(AA,AE,AB,AC,AD,BCA,B,BP,BBB,BB)

We note that since the mid-2000s the Confederation's debt level has declined significantly. The debt-to-GDP ratio, which is the economically relevant measure, fell by half between 2005 and 2019. This partly reflects the rise in GDP, but also a fall in debt by almost a third in absolute terms. In other words, the evolution of debt has far surpassed the stabilization called for by the debt brake, which aims to stabilize the debt.[5]

Unsurprisingly, the policy of supporting the economy during the COVID crisis resulted in an increase in debt. However, the debt is still quite modest, even though the recession was of unprecedented magnitude. In 2021, the debt-to-GDP ratio was slightly lower than in 2017. In absolute terms, the debt has returned to its 2014 level. This shows that the COVID crisis has not led to a crisis in public finances.

2.2. Analytical framework for the debt dynamics

Macroeconomic analysis shows that a government wishing to stabilize its debt-to-GDP ratio must run non-interest budget surpluses in the future (see Annex 7.1 for a detailed analysis). However, this assumes that the government borrows at the same interest rate as the private sector, which is higher than the growth rate of the economy.[6]

Blanchard (2022a, b) shows that in the United States and other countries, the interest rate on government bonds is not only lower than the interest rate paid by the private sector, but also lower than the rate of GDP growth. Tille (2020) shows that this is also the case for Switzerland. The direct consequence of an interest rate that is lower than the growth rate is that the debt-to-GDP ratio will automatically decrease in the absence of a primary deficit (non-interest expenditures net of revenues) in government spending. In other words, debt can be stabilized relative to GDP even with some deficit. The fact that the interest rate was lower than the growth rate explains much of the rapid decline in the U.S. debt-to-GDP ratio after World War II. Acalin and Ball (2023) point out, however, that this gap was strongly influenced by two factors, namely distortions in the interest rates on debt issued during the 1940s and 1950s, and higher-than-expected inflation that pushed up the growth rate of nominal GDP. Both of these factors ceased to play a role in the early 1980s. Reis (2022) shows that in a standard macroeconomic model, the government's ability to obtain a lower interest rate than the private sector is a form of government revenue, and that it plays a substantial role in industrialized countries.

The government's ability to borrow at a lower rate than the private sector reflects the special nature of government debt. It is an asset with limited risk (if any) and its fundamental value is easier to assess than debt issued by corporations. In addition, the government debt market is often the most liquid. This results in a safety and liquidity premium that reduces the financial return that investors require to hold this debt. In other words, the specific characteristics of public debt represent a form of non-financial return, called "convenience

[5] As indicated in the text, the economically relevant concept of stabilization is in terms of the ratio of debt to GDP. A stabilization in absolute value, which is often discussed in the context of the debt brake, implies a downtrend in the ratio.

[6] The gap is a direct consequence of the optimal inter-temporal allocation of consumption by an agent with a preference for earlier consumption, which is the standard case.

yield" in the literature. This is a feature common in macroeconomic models, for instance, those that include money holdings (which pay no interest). It should be noted that the convenience yield is not “set in stone” and can be reduced if government debt becomes excessive (in the same way as excessive money creation fuels inflation and reduces the demand for cash).

2.3. The downtrend in interest rates

A major development in the international macroeconomic situation since the 1980s has been the sharp decline in interest rates on government bonds. While this is partly due to lower inflation, it is not the only factor. Several studies estimate the so-called "natural" interest rate, i.e. the one that filters out inflation and the business cycle. Holston, Laubach, and Williams (2018) show a notable decline in this rate since the 1980s. Del Negro et al. (2019) show that this decline is observed globally, and that the recent natural rate is particularly low in historical perspective. Bacchetta, Benhima, and Renne (2022) and Hauzenberger (2021) show that the decline in the natural rate is also present in Switzerland.

The scientific literature has identified several structural factors that can explain this decline. These include increased non-pecuniary returns (Del Negro et al. 2017), population aging (Gagnon et al. 2021), and rising inequality (Mian, Staub, and Sufi 2021). Tille (2020) provides a review of the literature, and presents the evolution of various interest rates in Switzerland.

3. Data used in formulating the outlook for public finances

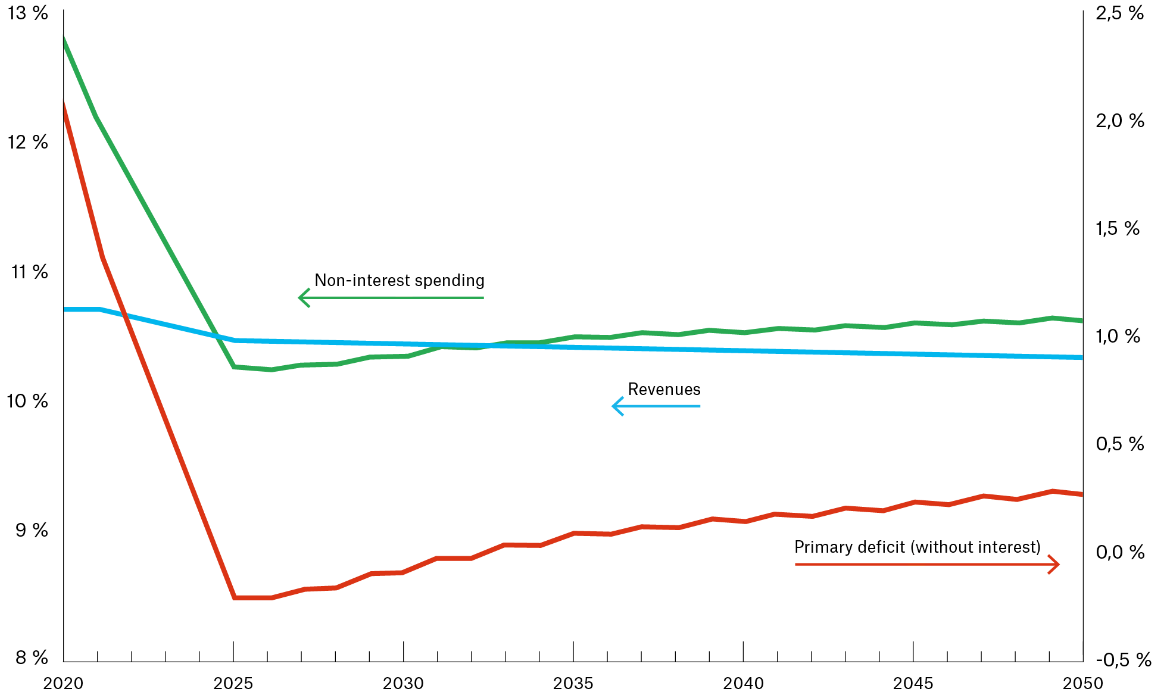
Our analysis takes as its starting point the optimistic scenario from FDF (2021). This is based on the Confederation’s revenues and expenditures, with a distinction being made between interest and non-interest expenditures, nominal GDP (in current francs), the short-term interest rate (3-month Libor) and the long-term interest rate (10-year federal bonds). The evolution of expenditures and revenues illustrates the dynamics of the debt.

We start by updating the database (Annex 7.2 provides details of the sources used). GDP values up to 2021, and forecasts up to 2024 are taken from SECO, and growth rates thereafter are taken from FDF (2021). Inflation figures up to 2022 are taken from the Swiss Statistical Office, and values up to 2032 are based on expectations published by the SNB. Thereafter, we assume that inflation is stable at 1%, which is the middle of the SNB's target range.

The short- and long-term interest rates up to 2022 are taken from the SNB statistical base. The values thereafter vary between the scenarios discussed below.

The Confederation's revenues and expenditures, as well as the gross debt up to 2022 are taken from FDF statistics and projections. These data enable us to calculate the effective interest rate on the debt directly. From 2025 onwards, we take the ratios of non-interest spending and revenues to GDP from FDF (2021) and combine them with the updated GDP figures to recalculate expenditures and revenues in absolute values. Between 2022 and 2025 the values are interpolated. Figure 2 shows the evolution of non-interest spending (green line), revenues (blue line), and the primary deficit (red line, right-hand scale). After the COVID crisis, spending falls rapidly until 2025, before again rising gradually and steadily. Revenues, on the other hand, remain stable after an initial decline. As a result, the primary deficit falls rapidly until 2025, moves into surplus between 2025 and 2031, and then rises steadily to 0.27% of GDP in 2050. This steady increase in the deficit is the factor that implies the need for a long-term adjustment of public finances highlighted by FDF (2021).

Figure 2: Revenues and non-interest spending, % GDP



As from 2023, interest expenditures, debt, and the effective interest rate are computed according to the different scenarios in the text below.

4. Scenarios for the evolution of the Confederation's finances

4.1. Calibration of long-term interest rates

The different scenarios considered vary according to the prevailing long-term interest rates. FDF (2021) considers that from 2031 onwards, the real short-term rate (3 months) is 0.6% and the long-term rate (10 years) is 1.6%, which gives nominal rates of 1.6% and 2.6% respectively.

Our analysis considers different values, based on academic studies as well as data from the financial markets. Several studies have estimated the long-term (10-year) real interest rate for Switzerland. Bacchetta, Benhima, and Renne (2022, 2021) estimate that this rate decreased to a value of -1% in 2020. Since this figure may include short-term cyclical movements, the authors estimate long-term values for real interest rates. In 2021, they estimate a value of -0.3% for the short-term real rate and 0.5% for the long-term rate.[7]

Hauzenberger et al (2021) consider the evolution of Swiss interest rates since the middle of the 19th century. They apply a statistical method to filter out short-term movements and to obtain estimates for the structural values of the real short-term and long-term rates. The authors estimate that in 2020 the real short-term rate was -0.5%, and the long-term rate was 0%.[8]

Another approach is to estimate the current real interest rates by combining the yields on federal bonds at different maturities and inflation expectations. The latter are derived from the quarterly surveys conducted by the SNB's delegates with a large number of companies.[9] As from 2013, they indicate expectations over the ensuing year, as well as expectations between 3 and 5 years. Note that the latter figure indicates the value of expected inflation over one year at this horizon (between the 4th and 5th year) and not the value of average annual inflation expected between now and 4-5 years' time. If we assume that inflation in 10 years will be at the midpoint of the SNB's target (1%), we are able, each quarter, to construct annual inflation expectations for up to 10-years, at a given horizon. Specifically, the SNB survey values give annual inflation 1 and 4 years into the future, and we consider annual inflation of 1%, 10 years into the future. The annual inflation for the other years is calculated by simple interpolation. We can then calculate the average inflation between now and a horizon t by taking the average of the annual inflation of the years up to and including t.

The yields on Swiss government bonds are taken from the SNB website.[10] We construct a quarterly series by taking the value of the first month of the quarter, because this corresponds to the calendar of the interviews conducted by the SNB with companies.[11] Note that bond yields indicate the average annual return between now and the maturity of the security. We can construct a one-year return at any horizon by combining the returns from two consecutive horizons.[12] It should be kept in mind that this calculation ignores risk and maturity premiums (that is, the fact that the interest rate over, say, ten years is higher than the average of successive one-year interest rates), and therefore tends to overestimate the return on a one-year bond at a future horizon.

Figure 3 shows the nominal and real interest rates, and inflation rates expected in the fourth quarter of 2022 for the time horizon considered. The values indicate the average annual rates between now and the horizon in question. We see that the real return (red line) remains negative at all horizons, amounting to -0.61% at 10 years. Figure 4 shows the evolution of rates

[7] Bacchetta, Benhima, and Renne (2021), Figure 6.
[8] Hauzenberger et al. (2021), Figure 4.2.
[9] https://data.snb.ch/en/topics/snb/cube/snbkosiq?fromDate=2011-Q1&toDate=2022-Q4&dimSel=D0(IERWM1,IERWJ1)
[10] https://data.snb.ch/en/topics/ziredev/cube/rendoblim
[11] These interviews take place between the middle of the first month of the quarter and the end of the second month.
[12] For instance, by combining the yield on a bond with a 9-year maturity and the yield of a bond with 10-year maturity, we can compute the expected yield on a one-year bond issued 9 years from now.

at the 10-year horizon since 2013. We see that the real rate has been persistently negative, and that the latest value is not exceptional.

Figure 3: Interest rate and inflation expectation by maturity, cumulated values until maturity (Q4 2022)

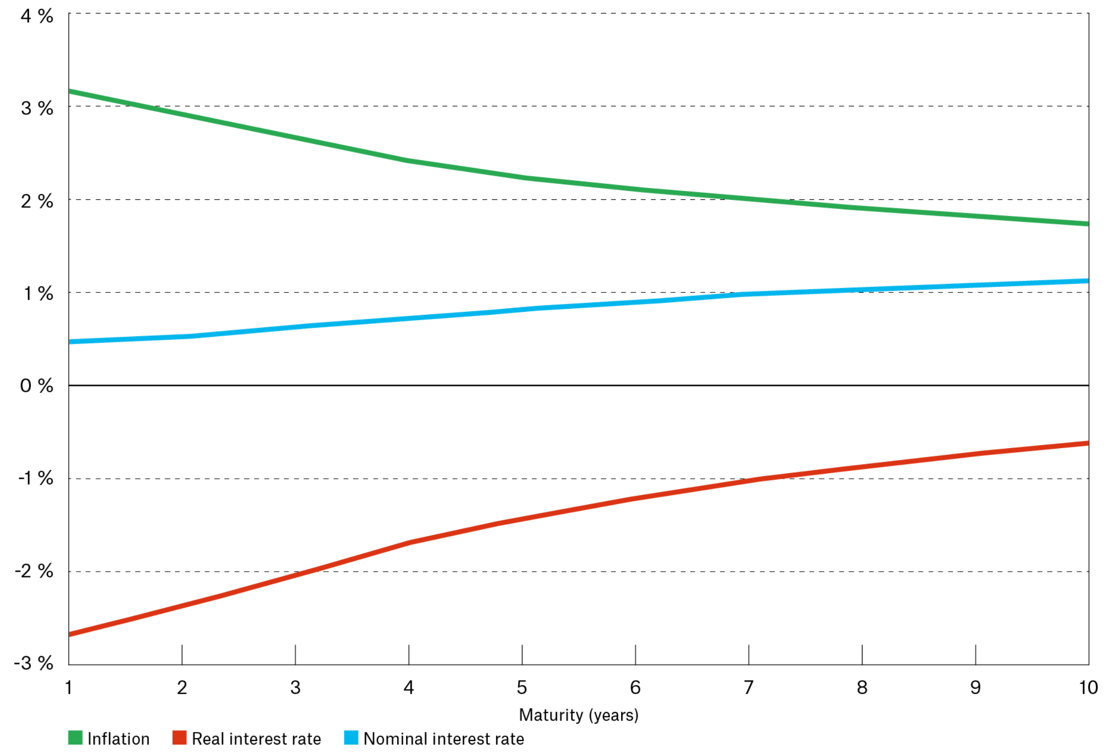
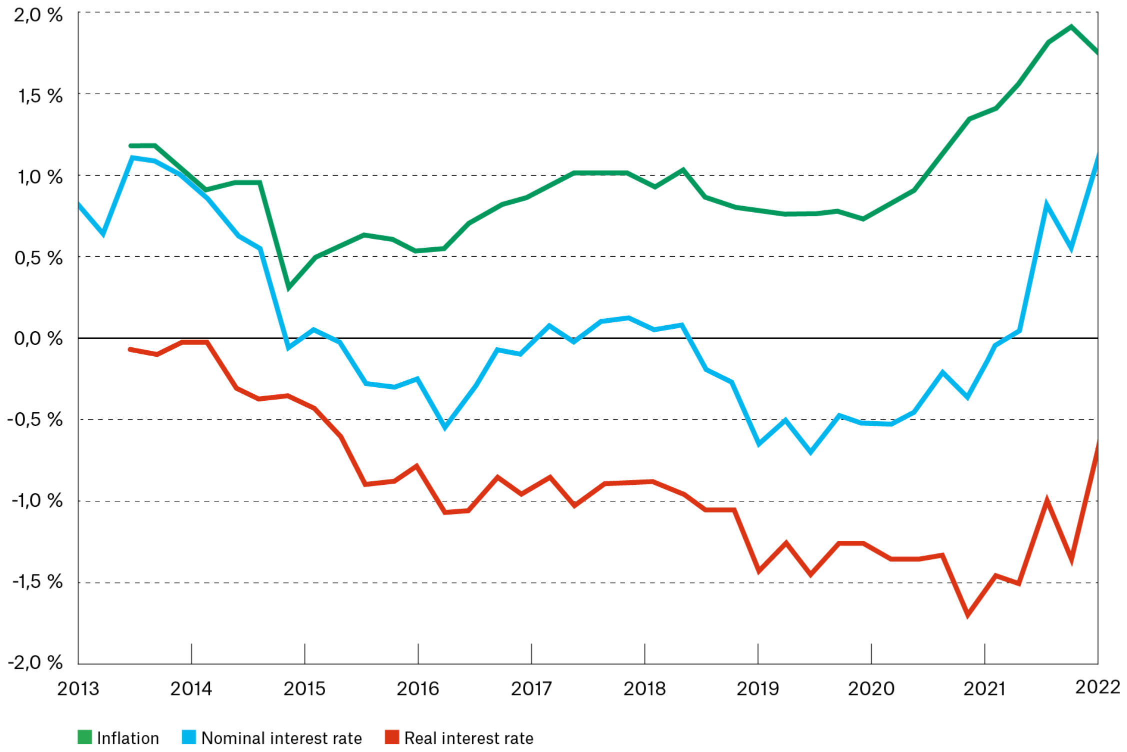
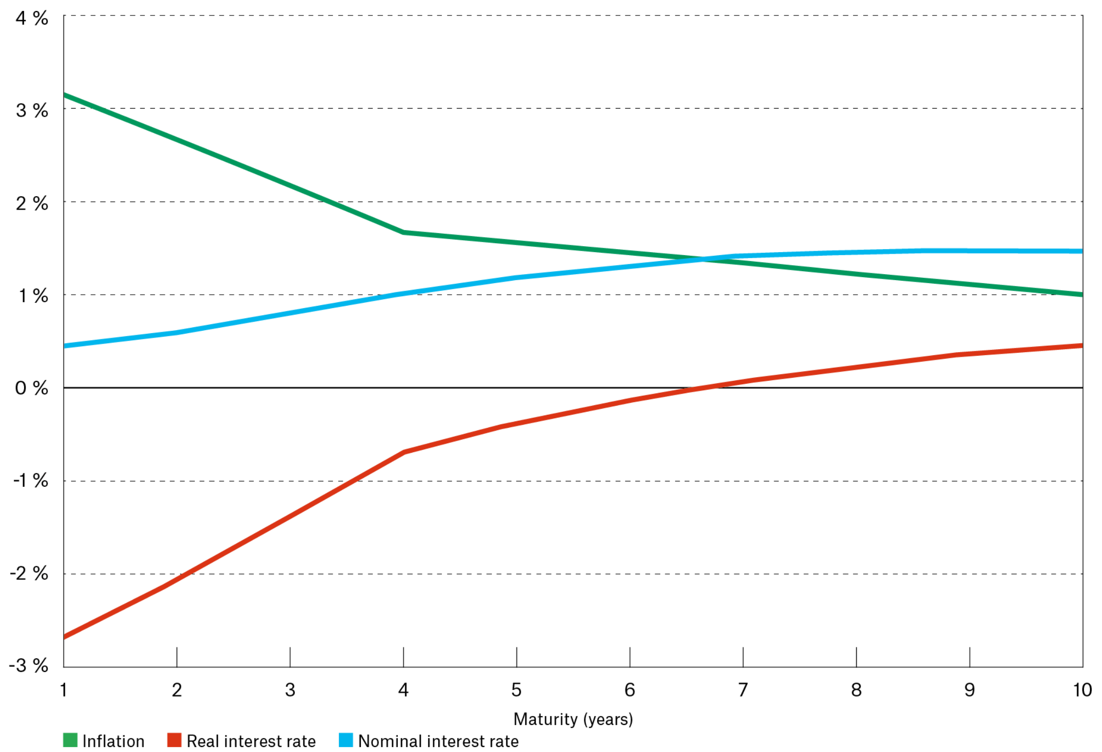


Figure 4: Interest rates and inflation, 10 years horizon



The rate and inflation expectation data also enable us to calculate expected one-year rates in the future. Figure 5 shows the values in the fourth quarter of 2022, and indicates that the markets expect a positive real rate for one-year bonds starting in 2029. In 10 years, this expected rate is 0.46%. As noted above, these values ignore the risk and maturity premiums included in long-term rates (which are therefore not simply the average of present and future short-term rates), and tend to overstate the rate at future horizons. Therefore, a zero or slightly negative real short-term return in the future is in line with these values.

Figure 5: Interest rate and inflation expectation by maturity, values at the maturity year (Q2022)



A final indication of the financial markets is the yield spread between short- and long-term bonds, i.e., the slope of the yield curve. Since the early 1990s, this spread has been consistently positive,[13] with an average value of 0.88% since 2000, and 0.65% since 2010.

In summary, the various approaches considered give the following indications for structural rates. The long-term interest rate is between 0 and 0.5%, and is currently negative.

[13] Except for the 1990-1993 period which was a time of substantial tightening of monetary policy.

The short-term rate is around -0.5%. These two values give a spread between 0.5 and 1.0%, in line with historical observations.

4.2. Interest rate scenarios

Based on the above, we consider three scenarios for the future evolution of interest rates. These scenarios vary according to interest rate values since 2024. The interest rate on the debt in 2023 is computed based on the interest expenditures in the Confederation's budget.[14]

1. Scenario based on the optimistic scenario of FDF (2021). From 2023 onwards, this scenario takes the real interest rates of FDF (2021) and combines them with the revised inflation values in order to establish the nominal rates.[15]
2. Alternative scenario with low interest rates. This scenario proceeds in three steps.
   - In 2023 we consider a short-term rate of 1.5%, which is an additional increase compared to the current SNB rate, and a long-term rate of 1.5%, which is a slight increase compared to the situation in the second half of 2022 where this rate oscillates between 1% and 1.5%.
   - From 2027 onwards, we consider a real short-term interest rate of -0.5% and a real long-term interest rate of 0%, implying values of 0.5% and 1.0% respectively for the nominal rates.
   - Between 2023 and 2027 the interest rate values are interpolated.[16]
3. Intermediate scenario. This scenario is constructed in the same way as the alternative scenario with low rates, but as from 2027, considers values of 0% for the short-term real interest rate and 0.5% for the long-term real interest rate, i.e., values of 1.0% and 1.5% respectively for the nominal rates.

Figures 6a and 6b show the evolution of short- and long-term interest rates under the three scenarios. The key point is that our two alternative scenarios show substantially lower rates than the one based on FDF (2021), especially from 2030 onwards.

[14] https://www.efv.admin.ch/dam/efv/fr/dokumente/Finanzberichte/finanzberichte/va_iafp/2023/va-1.pdf.download.pdf/VA1-f.pdf, page 80.

[15] With the recent increase in inflation and interest rates, simply taking the nominal interest rates of FDF (2021) would not be appropriate.

[16] These rates are used from 2024 onwards, as the interests for 2023 are taken from the Confederation's budget.

Figure 6a: Short-term rate

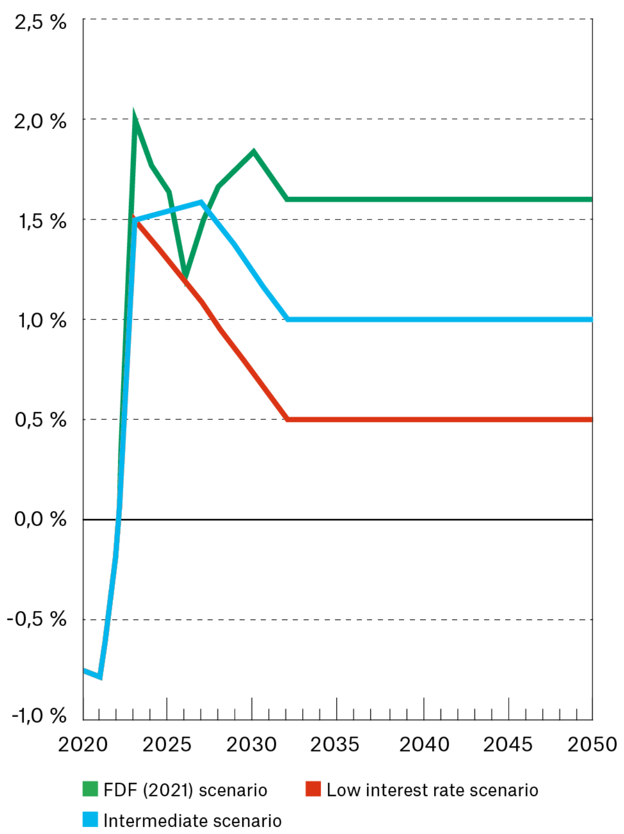
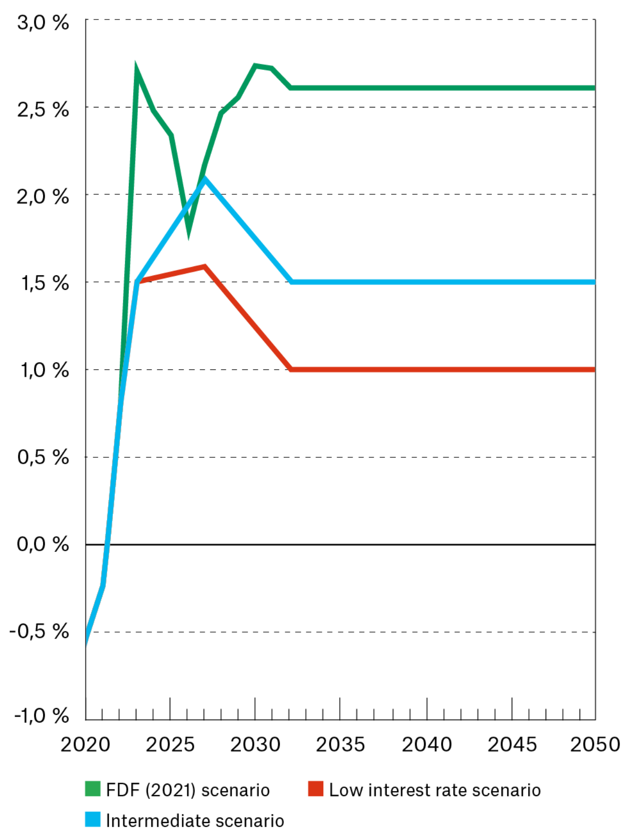


Figure 6b: Long-term rate



For each scenario, the values of the short- and long-term rates are combined with the amounts of public debt to construct an effective interest rate on the federal debt. We first take the amount of outstanding liabilities on the bond market at the beginning of 2023 according to SNB data,[17] which allow us to compute the repayments and interest expenditures over subsequent years. For the remaining portion of the debt, our computation relies on points presented in FDF (2021), namely the assumption that one tenth of the debt is repaid every year, and that one quarter of new debt is issued in the short term.[18] The details of the calculation are presented in Appendix 7.3. We assess the validity of our approach by applying it to the data in FDF (2021) and comparing the estimates we obtain with this relatively simple method to the values in FDF (2021). Appendix 7.3 shows that while our estimates do not coincide exactly with the values of FDF (2021), they are very close.

[17] https://www.snb.ch/fr/mmr/reference/ch_bonds_situation_20230201/source/ch_bonds_situation_20230201.fr.pdf

[18] FDF (2021) only applies these hypotheses as from 2030, their computations for previous years relying on the projections of debt issuances and repayments established by the Confederation, which are not publicly available.

Figure 7: Effective interest rate on Confederation debt

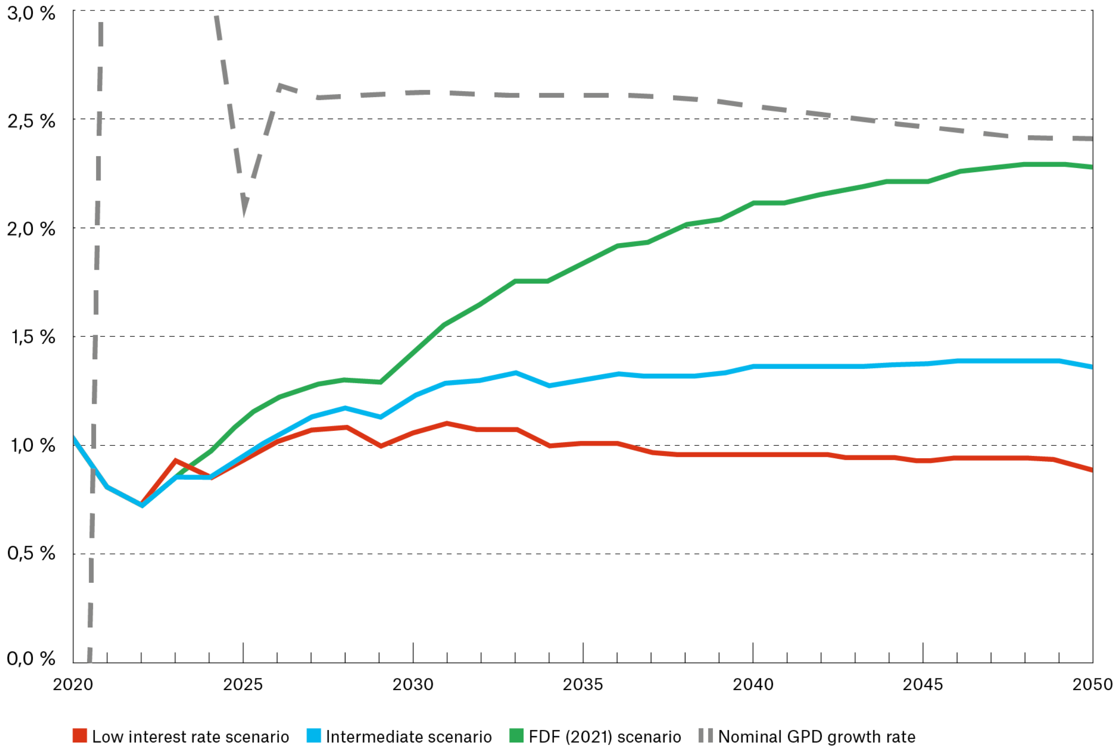


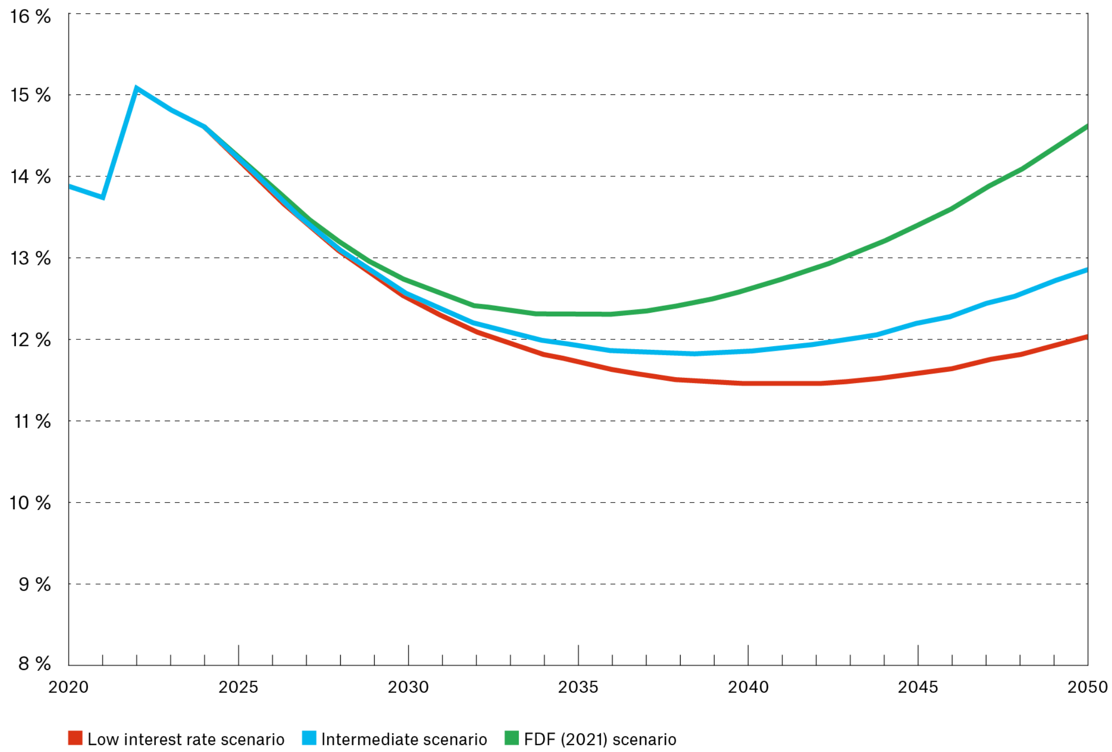
Figure 7 shows the evolution of the effective rate estimated by our method in the three scenarios. While the three lines are relatively close until 2028, they diverge thereafter. The rate in the scenario based on FDF (2021, green line) increases gradually to 2.28% in 2050. The situation is substantially different in the low-rate scenario (red line), where the rate peaks in 2030 and then declines slightly to 0.89% in 2050. In the intermediate scenario (blue line), the rate continues to rise until 2030 and then remains stable at 1.36% in 2050. In all three scenarios, the effective rate remains clearly below the nominal GDP growth rate (grey line), showing that the debt-to-GDP ratio reduces by itself in the absence of a deficit. While this gap closes in the FDF-based scenario (2021), it remains substantial in the other two.

4.3. Debt dynamics

The three scenarios imply different paths for the Confederation's debt. Figure 8 shows the dynamics of the debt-to-GDP ratio. We see that in all scenarios this ratio decreases until 2035, reaching a value between 11.2% and 11.9% depending on the scenario. This decline is the result of the sharp reduction in the primary deficit (Figure 2) that applies to all three scenarios, as well as the substantial difference between the effective interest rate and the nominal GDP growth rate.

After 2035, the evolution of the debt-to-GDP ratio shows a distinct contrast between the scenarios. It increases clearly and ever more rapidly in the scenario based on FDF (2021), to reach 14.6% of GDP in 2050. In the low interest rate scenario, in contrast, it is much more stable, increasing only at the end of the period to reach 12.0% of GDP in 2050.[19] The increase in the intermediate scenario remains moderate, with a value of 12.9% in 2050.

Figure 8: Ratio debt / GDP



4.4. Adjustment needed to stabilize the debt

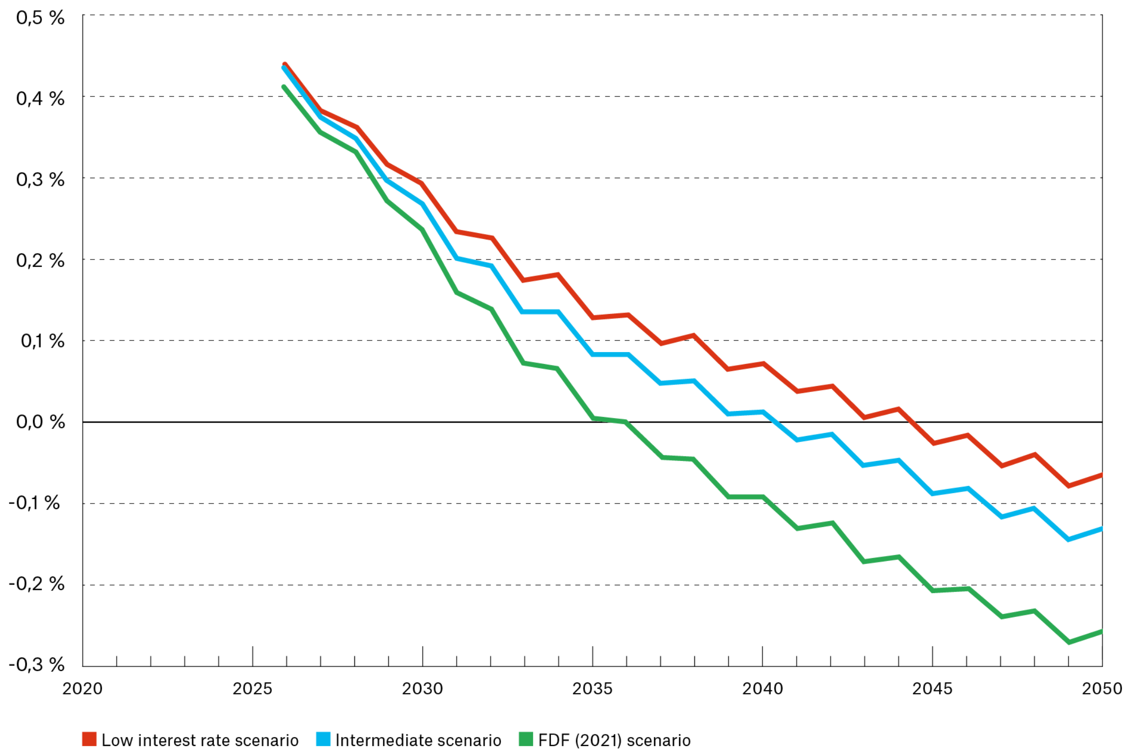
Because the debt-to-GDP ratio increases in all scenarios at the end of the sample owing to the increase in deficits, the debt brake is ultimately not respected, in that the debt ratio shows an uptrend in the later years of the sample. To stabilize the debt-to-GDP ratio, it is necessary to adjust the primary balance of public finances (the fiscal gap in FDF 2021) after a few years.

To quantify this adjustment, we consider the change required to the primary balance to stabilize the ratio at its 2025 value of 14.3% of GDP.[20] We consider this stabilization as a common policy that complies with the debt brake. Stabilizing the debt ratio implies, of course, that the debt will continue to increase in absolute terms, owing to the growth of GDP. While discussions of the debt brake are often expressed in terms of the absolute value of the debt, we

[19] The ratio will keep increasing if we extend the horizon, because of the steady increase in the primary deficit.
[20] The year 2025 is chosen as a baseline year for stabilizing the debt ratio for illustration purposes only, and does not indicate that that year's value is considered optimal.

choose to consider the stabilization of the debt-to-GDP ratio, as this is the measure that makes economic sense. Figure 9 shows the additional expenditures, as percentages of GDP, that are necessary to achieve the desired stabilization. The values are positive at the beginning of the sample because we are then in a phase where the debt ratio is falling. Deficits are therefore possible while keeping the ratio stable. Whether these deficits take the form of additional spending or tax cuts is an issue separate and apart from our analysis. As time goes by, the possible deficits decrease, due to the uptrend in spending (Figure 2), and from a certain point on, the stabilization of the debt requires a decrease in deficits compared to the projections in Figure 2 (negative values in Figure 9).

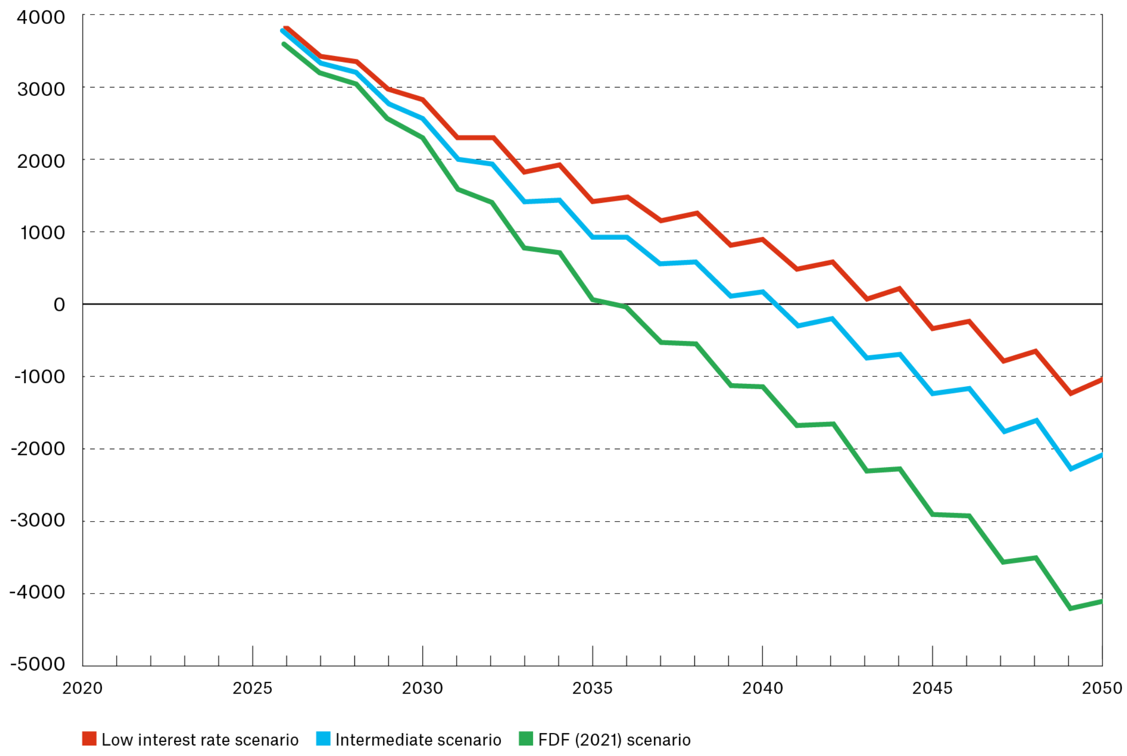
Figure 9: Additional spending to stabilize the debt / GDP ratio since 2025, % GDP



Several points can be highlighted. First, while the situation is least favourable under the scenario based on FDF (2021), the final adjustment remains moderate at less than 0.3% of GDP. Moreover, deficits are not to be reduced before 2035. Second, interest rate values have a substantial impact on the adjustment. In the low interest rate scenario (red line), deficits need only be reduced from 2045 onwards, and the adjustment in 2050 is only 0.06% of GDP.

Figure 10 shows the values of Figure 9 in millions of francs. In the scenario based on FDF (2021), stabilizing the debt/GDP ratio at its 2025 level allows for additional deficits of 19.0 billion up to 2035, but with the need for a 32.4-billion reduction thereafter. In terms of net present value over the entire horizon (using the interest rate of Figure 7 as the discount factor), stabilizing the debt requires a surplus of 4.1 billion. In the low-rate scenario, the possible additional deficits up to 2044 amount to 32.8 billion, followed by a 4.3-billion adjustment in the other direction, giving a net present value of possible deficits of 26.8 billion. Finally, the intermediate scenario allows for 25.6 billion in deficits up to 2040, followed by 11.9 billion in surpluses (deficits of 14.8 billion in net present value terms).

Figure 10: Additional spending, CHF millions



Our analysis shows that in the long run, a reduction in the primary deficit, either through spending restraint or tax increases, will be necessary to stabilize the federal debt ratio. However, the size of this adjustment remains moderate even in the least favourable scenario. In addition, the time horizon for deficit reduction is sensitive to interest rates and can be significantly extended. Finally, the next 10 years show a favourable situation where the return to normal spending after the COVID years and the spread between the growth rate and the interest rate generate substantial margins.

A relevant observation is that if the margins over the next 10 years are substantial, they remain temporary and an adjustment will be necessary in the end. Should we not then take advantage of this to reduce the debt in order to be better prepared for the future? This observation is well taken, but considers that the only investment that can be made is a reduction in the debt. However, when interest rates are low, reducing debt is equivalent to investing with a low return. An alternative would be to set up an investment structure that could invest the money in a more attractive way. Tille (2020) discusses the implications of creating such an investment fund.

4.5. Consequences of an increase in the debt ratio

Our adjustment discussion below aims to keep the debt-to-GDP ratio at its 2025 value (14.3%). This is a very moderate value. What would be the consequence of accepting a higher value for this debt ratio?

We analyze this question in the context of our low interest rate scenario. Figure 11 shows the debt dynamics in the absence of adjustment (red line, corresponding to the red line in Figure 8), under a policy of keeping the debt-to-GDP ratio at the 2025 level as considered above (green line), and under an alternative policy allowing the debt to rise to 16% of GDP in 2040, before stabilizing. This level corresponds to that prevailing in 2010, and is therefore by no means exceptional in historical perspective.

Figure 11: Debt / GDP ratio, parameters of low rate scenario

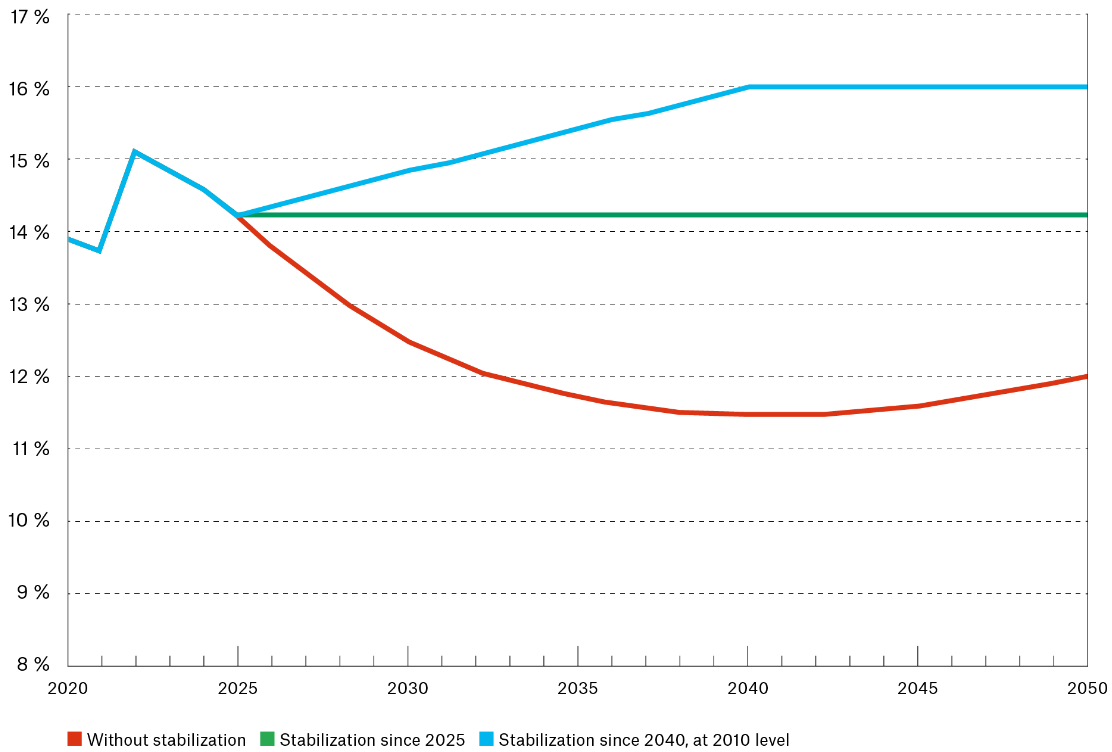
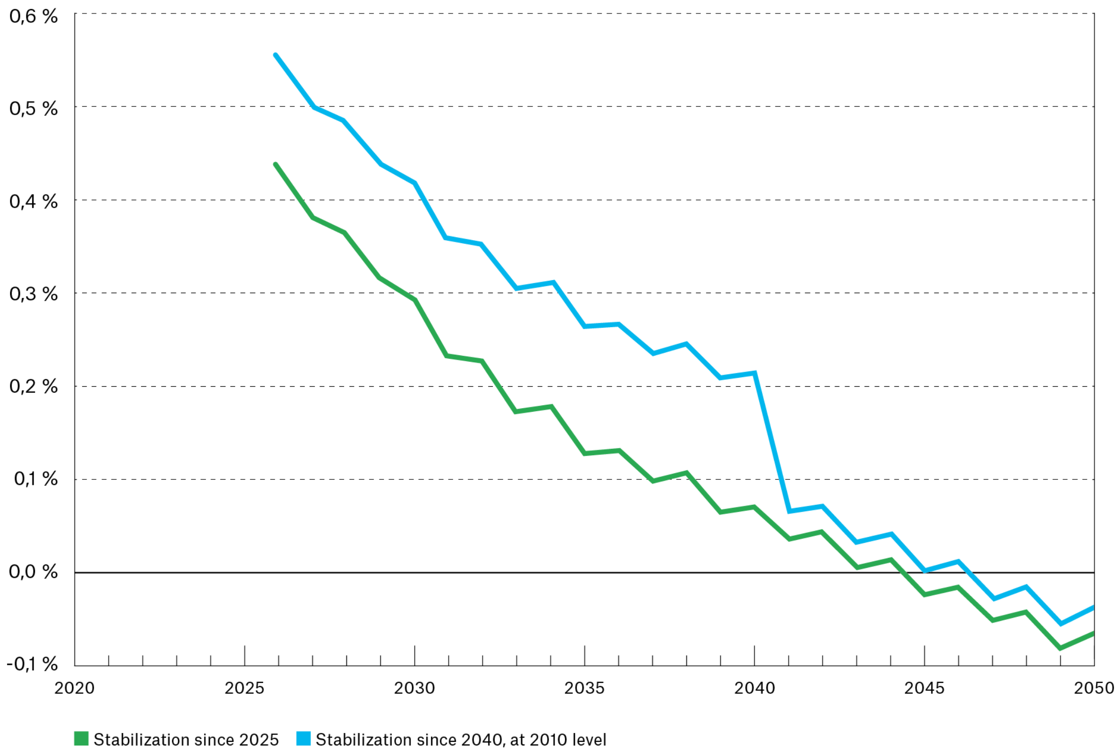


Figure 12 shows the change in the primary balance under the two stabilization scenarios. The green line corresponds to the low interest rate scenario (the red line in Figure 9).

We see that a policy to stabilize debt at a higher level significantly reduces the need for adjustment. A reduction in the deficit is only needed from 2046 onwards, and the additional surplus required in 2050 amounts to only 0.04% of GDP. But most importantly, the additional deficits possible in the first phase are substantial, amounting to 55.0 billion, followed by 2.0 billion in surpluses (net present value of deficits equal to 48.3 billion). A caveat to our analysis is the assumption that interest rates are not affected by the level at which the debt ratio is stabilized. This said, it is not clear that an increase of the debt ratio such as the one considered would substantially raise the interest rate. Furthermore, a moderate increase in interest rates would only negligibly reduce the margin freed up by accepting a higher debt ratio.

Figure 12: Additional spending, % GDP

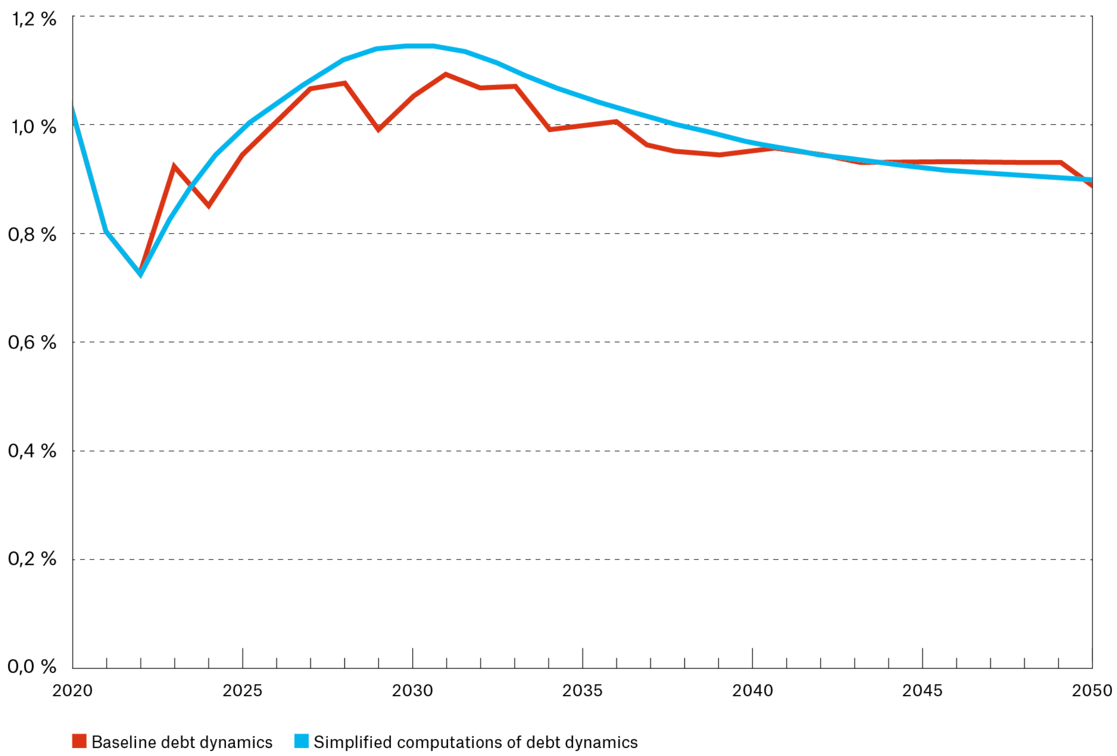


4.6. Alternative assumption regarding the debt repayment.

Our analysis distinguishes between the amounts of the outstanding bonds at the beginning of 2023 and the remaining debt. For the former, future payments of interest and principal are given. For the remaining debt, interest payments are calculated on the basis of short- and long-term rates, and we assume that 10% of the existing debt is repaid each year. Under a simpler alternative, the approach adopted for the second category of debt (excluding the original outstanding bonds) is also applied to the entire debt.

Figure 13 shows the effective interest rate depending on whether we use our approach (red line, corresponding to the red line in Figure 7) or the simplified approach (blue line). Both approaches give very similar results, with the interest rate being slightly higher under the simplified approach between 2024 and 2040. In terms of feasible deficits for the purposes of achieving a constant debt ratio (Figure 10), the simplified approach leads to a slightly lower value, with a present value of 26.1 billion (compared to 26.8 in our approach).

Figure 13: Effective interest rate, low interest scenario



5. Conclusion and avenues for future work

Our analysis shows that the outlook for the evolution of the Confederation's debt is sensitive to the parameters considered, and that further work to enrich the range of scenarios is useful.

While the implementation of the debt brake in Switzerland is not beyond criticism, including by the author of the present study, this mechanism forces the authorities to take a long-term view of public finances, which is eminently sound and commendable. The projections of FDF (2021) on which our analysis is based are part of this approach. They constitute a very useful contribution to the academic and public policy debate, for which the authors should be thanked.

Our exercise shows that the future level of interest rates plays an important role in the long-term outlook. Based on research into the structural level of interest rates, we consider scenarios with lower rates than those considered by FDF (2021). This alternative parameterization shows that the dynamics of the public debt are more favourable, and that the adjustment to the deficit that will ultimately have to be made is moderate and occurs over a longer time horizon. Our analysis also shows that the very favourable debt dynamics over the next 10 years provide substantial leeway for public finances. It should, of course, be borne in mind that this leeway remains temporary. We also show that stabilizing the debt at a higher level, albeit still moderate and within the historical norm, substantially increases the leeway.

One observation that could be made about our low interest rate scenario is that while it is based on estimates of the real interest rate from the scientific literature, these estimates entail a margin of uncertainty. If our scenario turns out to be too optimistic, then a more rapid adjustment of public finances would be required. Since the cost of an unfavourable error is not symmetrical with the gain from the same error in the opposite direction, i.e., we are risk averse, should we not consider a more pessimistic scenario than ours? This observation is fully relevant, and the intermediate scenario can be interpreted as reflecting this prudence. However, risk aversion does not imply that one should base oneself on the worst-case scenario. In that case, future surprises would certainly be only favourable, but a policy of strong prudence implies foregoing expenditures and the welfare they generate. In other words, prudence has an opportunity cost that should not be neglected.

In terms of future considerations, we can make three points. The first, which is simple but worth remembering, is that the analysis should not be conducted in terms of the absolute amount of debt, but instead in terms of its ratio to GDP. The second is that the debate would benefit from a more explicit objective for the long-term debt ratio. While the debt brake rightly aims at stabilization, there is almost no mention of the level at which the ratio should be stabilized. Economic analysis does not allow for a precise level to be defined, but it does provide some insights. In particular, while it is necessary to guard against a level of debt that is too high, the opposite is also true, because public debt is an asset with liquidity and security properties that give it a special role. It represents a form of infrastructure for the financial markets by offering a reference asset. No economic model indicates that a debt ratio tending to zero is a good idea. The choice of the long-term target for the debt ratio is largely a political one. An explicit discussion of this choice would be beneficial.

The final point is that the risk inherent in any projection needs to be better taken into account. Any long-term scenario is based on uncertain assumptions, and those considered in this study are no exception. An interesting approach would be to reinforce the assumptions on the core values of the variables used in the scenarios with assumptions on their volatility. This would make it possible to construct an estimate, not of a value for the debt ratio in 2050, but of the statistical distribution that it may take. This is the stochastic debt sustainability analysis approach proposed by Blanchard (2022a).

A final observation is that our analysis focuses on the outlook for the federal government. A similar exercise can be conducted for other public authorities, for which the long-term challenges are more pronounced, as shown by FDF (2021).

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7. Appendices

7.1. Debt dynamics

The government budget constraint during a period *t* indicates that the level of debt, in absolute value, at the end of period *t*, denoted $Debt_t$, is equal to the debt level at the beginning of the period, $Debt_{t-1}$, adjusted by the interest rate, r_t, plus the gap between expenditures, Exp_t, and receipts, Rec_t. This gap is called the primary deficit, $PD_t = Exp_t - Rec_t$.

$$Debt_t = (1 + r_t)Debt_{t-1} + PD_t$$

This dynamic relation can be expressed in terms of ratios to nominal GDP:

$$\frac{Debt_t}{GDP_t} = (1 + r_t)\frac{Debt_{t-1}}{GDP_{t-1}}\frac{GDP_{t-1}}{GDP_t} + \frac{PD_t}{GDP_t}$$

We denote the growth rate of GDP by $1 + g_t = GDP_t/GDP_{t-1}$, which enables us to express the dynamics of the debt-to-GDP ratio as follows:

$$\frac{Debt_t}{GDP_t} - \frac{Debt_{t-1}}{GDP_{t-1}} = \frac{r_t - g_t}{1 + g_t}\frac{Debt_{t-1}}{GDP_{t-1}} + \frac{PD_t}{GDP_t}$$

The debt-to-GDP ratio increases with the primary deficit, and with the gap between the interest rate and the economic growth rate. If $r_t > g_t$ a primary surplus ($PD_t < 0$) is needed to stabilize the debt ratio. In the opposite case ($r_t < g_t$), the ratio can be kept steady even with some primary deficit. Blanchard (2022a) shows that the case where $r_t < g_t$ is the most common in the United States. Tille (2020) shows that it is even more relevant for Switzerland.

A central element in the analysis of macroeconomic models is the intertemporal budget constraint, which combines the constraint of successive periods and expresses them in terms of net present value using a discount factor. For simplicity, we assume that the interest rate and the GDP growth rate are constant at r and g, respectively. We take a discount rate m, which represents the interest rate with which we calculate the net present value.

The budget constraint of period *t* is modified as follows:

$$\frac{Debt_t}{GDP_t} - \frac{Debt_{t-1}}{GDP_{t-1}} = \frac{r - m}{1 + g}\frac{Debt_{t-1}}{GDP_{t-1}} + \frac{m - g}{1 + g}\frac{Debt_{t-1}}{GDP_{t-1}} + \frac{PD_t}{GDP_t}$$

$$\frac{Debt_t}{GDP_t} = \frac{r - m}{1 + g}\frac{Debt_{t-1}}{GDP_{t-1}} + \frac{1 + m}{1 + g}\frac{Debt_{t-1}}{GDP_{t-1}} + \frac{PD_t}{GDP_t}$$

$$\frac{Debt_{t-1}}{GDP_{t-1}} = \frac{1 + g}{1 + m}\frac{m - r}{1 + g}\frac{Debt_{t-1}}{GDP_{t-1}} - \frac{1 + g}{1 + m}\frac{PD_t}{GDP_t} + \frac{1 + g}{1 + m}\frac{Debt_t}{GDP_t}$$

Iterating this relationship over successive periods leads to:

$$\frac{Debt_{t-1}}{GDP_{t-1}} = -\sum_{s=0}^{\infty}\left(\frac{1 + g}{1 + m}\right)^{s+1}\frac{PD_{t+s}}{GDP_{t+s}} + lim_{k\to\infty}\left(\frac{1 + g}{1 + m}\right)^{k+1}\frac{Debt_{t+k}}{GDP_{t+k}} + \sum_{s=0}^{\infty}\left(\frac{1 + g}{1 + m}\right)^{s+1}\frac{m - r}{1 + g}\frac{Debt_{t+s-1}}{GDP_{t+s-1}}$$

The first term is the present value of present and future primary surpluses ($-DP$). This is the usual conclusion that the initial debt must be offset by primary surpluses in the future. The second term is the present value of the debt at an infinite horizon. Economic analysis imposes the usual restriction known as the "transversality condition" that $lim_{k\to\infty}\left(\frac{1+g}{1+m}\right)^{k+1}\frac{Debt_{t+k}}{GDP_{t+k}}=0$. This implies that $m>g$, which is the case when m is the interest rate available to private agents (households and firms), which may be different from the rate r on government bonds. The last term represents the revenue that the government obtains from its ability to borrow at a lower interest rate than private agents, $m>r$. Reis (2022) denotes this term as "debt revenue".

In the usual case where $m=r>g$, the last term is zero and the debt must be offset by future surpluses. When $m>r$, the government has an additional source of financing. This source is conceptually identical to seigniorage in a monetary model, with the government's monopoly on money issuance providing a source of financing (money corresponds to debt with $r=0$). The ability to call on this source of financing is of course constrained by the public demand for money or public debt.

7.2. Updated data

The analysis in FDF (2021) includes expenditures (total, interest and non-interest) and revenues, resulting in the total deficit of the Confederation's finances. The data in FDF (2021) are updated as follows.

Nominal and real GDP

- Figures for 2019 to 2021 are taken from Seco.[21]
- The figures for 2022 to 2024 use the growth rates from the Seco forecast of December 2022.[22]
- From 2025 onwards, the figures use the growth rates from FDF (2021).

Inflation from the consumer price index.

- The figures for 2019 to 2022 are taken from the Federal Statistical Office.[23]
- The value of inflation in 2023 is taken from the SNB's published expectations for the year ahead (3%)[24]
- The value for 2026 is also taken from the SNB indicators (1.7%),[25] as is the value for 2032 (1%).[26]
- Between 2023, 2026 and 2032 the values are interpolated. After 2032, the long-term value (1%) is taken into account.

[21] https://www.seco.admin.ch/seco/fr/home/wirtschaftslage---wirtschaftspolitik/Wirtschaftslage/bip-quartalsschaetzungen-/daten.html
[22] https://www.seco.admin.ch/seco/fr/home/wirtschaftslage---wirtschaftspolitik/Wirtschaftslage/konjunkturprognosen.html
[23] https://www.bfs.admin.ch/bfs/fr/home/statistiques/prix.assetdetail.23925503.html
[24] https://www.snb.ch/en/iabout/pub/oecpub/quartbul/id/pub_oecpub_quartbul Chart 4.7, see also https://data.snb.ch/en/topics/snb/cube/snbkosiq 12 months maturity.
[25] https://www.snb.ch/en/iabout/pub/oecpub/quartbul/id/pub_oecpub_quartbul Chart 4.8, see also https://data.snb.ch/en/topics/snb/cube/snbkosiq 3-5 years maturity.
[26] https://www.snb.ch/en/iabout/pub/oecpub/quartbul/id/pub_oecpub_quartbul Chart 4.8, 10 years maturity.

Interest rate

- The 3-month money market yield for 2020-2022 is taken from SNB statistics.[27]
- The yield on 10-year Swiss government bonds for 2020-2022 is taken from SNB statistics.[28]
- The values for the following years are analyzed in the different scenarios in the text.

Receipts, non-interest expenditures, and debt of the Confederation.

- Receipts and expenditures for 2019 through 2021 are taken from the SF tables.[29] Total receipts are from the "einnahmen" sheet (line 8), and total and interest expenditures from the "ausgaben" sheet (lines 8 and 33), with the difference giving non-interest expenditures.
- Total receipts and expenditures for 2022 are taken from the SF forecasts,[30] which do not separately indicate interest expenditures. These are taken for the 2023 budget for the years 2022 and 2023.[31]
- From 2025 onwards, the ratio of receipts and non-interest expenditure to GDP is that of the FDF (2021). Between 2022 and 2025 these ratios to GDP are interpolated, and the absolute figures calculated accordingly.
- Gross debt for 2019 to 2021, as well as the forecast for 2022, are taken from the GFS table ("gfs" column AY).[32] An adjustment factor is applied until 2022 so that the change in debt matches the fiscal deficit.
- The effective interest rate on debt from 2019 to 2022 is computed based on the new data.
- As from 2023, the interest expense, debt, and effective interest rate are computed according to the different scenarios in the text.

7.3. Computation of the effective interest rate

The interest rate paid by the Confederation combines long-term (10 years) and short-term (3 months) rates. The FDF (2021) analysis proceeds in two steps. It first uses projections of debt issuance and repayment up to 2030. For later years, it computes an effective rate on the debt by considering that one-tenth of the debt is paid back each year and that 25% of the new debt issuance is short-term. The data from FDF (2021) give the short- and long-term interest rates, as well as the effective interest rate, but does not include the detailed computations linking these variables.

[27] https://data.snb.ch/en/topics/ziredev/cube/zimoma
[28] https://data.snb.ch/en/topics/ziredev/cube/rendoblim
[29] https://www.efv.admin.ch/efv/fr/home/themen/finanzstatistik/daten.html with the detailed table at https://app.efv.admin.ch/finanzstatistik/f/fs_bund/bund.xlsx
[30] https://www.efv.admin.ch/dam/efv/de/dokumente/finanzstatistik/daten/main_extern.xlsx.download.xlsx/main_extern.xlsx
[31] https://www.efv.admin.ch/dam/efv/fr/dokumente/Finanzberichte/finanzberichte/va_iafp/2023/va-1.pdf.download.pdf/VA1-f.pdf , table on page 80.
[32] https://app.efv.admin.ch/finanzstatistik/f/gfs_jahr/bund.xlsx

We construct our own estimate of the effective rate based on the elements provided in FDF (2021), as well as data on outstanding liabilities in the form of bonds at the beginning of our sample (outstanding amount, calendar of payments of principal and interest). This appendix presents our approach and contrasts the results with those of FDF (2021), relying on the data from FDF (2021) instead of the updated data.

At the end of 2020, total debt amounted to CHF 101,155 million. This amount included CHF 61,137 million in outstanding bonds ("initial commitments") on which an interest payment of CHF 1,264 million was expected in 2021 (2.07%), as well as a repayment of CHF 4,088 million. In 2021, the FDF (2021) study indicates a total interest payment of 708 million. We infer that the balance of the debt excluding bond commitments (40,018 million) had an interest amount of -557 million in 2021, i.e., a negative interest rate of -1.39%.

Debt at end-2020 and associated flows in 2021 (million francs)
(c) indicates a computed figure

	Debt end-2020	Flow 2021		
		Interest	Rate (%)	Repayment
Total	101’155	708	(c) 0.70	
Initial commitments	61’137	1’264	2.07	4’088
Other	40’018	(c) -557	(c) -1.39	

We now turn to the year 2021. The initial debt and associated interest flows are taken from the table at the end of 2020. The second step is to calculate the financing requirement for the issuance of new debt. As mentioned above, an amount of 4'088 million of initial commitment is repaid. We assume that 10% of the remaining debt is also repaid, i.e., 4'002 million, for a total repayment of 8'090 million. With a primary deficit of 21,409 million and interest payments of 708 million, this gives a debt issuance of 30,207 million. A quarter of this amount is issued on a short-term basis, at a rate of -0.70%, the rest on a long-term basis, at a rate of -0.20%.

The final step is to compute the effective interest rates for the year 2022. At the end of 2021, the debt is made up of the balance of the initial commitments at the end of 2020 (61,137 - 4,088 = 57,059 million), the balance of the other debt components at the end of 2020 (40,018 - 4,002 = 36,016 million, at a rate of -1.39%), the short-term issues of 2021 (7,552 million, at -0.70%) and the long-term issues (22,655 million at -0.20%) for a total of 123,272 million.

The data on initial commitments show an interest payment in 2022 of 1,183 million. To this we add payments on the other three categories (calculated on the basis of rates and amounts) for -599 million. This gives a total interest payment of 583 million in 2022, or an effective rate of 0.47%. The payment on debt other than the initial commitments is -599 million, or -0.91%.

Year 2021 (million francs)				
Initial debt		Amount	Rate (%)	Interest
	Total	101’155	0.70	708
	Initial commitments	61’137	2.07	1’264
	Other	40’018	-1.39	-557
Financing		Amount	Rate (%)	
Principal payment	Total	8’090		
	Initial commitments	4’088		
	Other (10%)	4’002		
Primary deficit		21’409		
Interest		708		
Total		30’207		
o.w. short term		7’552	-0.70	
o.w. long term		22’655	-0.20	
Final debt		Amount	Rate (%)	Interest
	Total	123’272	0.47	583
	Initial commitments	57’049	2.07	1’183
	Other (pre-2021)	36’016	-1.39	-501
	Issuance 2021 s.t.	7’552	-0.70	-53
	Issuance 2021 l.t.	22’655	-0.20	-45
	Other + issuance	66’223	-0.91	-599

We proceed similarly for the year 2022. The initial debt and associated interest flows are taken from the final part of the table for 2021.

Year 2022 (million francs)				
Initial debt		Amount	Rate (%)	Interest
	Total	123’272	0.47	583
	Initial commitments	57’049	2.07	1’183
	Other	66’223	-0.91	-559
Financing		Amount	Rate (%)	
Principal payment	Total	10’146		
	Initial commitments	3’523		
	Other (10%)	6’622		
Primary deficit		-1’617		
Interest		583		
Total		9’112		
o.w. short term		2’278	-0.70	
o.w. long term		6’834	-0.10	
Final debt		Amount	Rate (%)	Interest
	Total	122’238	0.45	550
	Initial commitments	53’525	2.08	1’112
	Other (pre-2022)	59’601	-0.91	-539
	Issuance 2022 s.t.	3’523	-0.70	-16
	Issuance 2022 l.t.	6’622	-0.10	-7
	Other + issuance	68’713	-0.82	-562

We then calculate the financing requirement by issuing new debt. The data shows an amount of 3,523 million as repayment of the initial commitments. We assume that 10% of the remaining debt is also repaid, i.e., 6,622 million, for a total repayment of 10,146 million. With a primary surplus of 1,617 million and interest payments of 583 million, this gives a debt issuance of 9,112 million. A quarter of this amount is issued on a short-term basis, at a rate of -0.70%, and the rest on a long-term basis, at a rate of -0.10%.

We finally calculate the effective interest rates for the year 2023. At the end of 2022, the debt consists of the balance of the initial commitments at the end of 2020 (57,059 - 3,523 = 53,525 million), the balance of the other debt components at the end of 2021 (66,223 - 6,622 = 59,601 million, at a rate of -0.91%), the short-term issuance of 2022 (2,278 million, at -0.70%) and the long-term issuance of 2022 (6,834 million, at -0.10%) for a total of 122,238 million.

The data on initial commitments show an interest payment in 2023 of 1'112 million. To this we add payments on the other three categories (calculated on the basis of rates and amounts) for -562 million. This gives a total interest payment of 550 million in 2023, or an effective rate of 0.45%. The payment on debt other than the original commitments is -662 million, or -082%.

These computations are repeated from year to year, based on the primary deficit, the data on the principal and interest payments on initial commitments (end-2020), and the interest rates on new short- and long-term issues. Figure 14 shows our estimate of the effective interest rate (red line), along with the effective rate from FDF (2021, blue line). While the two lines do not coincide exactly, the difference is still small, due to our simpler estimate. This difference in interest rates produces debt interest payment dynamics that differ very slightly from those of FDF (2021). We also consider the effective rate based on a simpler estimation method (green line), which disregards the data on initial commitments (this is equivalent to setting all initial commitment-related amounts to zero in the tables above). This simplified method also produces estimates close to FDF (2021), although less so than our method during the first ten years.

Figure 14: Interest rate on Confederation debt