The Coalition of Finance Ministers for Climate Action

Modeling the fiscal impacts of the net zero target within fiscal sustainability analysis

Switzerland—Federal Department of Finance

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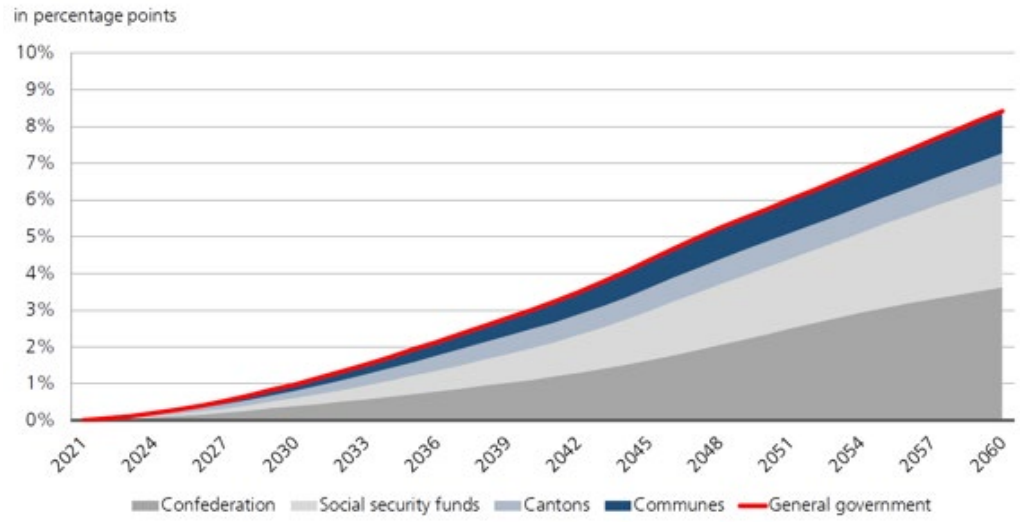
Overview

Climate change is one of the major long-term structural challenges facing Switzerland in the coming decades. The transition to net zero emissions by 2050, to which Switzerland is legally committed, will not be possible without strengthening climate policy instruments. The decarbonization process will have significant implications on the economy and on public finances. To inform and substantiate the economic policy discussion around the transition to net zero emissions, the 2024 Fiscal Sustainability Report published by the Swiss Federal Department of Finance uses a model-based pilot study to analyze the long-term impact of achieving the net zero target on public finances.

Climate mitigation measures will increase pressure on public finances

The pilot study builds on sectoral energy system models (ESMs) and a computable general equilibrium (CGE) model. According to the projection analysis, climate mitigation measures will likely slow down economic growth (GDP, consumption, and wages), increasing pressure on public finances, especially on the revenue side. Both direct and indirect effects play a role, with the latter dominating the fiscal effects. Direct effects include, for example, an increase in the tax on CO_2, which generates higher revenues in the short to medium term but lower revenues when the volume of CO_2 emissions decreases over time. Indirect effects occur through the impact of climate mitigation measures on macroeconomic outcomes, such as less growth in GDP, consumption, and wages, which in turn affect public revenue growth, including income taxes, profit taxes, and VAT. Under the assumption that fiscal rules are not binding, climate mitigation measures are projected to increase public debt over the next decades relative to a business-as-usual scenario. The Federal Government and the social security funds would be most exposed to the costs of climate mitigation measures (see Figure 1).

Figure 1. The impact of climate mitigation on the debt ratio relative to a business-as-usual scenario (as a % of GDP)



Source: FDF (2024) based on Ecoplan (2024)

The choice of climate policy instruments matters

The projections show that from a fiscal perspective, the path to net zero emissions can be reached most efficiently with carbon pricing and emissions standards (i.e., regulation). The analysis also shows the considerable loss of revenue from mineral oil tax due to the gradual electrification of the transportation sector and the need to introduce replacement levies on electric vehicles to mitigate some of the adverse effects on public finances. Conversely, extending green subsidies will likely put additional pressure on public finances. Overall, achieving the net zero target will affect the composition of public finances and require the careful management and monitoring of these

composition changes to reconcile the climate policies needed to reach the net zero target with sound and sustainable fiscal policies as well as economic growth opportunities.

Uncertainty about the long-term impacts of climate policy

Economic and fiscal impacts of climate policy are highly uncertain and depend on numerous factors and interactions within the economic system, many of which cannot be modeled precisely. For example, opportunities stemming from a comparative advantage in producing and exporting innovative green products are not included in the Swiss pilot study due to the high degree of uncertainty in international market developments. These aspects could be taken into account by formulating appropriate assumptions on potential future developments, which could significantly alter the model's results. If Swiss firms are assumed to secure a comparative advantage in these areas, the economic and fiscal impacts could be more positive than the Federal Department of Finance's estimates suggest. Conversely, if they lose market share and become more dependent on foreign imports, the impact could be more negative. The high degree of uncertainty and modeling limitations should be kept in mind when interpreting medium- to long-term analyses in this field.

More work is needed to assess the costs of climate change and adaptation measures

The costs of climate change itself and of adaptation measures could not be included in the analysis due to high uncertainty, as well as a lack of data and appropriate models. The Federal Department of Finance is monitoring progress in these areas to assess whether they could be included in future analyses. This would make it possible to additionally evaluate the benefits of climate policy in terms of avoided climate damage, which international studies argue to be much higher than its costs.

Communication

The pilot study is an integral part of the 2024 Swiss Fiscal Sustainability Report, published by the Federal Department of Finance. The flagship report was launched at a media event and sparked substantial interest from the media, academia, public authorities at different levels of government, and interest groups. The pilot study has attracted considerable interest from other countries and international organizations. The results have been presented at the national level in different formats, in bilateral expert meetings between MoFs as well as in international meetings. A summary of the report was also included in the financial legislature plan of the Government for the newly elected Parliament and in the form of short articles in economic policy journals in order to objectify the debate around climate mitigation.

Use in practice

To begin the analytical work of integrating climate into financial planning, three elements were key to the Swiss Federal Department of Finance.

Qualitative assessment of climate impacts as a good starting point: Understanding the channels and potential impacts of climate change and mitigation on the outcomes of interest is essential before embarking on a quantitative assessment of their economic and fiscal implications. In this context, the Federal Department of Finance dedicated a chapter of its 2021 Fiscal Sustainability Report to a qualitative evaluation of the costs of climate change in Switzerland, building on cooperation with the OECD (Baur et al., 2021, Brändle, 2021). In addition, engaging in dialogue with other countries is important, as their respective experiences can help focus the Department's own pilot work efforts.

Check resources, analytical capacities, and data availability: There are three important steps to consider when starting the modeling exercise. First, a review of the available internal resources, including for medium-term planning to carry out a pilot project. Based on the Swiss experience, MoFs should plan for a project duration of at least two or three years. Second, it should be determined whether the necessary modeling resources are available in-house or whether the modeling should be outsourced. Outsourcing modeling efforts to consulting firms or academic institutions can be a

practical solution in a first step. The Swiss Federal Department of Finance opted for an outsourcing solution, using the consulting firm Ecoplan, while closely monitoring and advising on the progress of the pilot study. Ecoplan was chosen for two reasons. First, they developed one of the few CGE models representing the Swiss economy. Second, they had in the past used this model (among others) to assess the economic cost of the climate and energy strategy for the Department of Environment, Transport, Energy and Communication (Energy Perspectives 2050+). However, it is also important to gradually build up in-house knowledge to improve climate impact assessments relating the economy and public finances to major changes in the climate and energy policy environment. Third, it is critical to inquire with the Ministries of the Environment and Energy about the availability and accessibility of various detailed emission and energy data sources. Access to comprehensive and accurate data is fundamental to any modeling effort. These steps should be taken in parallel rather than sequentially.

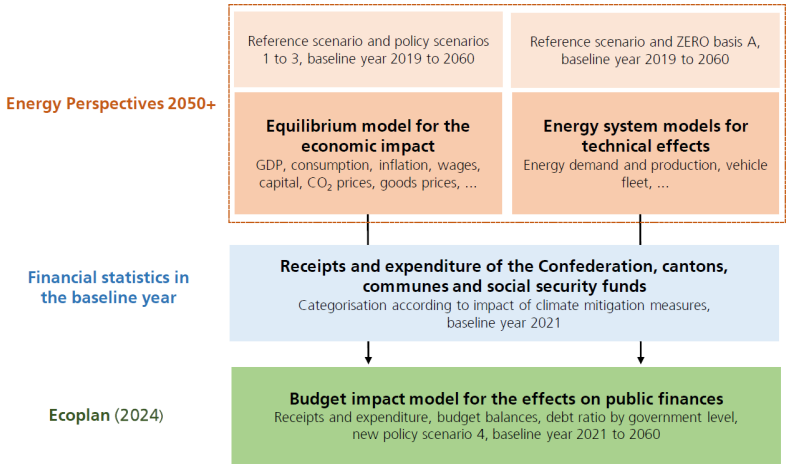
Choice of models: The pilot study builds on the results of technical sectoral ESMs and a CGE model used for the Energy Perspectives 2050+ strategy of the Swiss Federal Office of the Energy. These models analyze the impact of the transition to net zero emissions on the energy system and its (macro)economic consequences. They use policy scenarios in which carbon neutrality is assumed to be achieved by 2050 through an increase in carbon pricing, stricter emissions standards on buildings and vehicles, and an increase in subsidies to households on firms.

ESMs provide a detailed representation of energy supply, demand, and infrastructure, capturing technical and physical aspects of energy systems. They allow in-depth analysis within sectors (e.g., electricity, transportation, industry), which requires accurate and detailed data on the energy system, usually provided by the Ministry of the Environment and Energy, and involves intricate interactions between different system components. The complexity and level of detail of these models can lead to computational challenges.

The CGE model assesses the economic impact of the energy transition, incorporating market clearing mechanisms that ensure consistency between supply and demand toward a macroeconomic equilibrium. The model aggregates economic sectors, but may lack granularity in the energy sector. Therefore, it has been soft-linked to the sectoral results of the ESM. Both models rely on assumptions about the evolution of the energy system as well as about macroeconomic development, technological change, and policy effectiveness.

Based on the results from the ESM and CGE models, the Federal Department of Finance developed a budget-impact model to assess the implications of climate mitigation measures on public finances (see Figure 2). This was done by capturing both the direct and indirect effects of measures for different levels of Government, including the Confederation, cantons, and municipalities, and social security funds from 2021 to 2060.

Figure 2. Overview of the processing steps for the budget impact model



Source: FDF (2024) based on Ecoplan (2024)

Lessons and challenges

Climate policy analysis is an interdisciplinary field

Assessing the fiscal impact of climate change requires interdisciplinary expertise and relies on multiple data sources. Decarbonization scenarios, typically provided by the Ministries of the Environment and Energy, necessitate an understanding of where emissions occur and how they respond to policies. The Ministry of Economic Affairs often produces macroeconomic forecasts, while knowledge of public finances is the domain of the Ministry of Finance.

Modeling should balance detail and pragmatism

It is critical for model assumptions on policy measures and the economic and fiscal environment to strike a balance between detail and pragmatism. MoFs should recognize the key areas and issues the model should address and focus on them. The choice of policy scenarios should be deliberate in order to inform the climate policy discussion. Excessive detail can complicate the model, yielding only marginal information gains. The long-term economic and fiscal impacts of climate policy are highly uncertain and depend on numerous factors and interactions within the economic system, many of which cannot be modeled precisely. The high degree of uncertainty should be kept in mind when interpreting analyses in this field. Indeed, modeling should focus more on insights than on numbers.

In the end, politics will decide climate policies

Model-based analysis helps to inform and objectify the policy debate. However, this does not guarantee the proposed or most efficient climate policy will be implemented. For example, although carbon pricing is shown to be more efficient and less costly for achieving the net zero target than subsidies, there are no plans to increase the CO_2 tax in Switzerland, while subsidy programs have become more popular. These trends and uncertainties highlight the need to include different policy scenarios in the analysis.

Conclusions

The Federal Department of Finance considers sound and sustainable fiscal policies key. One element is a financial planning that goes beyond the annual budget perspective and includes identifying and assessing medium- to long-term challenges, such as climate change. A model-based analysis of the fiscal costs of climate mitigation measures was included for the first time in the 2024 Fiscal Sustainability Report. A critical next step is to also analyze the fiscal implications of climate change and adaptation measures. This would allow an assessment of the benefits of climate action in terms of avoided climate damage, guiding policymakers in developing efficient climate policies to achieve the net zero target, and objectifying the policy discussion around climate action.

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